Gadbjerg and Givskud revisited - changes in agricultural structure in two parishes in central Jutland between 1973 and 1997

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Abstract

The agricultural sector in Denmark has experienced drastic structural changes since World War 2 which have reduced the number of farms from 200.000 in 1960 to 63.000 in 1997. This article analyses the changes in agricultural structure at a local scale, comparing key farm parameters for farmers in Gadbjerg and Givskud parishes in central Jutland in 1973 and 1997. It was found that the proportion of full-time farmers has declined from 77 % to 41%, and that the dominant farm type changed from farm with mixed animal production to farms without animals. It is concluded that the drive towards a bi-polarization of the farming community into large full-time farms and small hobby farms which is a common development in Denmark for the period was more pronounced in Gadbjerg and Givskud parishes. Farmers have followed different pathways of development to adapt to the variable farming conditions, with the adoption of part-time farming being a very common practise.

Keywords

Agricultural development, structural adjustment, farm types, agricultural land use, land tenure, labour use, pathways of development, transition matrix.

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Geografisk Tidsskrift, Danish Journal of Geography 99, 69-80, 1999

After World War 2, the agricultural sector in Denmark followed a development path which has been similar to many other industrialized countries. A period of rapid modernization radically transformed the agricultural sector through a process which consisted of three main elements: 1) the intensification of production through the increased use of agro-chemical inputs and the mechanisation of farm activities, 2) the concentration of production on fewer and larger farms and 3) the specialization of production, limiting the production on each farm and region to one or a few production lines, to profit from economics of scale. This development has been documented for a number of western countries (Whatmore 1995; Bowler & Ilbery 1997a; Bowler & Ilbery 1997b; Ilbery & Bowler 1998), and has also been described in a Danish context (Jensen 1984; Reenberg 1984; Jensen & Reenberg 1986; Pinto-Correia & Sørensen 1995). The modernization of agriculture is commonly linked to the so-called productivist phase of change between 1950 and the mid-1980s, where the emphasis was placed on increasing farm output and securing a stable and cheap food supply (Buller 1998). This development was supported by agricultural policies at the national and international level (in particular the EEC/EU agricultural policy) as well as other factors influencing the agricultural sector (Wiborg & Rasmussen 1997). The term "technological treadmill" is employed to describe another driving force behind this development (Munton, Whatmore, & Marsden 1989). This term covers the development since 1950, in which the price of agricultural products has been falling and producers have been forced to lower their production costs faster than the decline of prices in order to maintain a profitable business. Farmers in western Europe largely achieved this by employing new production techniques and applying increasing amounts of industrial inputs to continually raise productivity or cease full-time farming.

This phase has been followed by the present phase, called the post-productivist transition which is no longer primarily concerned with increasing production but instead attempts to integrate agriculture within broader rural economic and environmental objectives (Ilbery & Bowler 1998). The second phase of agricultural change is symbolized by the EU Common Agricultural Policy (CAP)

reform of 1992, when EU support to farmers was redirected from price support mechanisms to area-based subvention (Bowler & Ilbery 1997b). Another important characteristic of the post-productivist transition phase is the rising awareness of the negative impact of modern intensive agriculture on environment and nature (Whatmore 1993). This concern has urged policy makers to integrate environmental measures into new agricultural legislation and as a result, the CAP reform in 1992 introduced schemes which reward farmers who employ more environmental friendly farming methods under the 2078/92 EU directive.

It is important to highlight the fact that the shift in objectives between the two phases of change did not mean the demise of productivist farm systems, but that the two "diverging pathways coexist" (Ilbery & Bowler 1998). These authors thus propose that: "intensive, high input/high output farming, with an emphasis on food quantity, is still being encouraged. This is now being complemented by the development of low input/low output farming, with an emphasis on sustainable farming systems and food quality" (Ilbery & Bowler, 1998, p.57). The result of this development is expected to be a very diverse farming sector, with large regional variations in farm types and farming systems, as some farmers continue with the traditional, productionist-style farm production while others follow new pathways of farm development, including the diversification of farm production into new sources of income either on or off the farm.

The purpose of this article is twofold. Firstly, to study the changes in agricultural structure in Gadbjerg and Givskud parishes between 1973 and 1997 in light of the forces of change outlined above. These changes will be related to changes in land tenure pattern and agricultural land use in the two parishes, to illustrate some of the spatial consequences of the structural adjustment. Secondly, this analysis serves as a platform to evaluate how the combined effects of the two phases of agricultural change has transformed the agricultural sector in the study area. This is done through a more detailed description of farmers individual responses to the productivist and post-productivist transition phases represented by the pathways of development followed by farms in Gadbjerg and Givskud parishes.

Methodology

Information about the agricultural sector in Gadbjerg and Givskud parishes in 1973 was collected as part of a survey undertaken in 1973 concerning land use and socio-economic conditions of different farm types (Jensen, 1977).

Data about agricultural activities in 1997 was collected from two main sources: 1) information from "Generelle Landbrugs Register" (Integrated Administration and Control System: IACS) which contains information about land use for all farms which apply for EU agricultural subsidies (Koushede 1996).

2) Additional information concerning household and farm type was collected in June 1997 using a questionnaire survey incorporating all land owners in the parishes. A 2 ha minimum size of the agricultural holding was chosen because it is the minimum size for properties to be legally required to cultivate land and it was also used as a parameter to identify farms in the 1973 survey. This selection criteria also excluded farmers who had rented out most of their land and were left with less than 2 ha of cultivated land. Furthermore, all farmers receiving pensions were excluded from the analysis, as they have a particular status (e.g. having a stable income from pensions and being at the end of their farming career). This makes it difficult to compare their farming behaviour to that of other farmers. A total of 230 farms participated in the 1973 survey and 135 in 1997.

In the following analyses, full-time farms are defined as farms where the owner has no other occupation besides farming. Owners of part-time farms supplement farm income with income from off-farm employment, while owners of hobby farms generally work very little on the farm and the objective of farming is more recreational than production-oriented. This definition was chosen because of the similar definition that was used in the 1973 survey, and it therefore allows a comparison of the farm types found in Gadbjerg and Givskud in the two periods. The classification was primarily done by the farmers themselves. While the identification of full-time farms is relatively straightforward, it is more difficult to establish a common definition of part-time and hobby farms, as both farm types derive a significant portion of their income from off-farm work. It is often a subjective interpretation by the farmers which determined whether their farms are considered as part-time or hobby farms. A classification based only on economic parameters (percentage of income derived from different sources or time spent on farm activities) would have resulted in a much larger group of farms being categorized as hobby farms instead of part-time farms while

the number of full-time farms would have remained unchanged.

Presentation of the study area

The two parishes are located in Give municipality in central Jutland, in a transition zone between the main stationary line of the last glaciation period and the outwash plain in front of the moraine deposits. This location has produced a dynamic physical environment, with large variability in soil types, alternating between coarse sandy and more loamy soils over small distances and even within a field (Madsen 1979). Comparing the two parishes from a biophysical perspective, Gadbjerg must be considered as the more favourable. This is mainly due to the higher prevalence of loamy soils. Each parish measures approximately 3500 ha.

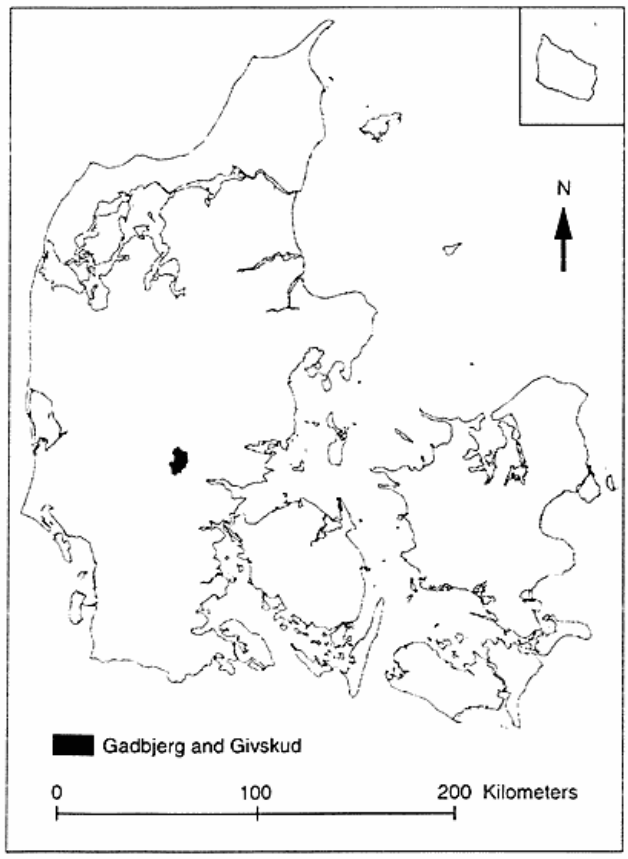

Figure 1: Location of Gadbjerg and Givskud.

Changes in agricultural structure between 1973 and 1997

The changes in agricultural structure in the study area has been analysed by comparing key agricultural parameters for the farms included in the surveys of 1973 and 1997. The data thus represents two "snapshots"in time, and provides a picture of the farming situation at those moments. Variations which have occurred between these two points in time are difficult to detect in this manner and makes it difficult to trace the influence of driving forces of agricultural change at a detailed level and to estimate the relative influence that they have exerted in Gadbjerg and Givskud during this period. However, it does provide an opportunity to see the influence of the sum of changes which occurred between the two points in time. The limitation imposed by the snapshot approach has been partly overcome by collecting information about changes in key farm parameters (area cultivated, livestock numbers, investments) since 1987 in the 1997 survey. Twenty percent of the farms in the 1997 survey were owned and managed by the same person in both 1973 and 1997. It follows that the changes in farm structure which are analysed in this survey in general cannot be related directly to the decision making of the present farmer, since a majority of them only took over the farm after 1973.

Number and size of farms

A significant characteristic of the changes in the agricultural sector during the past two decades has been the reduction in the number of farms. Between 1973 and 1997 the number of farms in Denmark has been reduced by 53 % from 133.000 to 63.000. At the same time, there has been a bi-polarization of the remaining farms into either small farms, which are mainly part-time or hobby farms or a second group of large full-time farms.

The change in the number and size of farms is also reflected in Gadbjerg and Givskud, which experienced a reduction in the number of farms during the last two decades from 230 to 135 farms (see Table 1, next page). This reduction of 41% is most noticeable in the category of medium-sized farms (10 to 50 ha) which constitutes 51% of the total number of farms in 1997 compared to 77% in 1973.

The dominant class of medium-sized farms in 1973 was significantly larger than the national average of 62% (see Table 2). This deviation was explained by Jensen and

production type	farm type	1973	1997	1973	1997	1973	1997	1973	1997	1973	1997	1973	1997
		0-10 ha		10-20 ha		20-50 ha		50-100 ha		> 100 ha		total	total
mixed farming	full-time	4	0	21	0	29	1	3	0	0	1	57	2
	part-time	3	0	6	1	5	1	0	0	0	0	15	1
	hobby farm	0	0	1	1	0	0	0	0	0	0	1	1
cattle	full-time	1	1	2	4	2	5	0	12	0	2	6	24
	part-time	0	0	0	0	0	1	0	1	0	1	1	3
	hobby farm	2	4	1	4	0	2	0	0	0	0	3	10
pigs	full-time	1	1	3	1	0	3	0	6	0	1	4	12
	part-time	2	0	1	1	0	1	0	1	0	0	3	3
	hobby farm	1	1	0	0	0	0	0	0	0	0	1	1
no animals	full-time	2	1	2	1	0	1	0	0	0	0	4	3
	part-time	0	3	0	4	0	4	0	0	0	0	1	12
	hobby farm	2	16	2	7	0	6	0	0	0	0	3	28
percent of all farms		18	26	40	24	37	27	4	19	0	4	100	100
number of farms		42	35	92	32	86	36	9	26	1	6	230	135

Table 1: Farm size, type and production in Gadbjerg and Givskud (values in percent).

farm size (ha)	1973		1997	
	study area	Denmark	study area	Denmark
0-10	18	31	26	20
10-20	40	29	24	21
20-50	37	33	27	31
50-100	4	6	19	19
>100	0	1	4	9
total (percent)	100	100	100	100
total (number)	230	133000	135	63000

Table 2: Distribution of farms in farm size classes (values in percent).

Jensen (1978) as a response to the rather poor agricultural potential. These conditions have historically necessitated a considerable minimum size of an agricultural holding in order to guarantee a livelihood from farming. Furthermore, the poor agricultural potential had not motivated the creation of large estates which are generally found in more fertile areas and instead the class of medium-sized farms had become dominant. The reduction in the number of farms in this size category between 1973 and 1997 has been compensated by the remaining farms becoming larger, so that 23% of the farms exceed 50 ha in 1997. This figure is very high compared with the situation in 1973 when only 4% were found in this size class. However, this development is not unique to this area, as the proportion of large farms on a national scale has followed a similar increase in this period. The proportions of medium sized and large farms in 1997 are comparable to the national averages of 52% and 28% respectively (Danmarks Statistik 1998). However, it appears as if the proportion of small farms (less than 10 ha) is higher in the study area. This difference is most likely caused by the high proportion of part-time and hobby farms, which are typically small farms (23% of all farms are part-time or hobby farms less than 10 ha). The difference in sampling technique must also be kept in mind, as the national agricultural statistics excludes farms measuring less than 5 ha after 1983, while all farms measuring more than 2 ha were included in the two surveys in the study area. It is therefore uncertain if this difference is significant.

Table 3 describes the changes in farm size of the individual farms in Gadbjerg and Givskud since 1987, as reported by farmers in the 1997 survey. Only farms which had the same owner since 1987 have been included in this analysis, limiting the number of farms to 80 out of the 135 farms. The overall trend is one of stability, with half of the farms not having changed size. Further calculations allow for a more detailed analysis of the differences between farm types. They indicate that 54% of all full-time farms have increased in size (corresponding to 81% of all farms which have increased in size). The survey in 1997 also revealed that most of the farms have increased in size through the purchasing of land, and only 13% by only renting land. At the other extreme, 25% of the hobby farms had reduced their area (corresponding to 71% of all farms which have decreased in size). Hobby farms which have

farm type	full-time	part-time	hobby	all farms
stable	38	76	50	50
increase	54	18	8	32
decrease	8	6	42	18
total	100 (n=39)	100 (n=17)	100 (n=24)	100 (n=80)

Table 3: Changes in farm size since 1987 in Gadbjerg and Givskud (values in percent).

increased in size have often done so by terminating rental agreements, which consequently returned land to the property.

It can be concluded, that a bi-polarization of the farming sector into large full-time farms and small hobby farms appears to characterize the development in the study area. The higher proportion of smaller farms seems to be different from the general pattern found on a national level.

Production type

Since the first decades of the 20th century the Danish farming sector had been characterized by farms with mixed production lines, including livestock (pig and cattle husbandry) and crop production, both for fodder and sale (Jensen & Reenberg 1980). This farming system allowed for the use of different resources and relied on a high degree of recycling of nutrients between the different production systems and locations on the farms. Towards the middle of the 20th century, the close relationship between fodder resources in the form of grazing and fodder crops in the arable production and the nutrient input in the form of manure, was gradually replaced by inorganic fertilizers and imported food stuffs. Nevertheless, the mixed production farm remained the backbone of the farming sector well into the decades after World War 2. The increased specialization in the farming sector in the 1960's and 1970's lead to a rapid decline in this farm type and gave way to farms specializing in either pig production or cattle (mainly dairy) combined with an arable production which was less connected to fodder consumption.

The tendency to specialize in either of the production lines did not yet dominate in Gadbjerg and Givskud in the early 1970's, as the majority of farms were still mixed farms with both pig and cattle production in 1973. It is interesting to note that 75% of the farmers indicated in the 1973 survey that they intended to remain with mixed farming, and that they did not plan to specialize in one single production line. Continuing with well-known production systems which had been adapted to local conditions and the available resources over time was mentioned by a number of farmers, as the reason for wanting to continue with the traditional system as well as the levelling of the workload throughout the year. However, the situation in 1997 was quite different from the one planned by most farmers. In fact, as Table 4 indicates, the percentage of farms with mixed production was drastically reduced, from 73% for both to only 4% in 1997. In contrast, the farms without animals, which were a small minority in 1973 now dominate the agricultural sector in Gadbjerg and Givskud, representing 43% of all farms. Most of these farms are hobby and part-time farms, which have eliminated the livestock production due to lack of time. Farms specializing in cattle represent another significant group of farms (37%), with farms specializing in pig production as the second smallest group (16%). Most cattle farms are dairy farms. It should be noted that in 1973 and 1997 the group of farms with no animals included farms with a very limited number of farm animals (cattle or pigs) or with specialized animal types which have very little commercial value (horses, sheep, dogs, poultry). It can be concluded that the specialization of farms which is one of the characteristics of the productivist phase of the recent agricultural development, manifested itself very clearly in the period between 1973 and 1997 in Gadbjerg and Givskud .

production type	*1973*		*1997*	
	study area	*Denmark*	*study area*	*Denmark*
mixed farming	*73*	*48*	*4*	*13*
cattle	*10*	*10*	*37*	*32*
pigs	*8*	*24*	*16*	*17*
no animals	*8*	*17*	*43*	*37*

***Table 4:** Farm production types in 1973 and 1997 (values in percent).*

Comparing the situation in the study area with national statistics (see Table 4), it is clear that farms in Gadbjerg and Givskud in 1973 were not quite as specialized as the average farm in Denmark. In contrast, it appears that the farming profile in 1997 has gone further towards the farm type with no animals (a characteristic of part-time and hobby farms) than the national average. It is also apparent that the proportion of farms with cattle is higher in the study area than on a national level. It should be kept in mind that the national statistics figures include pensioners (corresponding to 19% of the farming population in 1997), while the data from Gadbjerg and Givskud excludes this farming segment. This difference may partly explain the deviation found between the study area and the national averages, notably the larger proportion of farms with mixed farming found at national level in 1997.

Farm type and labour force composition

The development of alternative employment opportunities combined with the poor economic conditions of the agri-

cultural sector during the 1970s and 1980s shifted the balance away from the family-run, full-time farm which employed the owner and often his wife as well as casual labour during peak periods to part-time farms where the main income was derived through other sources. In 1973, 86 % of all farms in Denmark were full-time farms and family labour constituted 33% of the labour force (besides the owner), the rest being hired labour (Danmarks Statistik 1975). In 1997, full-time farms constituted only 45% of all farms and the amount of family labour involved in farming had declined to 25% of the total labour force (Landbrugsforeningerne 1998).

The structural adjustment from the dominance of full-time to part-time farms had also started in Gadbjerg and Givskud in 1973. In fact, it appears that this development was ahead of the national average in both years, as only 71% of the farms were run as full-time farms in 1973 (see Table 1). It is difficult to attribute this particular development in Gadbjerg and Givskud to individual factors, as it is probably a combination of factors which have interacted to promote the specific development. Some factors, such as the relatively poor agricultural potential of the area, which was highlighted as a driving force of agricultural change by Jensen and Jensen (1978), has probably served as a "push" factor, which made it necessary in 1973 for many farmers to supplement farm income with other incomes. Other reasons, such as an increase in alternative employment opportunities has served as a "pull" factor and has also influenced this development. In 1997 only 41% of the farms were run as full-time farms (compared with 45% on a national level), whereas 49% of the farms derive a substantial portion of their income elsewhere.

An analysis of labour use in Gadbjerg and Givskud indicates that full-time farmers employ a variety of other labour on the farm (see Table 5). Only 16% of the full-time farmers work alone on the farm. Family members are the most common source of labour. Their contribution can vary from full-time assistance to infrequent assistance by children after school or in vacations. A large proportion of the full-time farmers employ hired labour. Some farmers stated that an important reason to enlarge farm production was to be able to employ hired labour to permit a working life with vacations and regular free weekends.

Assistance from machine pools has become increasingly common, as farmers out-source time consuming activities or activities which require special machines. Common activities undertaken by the operators from machine pools were slurry application and harvesting.

Agricultural land use

Information about land use was obtained from the IACS database for farmers who applied for EU agricultural subsidies in 1995 (67% of the farmers participating in the 1997 survey) and all land use information refers to this year. Information concerning the remaining farmers was obtained through interviews in 1997. Information about land use in 1973 was collected in the survey of 1973. The relative area of different crops in Gadbjerg and Givskud and at the national level is shown in Table 6.

labour type	*full-time*	*part-time*	*hobby*
farmer only	16	38	35
family members	42	31	50
hired labour	38	0	0
machine pool	58	50	28

Table 5: *Labour use on farms in Gadbjerg and Givskud in 1997 (values in percent).*

agricultural land use	*1973*	*1973*	*1995*	*1995*
	Denmark	*Study area*	*Denmark*	*Study area*
wheat	4	0	22	11
rye	1	1	4	6
winter barley	0	0	7	8
spring barley	49	44	19	24
oats and mixed grains	4	5	1	1
cereals for green fodder	1	2	3	2
maize	0	0	1	1
beets	6	10	2	4
grass in rotation	15	23	9	22
permanent grass	11	10	8	5
pulses	0	0	3	4
rapeseed	2	0	6	3
potatoes	1	3	2	2
seeds for sowing	2	1	2	0
vegetables	0	0	1	0
other	4	1	3	0
set-aside	0	0	8	6
total (percent)	***100***	***100***	***100***	***100***
total (ha)	***2951864***	***4357***	***2726000***	***3252***

Table 6: *Agricultural land use in Denmark and Gadbjerg and Givskud in 1973 and 1995 (values in percent).*

Grain crops covered approximatelly 50% of the area in both 1973 and 1995. However, this stable figure covers large changes in the proportion of land cultivated with different cereals. The area with spring barley increased tremendously since 1950 as it became the most important cereal for pig feed in Denmark (Jensen & Reenberg 1986). It reached a dominant position during the early 1980s where monocropping with spring barley was common, in particular in Jutland. This predominance is reflected in the land use statistics, where the relative area of spring barley corresponded to 88% of the grain area in the study area compared to 85% at the national level in 1973. A shift towards the cultivation of winter crops began in 1985, as a result of concerns over the environmental consequences of monocropping and risk of wind erosion and nutrient leaching from winter bare fields (Reenberg 1988). Environmental legislation made it mandatory to have at least 65% of the cultivated area covered with crops in the winter since 1988, making the transition towards winter crops even more pronounced. As a consequence, between 1973 and 1995, the area cultivated with winter crops increased and covered 25% of the study area in 1995 (compared with 33% at the national level). The increase in the area cultivated with wheat occurred mainly on the better soils in Denmark, and the relative area cultivated with wheat in the study area in 1995 was only 50% of the national average, reflecting the rather poor soil conditions. Spring barley therefore remains the most important grain crop in Gadbjerg and Givskud in 1995, a characteristic of the poorer soils of Jutland. The area cultivated with oats and mixed grains diminished strongly during this century, as barley became the dominant grain for pig feed, and the disappearance of horses as draught power after 1945 also diminished the demand for oats as feed grain. Gadbjerg and Givskud is not located in the main oats growing area in Denmark and the proportion of the area cultivated with oats therefore corresponds to the national averages in both 1973 and 1995.

The land use statistics of 1973 and 1995 reflect the relatively large number of cattle farms in Gadbjerg and Givskud. The proportion of the area cultivated by typical fodder crops and green fodder (beets, grass, cereals and maize) was much higher than the national averages in both years, corresponding to 45% and 34% of the area in 1973 and 1995 respectively. The decrease in the area of these crops between 1973 and 1995 is accounted for with the decrease in the area with grass and beets. The decrease in the area of beets was partly compensated by an increase in the area of maize, which has replaced beets as a fodder crop in many dairy cattle farms.

Permanent grasslands, such as meadows and commons, are of ecological importance as they are originally oligotrophic environments which provide habitats for several endangered plant species (Hald 1998). The decrease in the permanent grass land is therefore of concern from a nature conservation viewpoint. This reduction can be linked to the decrease in the number of farms with cattle. Many farmers started cultivating these areas when cattle disappeared from the farms, as there was no longer any use for grass land.

The area cultivated with industrial seeds (e.g. rapeseed) and pulses (primarily field peas) increased rapidly since 1978 as a result of the EU subsidies for the cultivation of protein crops. Pea cultivation is particularly attractive on sandy soils where the comparative advantages of cultivation are greatest, which might be reflected in the land use statistics in 1995. Rapeseed, on the other hand, is not so common in areas with many dairy farms.

The study area is located in the traditional potato-growing area of central Jutland, a characteristic which is reflected in the land use statistics from 1973, when the area cultivated with potatoes was higher than the national average. The relative area cultivated with potatoes was reduced to a level similar to the national average in 1995. Seeds for sowing, vegetables and other crops, only took up a small area in 1973 and had virtually disappeared from Gadbjerg and Givskud in 1995.

Set-aside was introduced as a requirement to obtain EU agricultural subsidies in 1992 for all farms measuring more than 17.6 Ha and it therefore does not appear in the land use statistics for 1973. The proportion of farm area that must be set aside has varied from 15% to 10% between 1992 and 1995, and it appears as if the area with set-aside is slightly less than the national average in 1995. The reason for the smaller proportion of set-aside might be the larger number of small farms in Gadbjerg and Givskud compared to the national level which are not required to set aside part of the farm area in order to obtain EU subsidies or do not apply for agricultural subsidies altogether.

Land tenure

Danish farms are traditionally farmer-owned and operated. This ownership pattern has been a political objective throughout the last centuries and has been reinforced by

agricultural legislation. Agricultural law support family-based ownership and put a maximum limit to the number of farms that can be legally combined into one holding (Strukturdirektoratet for Landbrug og Fiskeri 1995). A common way to acquire additional land for farming is through renting or leasing farms. While the renting of entire farms is not common, many full-time farms rent land. In 1997, 20% of the farmed area in Denmark was rented land.

It was noted by Jensen and Jensen (1977) that the renting of land was common in Gadbjerg and Givskud in 1973 and caused a breaking up of the traditional compact farm holdings which had been a common feature since the enclosure movement changed cadastral boundaries in the late 18th Century. The pattern of land ownership and *de facto* farm units was already in 1973 a complex patchwork with farmers in need of extra land renting where land became available.

The use of rented land has increased in the two parishes since 1973. While the number of farmers renting land has remained almost constant, the area rented has increased from 323 ha to 732 ha. This means that the average area rented in 1997 is 15 ha compared to 6 ha in 1973. It should be mentioned that the farms included in the 1997 analysis correspond only to 2/3 of all farms renting land in the study area. Another 26 farms in neighbouring parishes rent an additional 240 ha, so that the total area rented correspond to 991 ha. These farms are not included in this survey, in order to make the data from the two periods as comparable as possible. If the area rented by these farms is included in the analysis, it appears that 23% of the area under cultivation in the two parishes in 1997 was rented, which is in line with the national figures. It is of interest to note that the land use on the rented land deviates significantly from that in Gadbjerg and Givskud in general. The dominant land use, that of grain crops, covers approximately 50% in both cases. However, set-aside occupied 25% of the rented land in Gadbjerg and Givskud, with other crops covering the remaining 25%. In contrast, set-aside only covers 6% of the total farmed area in Gadbjerg and Givskud (see Table 6). The markedly higher proportion of set-aside on rented land indicates that in many cases it is used primarily to fulfill the mandatory set-aside quota in order to obtain EU-subsidies. This observation is reinforced by some farmers comments concerning set-aside, with statements along the lines of: "I only want set-aside on rented land, not on my own property".

Pathways of development

The change in farm status of individual farms between 1973 and 1997, as expressed by the change in farm and production type, is a good indicator of the overall development trends in the study area. It is possible to trace the evolution of 105 out of the 135 farms which were included in the survey in 1997. The remaining farm holdings were not included in the 1973 survey, as they were managed by pensioners, had rented out all their agricultural land or were omitted from the survey for other reasons. Furthermore, the sub-division of some farms between 1973 and 1997 as well as the considerable dynamics in land rental in the area described in the previous section, means that several farms in 1997 were a part of one single farm in 1973 and vice versa. The 105 farm included in this analysis therefore correspond to 103 farms in 1973. The trajectory of the individual farms between 1973 and 1997 has been categorized using two transition matrices shown in Tables 7 and 8. The percentages listed in the individual categories can be regarded as an approximation of the actual number of farms in the categories as the total number of farms in this analysis is very close to 100. It should be kept in mind that 80 percent of the farms have changed ownership between 1973 and 1997. It is therefore not possible to relate changes in farm status directly to the present owners decision making in most cases.

Table 7 shows the changes in production type in the two parishes. The results underline the high degree of dynamics which have characterized the change in agricultural structure in Gadbjerg and Givskud. Only 14% of the holdings have continued with the same production line in the period examined. Furthermore, the drastic reduction in the number of farms with mixed production has lead mainly to an increase in the number of farms specializing in cattle production (50% of the farms which originally practised mixed farming in 1973 or 39% of all farms) and farms with

1997 / 1973	mixed farming	cattle only	pigs only	no animals	total 1973
mixed farming	4	39	11	24	76
cattle only	0	4	0	6	10
pigs only	0	0	4	4	8
no animals	1	0	2	2	5
total 1997	5	43	18	36	100

Table 7: Transition matrices of changes in production types on farms in Gadbjerg and Givskud (values in percent).

no animals (corresponding to 30% of the mixed farms in 1973 or 24% of all farms). The few farms which had already specialized in either cattle production or pig raising in 1973 have either continued with this line of production or have abandoned animal husbandry altogether. None have changed specialized production line (e.g. from pig to cattle husbandry). Interestingly, livestock has appeared on 3 out of the 5 farms which did not have any animals in 1973.

Table 8 describes the development in farm type status between 1973 and 1997. It appears that 49% of all the farms have retained the same status in both years. In 1997 half of the full-time farms remained as full-time farms, whereas the other half are either part-time or hobby farms. Interestingly, about a third of the part-time and hobby farms in 1973 are today run as full-time farms. This indicates that there has been a considerable change within the farm sector, and that even if a farm was run as a part-time or hobby farm in 1973, it could later become (part of) a full-time farm in 1997. Two thirds of the part-time or hobby farms in 1973 have remained with this farm type status, indicating that a considerable number of farms (22% of the 105 farms) were not full-time farms at these two points in time.

One sub-group of farms is of particular interest in this analysis. It consists of the farms which were owned by the same farmer in both 1973 and 1997, and where changes in farm status therefore can be related directly to the decision making of the present owner. The analysis of the evolution of these farms between 1973 and 1997 gives a good indication of the reaction by farmers in Gadbjerg and Givskud related to the two phases of agricultural change. These farmers represent the group of farmers which were younger than 42 years old in 1973. 73% of the 26 farms included in this analysis were full-time farms and 69% were mixed farms. In this way, the sub group seems fairly representative of the farm structure in Gadbjerg and Givskud in 1973, although it must be kept in mind that the sample size is small when divided into farm status groups. 80% of the farms have changed farm status (either production or farm type) underlining the magnitude of change which has occurred in the past two decades in Gadbjerg and Givskud. The full-time farm, with mixed production, was by far the largest group, representing 61% of the 26 farms. The number of farms in this group has declined and only represent 8% of the farms in 1997. The majority of the farms with mixed production have become cattle farms (35% of the 26 farms), with full-time pig farms being the second largest group (12% of the 26 farms). The evolution on the farms which had already specialized in either cattle production or pig raising in 1973, confirmed the findings of the analysis for the 105 farms in Table 9. These farms (24% of the 26 farms) have either continued with their line of production or have abandoned animal husbandry altogether. Livestock has re-appeared on two farms which had no animals in 1973 (8% of the 26 farms).

1997 / 1973	*full-time*	*part-time*	*hobby*	*total 1973*
full-time	*39*	*11*	*29*	***79***
part-time	*6*	*7*	*5*	***18***
hobby	*1*	*0*	*3*	***4***
total 1997	***46***	***18***	***37***	***100***

Table 8: Transition matrix of changes in farm type on farms in Gadbjerg and Givskud (values in percent).

In conclusion, the typical development for a farm in Gadbjerg and Givskud can be described as a transition which involves a change in farm status from a full-time farm with mixed production to a part-time or hobby farm with no animals. The analysis of the changes in farm status for the sub-group of farms with the same owner in both 1973 and 1997, indicates that farmers have followed different pathways of development and have reached different stages of transition in 1997 as shown in Table 9. Based on the results of interviews with farmers in 1997, it appears that this development had taken place in several phases. As a starting point, the majority of farms were full-time farms with mixed production (transition stage 1). In the second phase, farmers seem to have chosen between two different pathways of development. In the first case, farmers continue with full-time farming, but specialize in either pig production or cattle (transition stage 2a). In another scenario, farmers become part-time or hobby farmers and engage in off-farm employment to supplement farm income (transition stage 2b). This change in farm type status is often parallelled by a specialization in pig production, as pig production is easier to combine with off-farm employment. The specialization in pig production cannot be recognized among the farmers included in this analysis. This is probably due to the selection criteria employed which exclude very old farmers. At a third stage, often due to age or health problems, farmers abandon animal production altogether and concentrate on crop production (transition stage 3). Farmers may skip some stages or alternate

1973		1997		stage of transition[1]	percent of farms
production type	farm type	production type	farm type		
mixed farm	full-time	pigs	full-time	2a	12
mixed farm	full-time	cattle	full-time	2a	35
mixed farm	full-time	mixed farm	full-time	1	8
mixed farm	full-time	no animals	part-time	3	4
mixed farm	full-time	no animals	hobby	3	4
mixed farm	part-time	cattle	full-time	2a	4
mixed farm	part-time	cattle	part-time	2b	4
cattle	part-time	cattle	part-time	2b	4
cattle	part-time	no animals	hobby	3	4
pigs	full-time	pigs	full-time	2a	8
pigs	part-time	no animals	part-time	3	4
pigs	hobby	pigs	hobby	2b	4
no animals	full-time	pigs	full-time	2a	4
no animals	part-time	mixed farm	part-time	2b	4

Table 9: Transition matrix for 26 farms in Gadbjerg and Givskud (values in percent).

[1]See text for explanation of transition stages

between stages according to the priorities of the household, but the overall trend appears to be a succession between the different stages. It appears in Table 9, that only a very small group of farms remain at stage 1 in both 1973 and 1997. In contrast, a 67% majority of the farmers have reached stage 2a, in which they have specialized in either pig or cattle husbandry. A smaller group of farmers, corresponding to 12% of the 26 farms had also reached stage 2, but were characterized by changing farm type status to part-time farm (stage 2b). Only 16% of the farms had reached stage 3, in which they had abandoned animal production altogether and were either part-time or hobby farmers. The reason for this small fraction included in stage 3 is most likely to be that pensioners have been excluded from the analysis which would otherwise show up in this category.

Discussion and conclusion

The structural adjustment of the agricultural sector has brought major changes to the farming population of Gadbjerg and Givskud between 1973 and 1997. Direct comparisons of the situation in 1973 and 1997 must be done with caution, keeping in mind the rather small sample size. However, certain trends do emerge and allow a comparison with the development occurring at a national level during the same period. The number of farms was reduced by 41% and the main farm type changed from full-time mixed farming to hobby farms without animals. At the same time, a bi-polarization of farms into either large full-time farms or small hobby farms took place. In this manner, the changes in the study area resemble the development which is taking place at a national level in the same period.

However, there are significant differences between the study area and the national averages, as the proportion of full-time farms was smaller than the national level in both years. A range of factors are known to influence the decision to undertake farming as a full-time activity, and this development is most likely driven by a combination of factors, such as the availability of alternative job opportunities, distance from major towns and the biophysical agricultural potential rather than one single driving factor (Landbrugsministeriet 1998). In the case of Gadbjerg and Givskud it is likely that a combination of an increase in alternative job opportunities in neighbouring towns between 1973 and 1997, and the rather poor agricultural potential promoted the development towards the dominance of part-time and hobby farms.

It appears that the drive from mixed farming to specialized farming started relatively late in the study area, as the proportion of mixed farms is much higher than the national average in 1973. In contrast, the agricultural sector became more specialized in 1997, with the proportion of farms with mixed production being smaller than the national average. The relatively large proportion of dairy farms also deviates from the national average.

The agricultural land use in the study area is typical for areas with many cattle farms. It appears to be stable on the general level, with similar proportions of land cultivated with different crop categories in both years. However, changes in economic conditions and agricultural legislation between 1973 and 1997 affected the composition of grain crops and also lead to the cultivation of new crops, such as maize and rapeseed. The decline in the number of farms with cattle is a matter of concern from a nature conservation viewpoint, as many semi-natural landscape elements depend on grazing to maintain a high habitat value. The area of rented land has more than doubled between 1973 and 1997, and significant differences in land use on rented land compared to owned land was discovered, with a much higher proportion of set-aside on rented land.

The pathways of development followed by a sub-group of farms which had the same owner in 1973 and 1997 generally reflects the trends of the aggregated results calculated at the scale of the study area. 79% of the farms had reached an intermediate stage of transition between being a full time farm with mixed production to a part-time or hobby farm with no animals. However, the results from the analysis at farm level must be viewed with caution. Firstly, because they are based on a sub group of farms and secondly because the parameters included in the analysis (farm type and production status) are known to be influenced by a variety of factors. Farmers decision making is strongly related to the particular "phase" of farm life. Boehlje (1992) identifies three phases in farm life: 1) establishment, 2) expansion and survival and 3) withdrawal, with a particular set of priorities and goals associated with each phase. These goals are translated into farming strategies under the influence of the forces of change as described in the introduction. It is therefore not possible to establish relationships between the factors influencing farm structure development and the actual changes occurring at the local level without including information about the socio economic conditions in the individual farm. It should be added that a small group of part-time and hobby farms maintained the same farm type status in 1973 and 1997 and as such never made a decision to change from full-time status to part-time farming status during this period.

The changes that the farms experienced in the two parishes between 1973 and 1997 document a profound structural adjustment of the agricultural sector in the course of the transition from the productivist to the post-productivist phase of agricultural change. If full-time farms are considered as exponents of the productivist mode of agriculture and part-time and hobby farms are considered as exponents of farms following a post-productivist transition, it can be concluded that a majority of land owners in the two parishes today orient their farming strategy towards a post-productivist mode of agriculture.

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