Changes in French Agriculture between 1862 and 1962

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In the course of the XIXth and XXth centuries, economic growth brought about a change in the structure and regional distribution of French agriculture. Although the countryside has everywhere, except in the cities, maintained an agricultural character, there are differences between the regions where agriculture has been adapted and has modernised, and those where farming activities have remained more traditional.

This situation is the result of a long process of evolution which was under way by the end of the XVIIIth century and was to continue through the XIXth century as well as in the XXth. Agriculture felt the consequences of the various changes which occurred throughout this time: the close of the *Ancien Regime* and the last of the great famines; the affectes of political instability and social change; the establishment of new structures, and changing agricultural production, as wheat growing, potato, maize, sugar beet, fodder production and livestock rearing began to expand, while the methods of production became mechanised, the soil itself became improved, and the scale of commercialisation of production expanded.

During the XIXth century, the prosperity which resulted from this economic expansion was particularly noticeable under the Second Empire. However, not all the economic partners shared equally in the profits — it was in part the working classes which bore the brunt of this prosperity, and the working classes had come originally from the rural population. In both economic and social terms it was often the latter which had to suffer the costs of economic growth. But certain groups, like the small peasant farmer, and certain regions fared better.

The period was marked by a whole series of crises in agriculture, some of which resulted both from purely natural factors, as in the case of the phylloxera which so deeply affected wine production and also from the way in which the economic system worked (as in the case of competition from foreign cereal producers), and the ways in which the farmers adapted to meet changing structures. And the introduction of commercial and financial methods into farming was not always beneficial: the wheat crisis led to a protectionist policy which was contrary to the long-term interests of the nation, and hence also to those of agriculture.

In the XXth century, the exodus from the countryside continued after the First World War, mechanisation accelerated and farming changed almost out of all recognition from what it had been only a few years earlier.

But through these phases of crisis and subsequent prosperity, and despite a certain degree of resistance on the part of the agricultural population which was slow in finding a new level of balance in both quantitative and qualitative terms, agriculture shared in the general expansion. Production levels improved, the range of products increased, standards of living improved. The agricultural population, whose number continued to fall at irregular intervals, was seeking to find new equilibrium.

The birth and the growth of industry and transportation had thrown agriculture into an unbalanced situation, which was

expressed in geographical terms by a new redistribution of farming activities and the siting of agricultural production. Economic growth brought about new conditions of mobility which tended to do away with close dependence on the land. According to the classical theory of the siting of agriculture, the cultivated area should have been transformed quite rationally by the process of economic growth, so as to bring about an optimal distribution of crops and the productive structure. In fact, economic growth created a whole series of local imbalances which were only ironed out in relation to the resistance put up by local structures to change, which helps explain the very unequal way in which French agriculture adapted from one Department to another.[1]

The regional diffusion of the economic expansion was dependent on the mobility of the different factors. For agriculture, one of the most important of these is the land because it cannot be moved but it can be qualitatively improved. But the immobility of the lands is compensated by the mobility of the crops, while both men and the means of production are of course both increasingly numerous and entirely mobile.

At the level of the Department, the relationship between growth and the displacement to which agriculture was subject can be traced through a number of indicators, such as variations in the duration of crop production, yields and productivity, increases in working capital, and the development of new means of production, in so far as growth is concerned, and from the shifts in cultivated areas, changes in types of crops cultivated, and the movement of men from one area to another, shifts in age groups, skills and so forth.

The causes of all these changes cannot be found in agriculture alone. New crops, such as the potato or sugar beet, were subject to various constraints in the ways in which they were established

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[1] J.L. Guigou, *Théorie economique et transformation de l'espace agricole*, 2 Vols, Gauthier-Villars, 1972.

and organised. Were they encouraged or held back by other farming activities? For example, what influence did the sugar industry have on the expansion of this crop? What sort of restraint was imposed by traditional farming practices? The spread of mechanisation which had allowed cereal cultivation to be greatly improved, had been held up perhaps not so much by lack of finance as by a certain hostility towards innovation? Which were the regions in which the recruitment of labour by industry had left the agricultural population structurally imbalanced, so preventing the increase of productivity and encouraging the exodus of an excessive number of the young?

Such problems as these have already been examined in certain studies,[2] some of which have been concerned with agricultural growth at a regional level, and others with a statistical analysis of the changes in production at a Departmental level. Our aim in this paper is to try to find at the Departmental level the relationship between the growth in agricultural production and the geographical placement of crops, on one hand, and on the other the extent to which the causes were to be located within the farming economy or within the economy of France as a whole.

1. Methodology

A. *The Data*

The ten-yearly agricultural inquiries contained in the *Statistique Générale de la France*, together with the subsequent annual agricultural statistics of the I.N.S.E.E., contain sufficient information for a study of agricultural growth (its timing), geographical distribution (the Departmental data) of the factors of production,

[2] J.L. Guigou, *op. cit.*: L.M. Goreux 'Les migrations agricoles en France depuis un siecle et leurs reactions avec certains facteurs economiques' (*Etudes et conjoncture*, n. 4, 1956); M. Demonet, 'L'agriculture en France d'après l'enquête de 1852', in *Pour une histoire de la statistique*, INSEE, 1977; J. Pautard, *Les disparités régionales de la croissance de l'agriculture française*, Paris, Gauthier-Villars, 1965.

and for understanding the local conditions under which adaptation was made to the expansion of agricultural production, either concurrently, or at least in some compatible form, with that in other sectors. Where we find evidence of the continued existence of a decaying agriculture, this is evidence of a failure to adapt, but the agricultural prosperity of a certain region may also result from poor adjustment to a general process of growth which elsewhere had damaged the development of agriculture.

Agriculture is hardly a leading sector of the economy. The mobility of many of its factors (such as land) is weak, or else dependent on other sectors (such as labour mobility and capital). Also, the redistribution of factors, did not necessarily lead to any optimisation, but rather to a ' negative optimisation ', which helps explain certain persistant examples of decline.

In attempting such an analysis there are a number of methods from which to choose, amongst which one might list the following:

— measurement of the autonomous evolution of agriculture, quite apart from the other sectors of the economy, from either a static or an evolutionary point of view; [3]

— analysis of the degree of solidarity existing between agriculture and the rest of the economy, in order to highlight the permanent features of its adaptation to growth and set aside the purely local circumstances of change.

Growth can be measured from the changes in the absolute values of the data, from comparison of the indices over time, or of the nature of the variables, through measurements of position and dispersion. The agricultural surplus is a useful indicator of growth, because the marketed portion indicates the difference between total production and what has been retained for autoconsumption and for intermediary consumption. In the pre-

[3] M. Demonet, J.L. Guigou, *op. cit.*

capitalist economy it is very slight, but thereafter becomes increasingly important. It is something which is extremely difficult to measure at a Departmental level, although it can be gauged indirectly from growth in productivity. But it is wholly characteristic of both agricultural growth and product redistribution.[4]

Mobility can be measured from the Departmental figures for agricultural production and the corresponding populations. Demographic mobility is expressed both in population movement and by shifts in the age structure of the active agricultural populations. Production development is revealed by the distribution of various crops over the different Departments,[5] by yields, productivity, and new forms of enterprise...

We have only listed here the quantitative factors of production, those which relate both to the land and to men. The basic data are drawn from the S.G.F. and the I.N.S.E.E. (Agricultural Inquiries and Censuses), because they are comparable throughout the period 1862-1962, or because equivalents can be calculated from them. However, the XIXth century Departmental agricultural statistics have often been challenged. There are many writers, on the other hand, who argue that they are reliable, and claim that they are uniform from area to area and quite open to comparison over time.[6]

The data used have been grouped into four categories, which represent Departmental agricultural production and the conditions under which it occurred:

a) the factors of production, which include the land and such natural factors as the quality of the soil, the maximum altitude, average rainfalls and hours of sunshine; the men (density

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[4] J. Pautard used the agricultural product per hectare and per worker as the indicators of Departmental growth.

[5] J.L. Guigou, *op. cit.*

[6] M. Hau, 'Etudes de la croissance regionale de 1810 à nos jours: données et lacunes'; G. Garrier, 'Les enquêtes agricoles décennales du XIXème siècle: essai de analyse critique' — both are in *Pour une Histoire de la Statistique*, INSEE, 1977).

of the total and the urban population, number of active male agricultural workers, who unlike women are extremely difficult to discover on any systematic basis for the period as a whole, the number of wage-earning agricultural labourers);

b) output of certain major essential products, and their distribution over the territory as a whole (cereals, potatoes, fodder crops); yields per hectare and the productivity per active agricultural male, numbers of cattle and pigs, and the size of working capital, which can be used as an indicator for meat production, which would otherwise be extremely laborious to reconstruct from these figures by Department for the period as a whole. We have not used data for either specialised or highly regionalised products;

c) the means of production and the forms of farming, which are represented by the number of farms, the forms of traction used, and the amounts of manure employed.

It is difficult to set chronological limits to the ongoing and unbroken movement of time, and this is the more difficult because the periods of economic crisis and expansion do not fit exactly with the available statistics. In fact, choice is largely determined by the latter: the inquiry of 1862 was the first to provide figures of high reliability, and this has been taken as our starting point. The period 1862 to 1962 then constitutes an important moment in the process of economic growth from which France has benefited since the close of the XVIIIth century. Our geographical field covers the metropolitan French Departments, from which four have been excluded (Seine, Seine-et-Oise, Corsica; Belfort has been included with the Haut-Rhin, of which it was part until 1871).

B. *The analysis of the data*

In order to give a full picture of French agriculture Department by Department, some 40 variables have been considered

and analysed in terms of the principal components, since the analysis of the data reveals without any prior hypothesis the nature of the links between the majority of the variables, which can then be interpreted accordingly.[7] Some of the numerous results arising from the programme used[8] can be used for a descriptive study to explain the nature of the relationships between economic growth and the displacement of agriculture, which follows in the present paper. In particular, the matrix of the correlations makes it possible to see the links between the different variables, so that those that seem to operate free of any other connections can be eliminated. In this fashion we were left with only 27 variables (described in Part II). To give an example, the value of leases of sheep and the area of forest and woodland were eliminated in this way.

Following the objective of the study, the nature of the variables in 1862 and 1962 have been taken as indicators of growth, since they give a general measure of regional distribution. The regional maps which have been drawn for each variable show the degree of displacement of the factors of production.

a) The characteristics of the variables

The first characteristic is the parameter of position: median, average, minimum and maximum incidence. The average shows the levels reached by such figures, but tells us nothing about extremes. The median divides the distribution into two equal parts, and unlike the average it is not distorted by extreme values. This means that it enables us to evaluate the relative importance of strong and weak values. The maximum and minimum incidence provides information on the field covered by each variable.

The second characteristic is the dispersion parameter:

i) The typical variation measures the total dispersion based on the average.

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[7] M. Volle, 'L'analyse des données', *Economie et Statistique*, n. 96, Jan. 1978.

[8] TOLBIAC programme.

ii) The coefficient of variation (typical variation-average) allows us to compare dispersion.

The interpretation of the characteristics of Departmental distribution is based on quantitative data. They allow us to attempt comparisons over time with regard to the growth or contraction of a given variable and in terms of the variations in the degree of Departmental dispersion. By taking together the geographical coverage of a particular variable, as illustrated from the maps, and also its corresponding characteristics, one is able to establish the geographical position of a whole series of variables in the case of either different data for a single year or of similar figures for two different periods. Do the high readings which occur in the case of certain Departments correspond to a dominant position held by the same? In fact, the development between two points in time which measures growth also helps answer this question. Given identical geographical distribution of two variables at a given date, a comparison of the characteristics of the two enables us to see whether or not the process of development was parallel. Depending on the situation it will be either the development of the Departmental distribution or that of the variables which is of the greatest significance, and which gave the lead in growth or in its Departmental diffusion.

II. Interpretation of the data

A. *Evaluation of agricultural growth at a national level*

Growth can be assessed quite simply on the basis of the differences between the figures taken from the statistics for 1862 and 1962 (Table I). Each variable had increased, with the exception of the numbers of the active farming population and the number of farms. Agriculture took part in the general process of growth, but with one peculiarity, the loss of a large

TABLE I

NATIONAL ECONOMIC GROWTH (86 Departments)

	1862	1962	Variations
Density of total population	680 h/mill.ha	842 h/mill. ha	+ 23,8%
Density of urban population	196	538	+ 174.5
Density of active male agric. pop.	91	47	— 48.4
	2,024 milliers	793.7 milliers	— 60.8
Production of cereals	16,486.8 mill. T	24,852.8 mill. T	+ 50.7
Production of potatoes	10,319.8	12,867.1	+ 24.7
Production of fodder crops	15,016.6	92,681.4	+ 517.2
Number of cattle	12,676.5 milliers	20,149.2 milliers	+ 74.7
Number of pigs	5,902.7	9,008.1	+ 52.4
Number of farms	3,225.9	1,899.2	— 41.2
Production of cereals per ha	11 qx/ha	27.3 qx/ha	+ 24.9
Production of potatoes per ha	85.5	132.4	+ 54.8
Production of fodder crops per ha	50.7	142.8	+ 181.6
Production of cereals/a.m.a.p.	34.4 qu/a.m.a.p.	107.7	+ 213
Production of potatoes/a.m.a.p.	18.2	42.7	+ 134.5
Production of fodder crops/a.m.a.p.	30.7	318.4	+ 937.1
Number of cattle/ha of meadow	0.9	1.1	+ 22.2
Number of cattle/a.m.a.p.	2.4	7.9	+ 229.1
Number of pigs/a.m.a.p.	1.2	3.5	+ 191.6
Units of traction	3,449.9 milliers	4,150.7 milliers	— 25
Nitrogen fertilisers (N)	495 mill.T (41,1%)	591.7 mill.T (24,9%)	+ 19.5
Phosphate fertilisers (P2 05)	202.9 (16,9%)	1,016.5 (42,8%)	+ 401
Potassium fertilisers	507.3 (42,1%)	769.6 (32,3%)	+ 51.7

number of its workers, which was to make a major contribution to productivity. But this growth was unequally distributed amongst the different regions and also varied with different types of production.

Fairly moderate variations (that is less than 100%) are found in the case of density of the total population (+ 23%), the number of active male farm workers (−48%), the number of agricultural wage-earners (−60.8%). Production of cereals and potatoes, together with their corresponding yields, and the profits from cattle and pig farming increased roughly in step with the average. The same was true for units of traction and for the use of nitrogen and potassium fertilisers.

Much faster rates of growth affected the following variables, however: the density of the urban population, the production of fodder crops, and corresponding yields, the productivity of cereals, potatoes, fodder crops, and the number of cattle and pigs, together with the use of phosphate fertilisers. These phenomena were all inter-related: the development of new types of cultivation and the improvement of cereal production corresponds with the process of urbanisation.

At the Departmental level, elements of a national variable might move in an opposite direction, depending on the form of distribution and the size of the disparities. The shift of areas of cultivation and the reduction in the number of Departments producing a certain crop might well be accompanied by large increases in production and in yields. And if internal migration was considerable, the population of a Department could still remain stable even in cases where there was heavy urbanisation. The transformation of the agricultural terrain varied according to whether these movements were intra- or inter-Departmental.

The highest growth rates were those relating to mobility: the mobility of men towards the towns and industrial employment; the mobility of new types of production which went in search of the most suitable types of soil. But the indicators of progress like the units of traction and the consumption of fertilisers show only moderate increases, because the quantitative situation tends to conceal the qualitative development.

B. Simultaneous interpretation of growth and agricultural displacement

a) POPULATION

1. *Density of the total and of the urban population*

	1862	1962
Median:	580 men per ha	550
Average:	648.6	700
Typical-variation	303.8	599
Coefficient of variation	26.8%	85.5%
Minimum reading	210	132
Maximum reading	2,271	3,962

The process was characterised by heavy concentration in certain Departments and a relative gap in the majority of the others. Over time, this became even more marked because urbanisation was not evenly spread and in France the major poles were not many in number (see map 1).

In geographic terms, there is a coincidence in both time and place between the regional distribution of total population density and that of the urban population, except in the cases of Brittany, a relatively thinly orbanised region, and the Mediterranean coast where the situation was the reverse. The highest population densities were here found around the edges of the region: in the West, the East, the North and on the Mediterranean coast, except for the Lyon region where an ancient and important urban tradition was matched by a fairly thin population. All the Departments with high population densities were close together and formed regional groups, except for the Gironde and the Haute Garonne.

The zones of average population density lay around those with the higher densities. The gaps can be found in the central eastern area, between Lorraine and the Paris region, in the southern Alps, and in the Massif Central. The low population of the

central part of the territory evidently produced a centrifugal demographic pattern, and the zones in this region which in 1862 showed either high or average densities had by 1962 disappeared.

2. *Density of active males in the agricultural population*

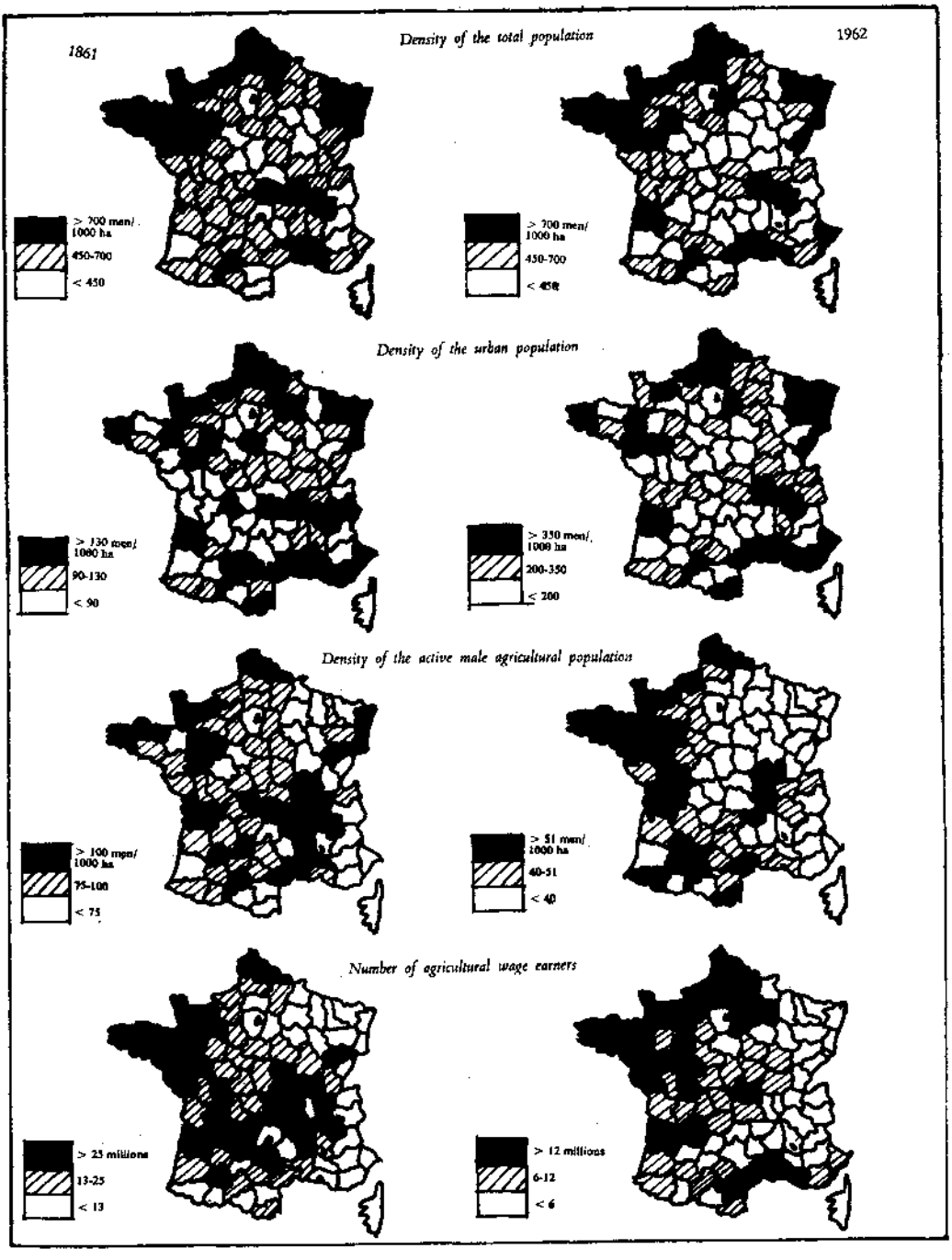
	1862	1962
Median:	128 men per 1000 ha.	251
Average	169.2	408
Typical variation	196	541
Coefficient of variation	115.8%	132.6%
Minimum reading	22	46
Maximum reading	1,247	3,313

Over the course of the century the figures fell sharply for the whole territory. The degree of dispersion in 1962 was much less than in 1862. From the maps one can see a change in the placement of the higher density zones, but the differences were not great and by the close of the period the gap between the highest and lowest densities had disappeared (map I).

The Departmental distribution of the active male agricultural population and its development over time seems to have been quite independent from that of the rest of the population. In 1862 the Departments with the highest densities were situated in the Southern half (the Rhone and the Garonne Valleys) in the West, the North, and in Alsace. The Centre-East and the Alps were the least well provided areas.

In 1862 the western half, which some hundred years earlier had had only average densities, contained some of the highest levels, whereas the Paris region and the East were nearly deserted. In the East, industrialisation encouraged the exodus of farm labourers, but in the North and in the Pas-de-Calais they did not move. For many of the regions one can detect a quite different geographical distribution between the two dates, which

MAP 1 - POPULATION



indicates the extent to which local conditions meant that the challenge was felt.

3. *Agricultural wage-earners*

	1862	1962
Median:	21.7 thousands	9.9
Average	24 thousands	9
Typical variation	14.5	5.3
Coefficient of variation	60.3%	55.6%
Minimum reading	2.9	1
Maximum reading	71.6	29.9

The decline was greater than that of the total active male population in the countryside, because the wage-earners were not tied to the land and were therefore the first to leave. In 1862 their geographical distribution favoured the Centre, the West, and the Pas-de-Calais, while the gaps were in the East and the Alps (Map 1). By 1962 the largest groups had shifted towards the West, the North and Languedoc, probably in relation to the development of certain types of production which require either permanently or temporarily relatively high numbers of labourers (such as livestock rearing and wine production), rather than to the size of the active male agricultural population:

b) PRODUCTION

1. *Cereals*

	1862	1962
Median	188.2 thousand tons	236.5
Average	192.4	295.2
Typical variation	102.5	264.4
Coefficient of variation	53.3%	89.6%
Minimum reading	27.7	2.4
Maximum reading	459.4	1,344

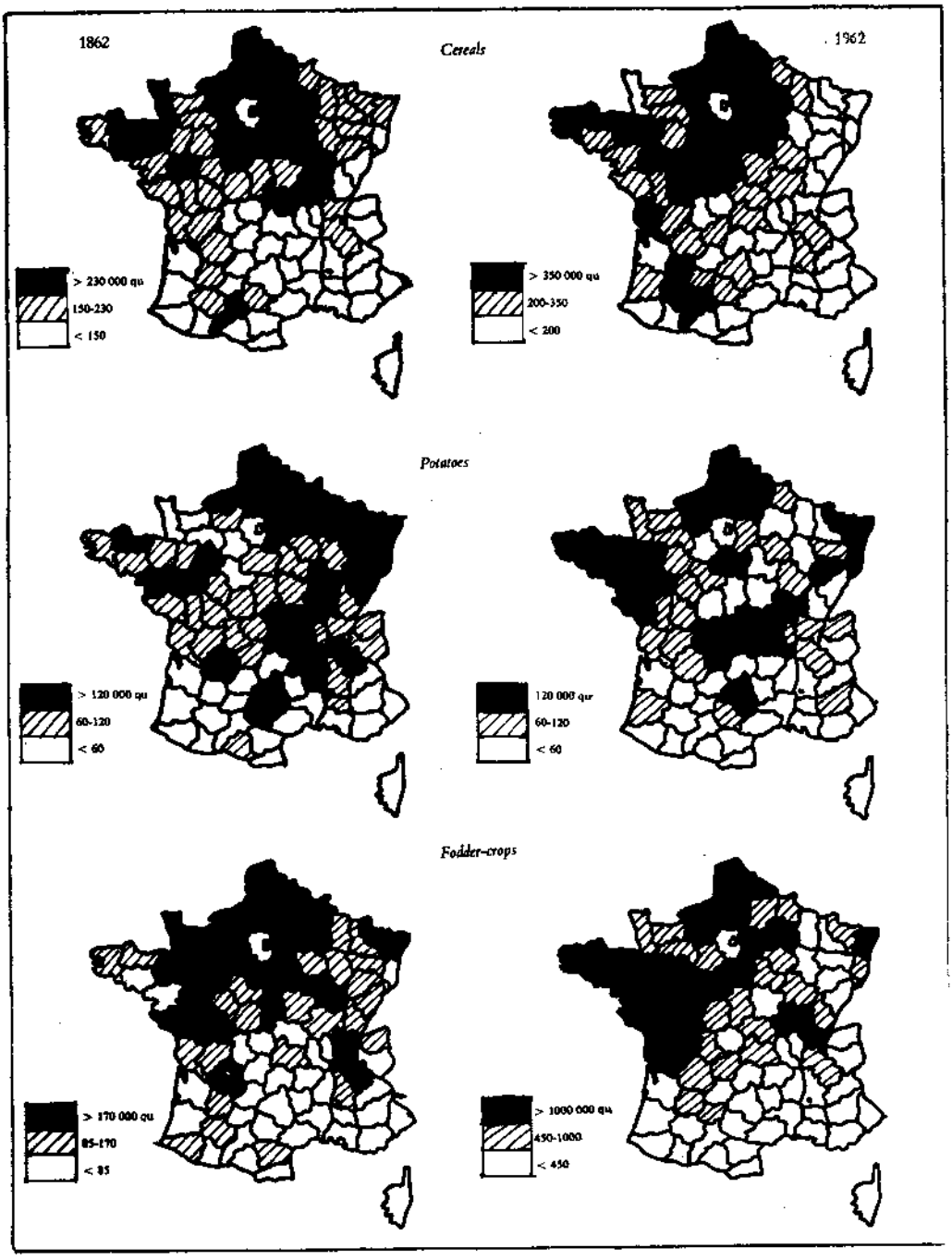
All types of cereals have been grouped together. The production zones of each are often determined by geographical constriants such as the nature of the soil. There is a negative correlation (and also a very low one: —0.57 in 1862 and —0.52 in 1962) between altitude and average rainfall, on one hand, and the cultivated area on the other. The most favoured regions for cereal production were the lower and drier regions which are found mainly in the North (see maps 2 & 6). From very ancient times cereals had constituted the most essential form of production and the basis of the diet. For this reason they had been cultivated pretty well throughout France, variations being due mainly to differences in wealth and the situation of the land; rye was sown on poor land, whereas wheat was the aristocrat of the cereals and the most sought after. In addition, the combination of cereals and livestock, with the dung heap as by-product and the only form of fertiliser available, was essential for preserving the natural qualities of the soil. But it was not always sufficient and the greater part of the land tended to be left fallow in order to avoid soil exhaustion. The other cereals (hay, maize, and the more recent barley) had more specific uses.

The changes affected:

— the range of products (the expansion of wheat, decline in rye, hay, the appearance of maize etc.);
— their utilisation, since the part destined for food consumption fell in relation to that for livestock feed, required for meat production. The production of cereals also in quite recent times became an export industry.

On map 2 one can see that the zone of heaviest production was much the same in 1962 as in 1862: a third of the territory of the Northern half (except for the East), as well as a narrower zone in the Garronne valley in the South West. By 1962 the zones of medium production has shifted towards the West and

MAP 2 - AGRICULTURAL PRODUCTION



the South West, while production along the Mediterranean and in the East was low.

The continuity of these geographical structures also corresponds to an important expansion in the volume of output (over 50%). In 1862 the Departmental distribution of output was fairly uniform (with low typical variants and coefficients of variation). By 1962 the gap between the average and the median had grown considerably, while the typical variant had also grown considerably (in fact more than doubled), which means that the increased production was concentrated in these Departments which had formerly been the major producers, whereas in the others there was a falling off.

2. *Potatoes*

	1862	1962
Median	83.7 million tons	84.7
Average	103.5	148.5
Typical variant	72.5	211.8
Coefficient of variation	70%	142.6%
Minimum reading	8.9	10.6
Maximum reading	458	1,152

During the XIXth century the cultivation of potatoes expanded. Initially they made up for shortages in the poorer cereals in the basic diet, and so contributed to alleviating famines and crop failures. Thereafter, their use gradually began to be diversified, especially as animal foods. In 1862 the largest production was in the Eastern half (the North East and the Centre-East), as well as in certain Western Departments. The South-West, the Mediterranean south and Normandy were only slight producers. At the same time, potato growing was already widespread and had considerable dispersion. Between 1862 and 1962 production increased little (about 25%), but it tended to shift and become highly concentrated (as is shown by the marked

rise in the typical variant figure). Highest production was then found in Brittany, the North, in the Centre and the East. There is no great production in the southern half (map 2).

3. *Fodder crops*

	1862	1962
Median	125 thousand tons	562.8
Average	174.1	1,052
Typical variation	139.2	1272
Coefficient of variation	79.9%	120.8%
Minimum reading	6.5	36
Maximum reading	572.7	6050

The area of production is nearly the same as that for cereals (they are often sown on a complementary basis). The structure, however, is very different, because production of fodder crops has developed as a result of a change in the traditional method of farming — that is a more rational crop rotation and the abandonment of fallow land, together with the development of livestock rearing as a primary activity. It is this which explains the striking increase in production (over fivefold) between 1862 and 1962, which was accelerated by the growing demand for meat.

In 1862 the principal producing Departments were situated in the northern half, excepting Brittany, and also a bit in the East. Such crops were unknown in the South, except in the South West and the Rhone valley. This was partly due to the nature of the climate (maps 2 & 6). In 1962 the distribution by Department shows the impostance of the growth in the production and consumption of meat. The characteristics of this variable had all increased, and the coefficient of variation in particular shows a move from prevalently low to prevalently high values — that is to say, both an absolute increase in the values and in the concentration of production within a small number of Departments, mainly in the West and the North.

4. *Livestock-cattle*

	1862	1962
Median	132 thousand	208.5
Average	153.2	237
Typical variation	107.6	157.8
Coefficient of variation	70.2%	66.6%
Minimum reading	2	4
Maximum reading	708	729

Between 1862 and 1962 there were two quite different forms of livestock rearing. One was carried on as a complementary activity to crop production, in order to provide labour and manure (especially in combination with cereals and on neighbouring land), with meat and dairy products also providing secondary production. By 1962 livestock rearing and cereal farming had become separated geographically; the animals and their fodder were also generally parted (as in the case of Normandy and the Centre), except for grazing land.

In most regions, cattle took up an important share of the agricultural land (see map 3). In all cases livestock rearing proved ill suited to full mechanisation, and therefore provided permanent employment (in contrast to the more seasonal employment created by cereal production) for a relatively large work force: there is a positive correlation between the series 'heads of cattle' and those of the active male agricultural population and the agricultural wage-earners: 0.70 in 1862, but 0.37 in 1962. The heavy contraction in this group of workers also affected livestock rearing. The total numbers of cattle also increased by about 75% over the period.

The concentration of the placement of the cattle also increased over the period, but only slightly (as is revealed by the increase in the typical variation). In 1862 one finds the largest numbers of cattle in all the coastal Departments from West to

North, as well as in certain Departments of the centre, which formed a diagonal running from the extreme South West (the Basses Pyrénées) to the extreme North East (the Bas Rhin), and covering the North of the Massif Central. On either side of this diagonal there were zones of average density which covered the West, the Paris basin, the East and the South of the Massif Central, the north of the Alps. The South East was the land of the sheep, the numbers of which were being greatly reduced due to the suppression of fallow and the improved use of the soil, and which developed in a way that was quite independent from other variables. We have not taken these figures into account for that reason.

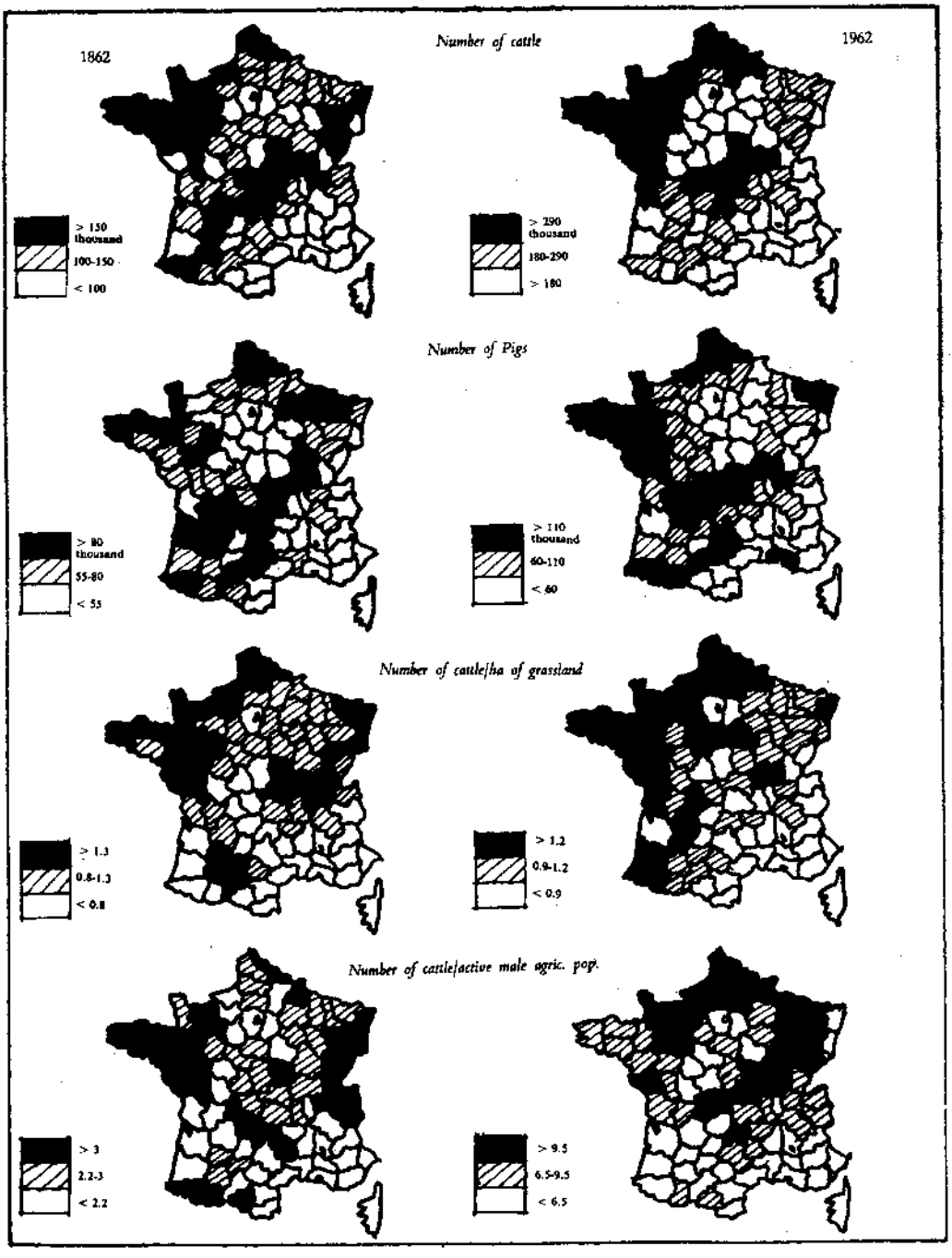
In 1962, the concentration of cattle benefited the East, the North and also the centre. Rather than a case of geographical displacement, then, this was rather a strengthening of the existing zones. The separation of cereals and livestock led to the isolation of the South-West and the Paris basin.

5. *Livestock-pigs*

	1862	1962
Median	64 thousand	73
Average	68.2	104.7
Typical variation	32.1	89.2
Coefficient of variation	47%	85.2%
Minimum reading	16	4
Maximum reading	164	418

Pig rearing was not related to the farming space available, but required a considerable amount of labour. During the period studied it moved from traditional artisan to quasi-industrial methods. However, the total number of pigs did not increase more than 50%. In 1862 the number was very widely dispersed, although this was much less true in 1962 (see the increase in the typical variation and in the coefficient of variation) (map 3). It

MAP 3 - LIVESTOCK-CATTLE AND PIGS



can be seen that the favoured zone for this type of production was very similar to that for cattle raising: the West, the North, parts of the East and centre running along a South-West to North-East diagonal.

6. *Yields and productivity*

a) Production per hectare (yields)

	1862	1962
Cereals		
Median	10 quintals per ha	22.2
Average	10.4	24.4
Typical variation	2.3	8.6
Coefficient of variation	22.1 %	35.3 %
Minimum reading	6.3	8.8
Maximum reading	19.3	49.8
Potatoes		
Median	73.9 quintals per ha	120.1
Average	74.6	132.4
Typical variation	23	55.2
Coefficient of variation	30.8 %	41.7 %
Minimum reading	25.9	0
Maximum reading	130.8	251.3
Fodder crops		
Median	46.1	109.5
Average	50.7	142.8
Typical variation	20.3	112.2
Coefficient of variation	40.1 %	78.5 %
Minimum reading	24.2	16.5
Maximum reading	166.4	547.8

Production per hectare is a good indication of agricultural progress. For the types of product examined in the present study, the increase in yields was the result of the geographical

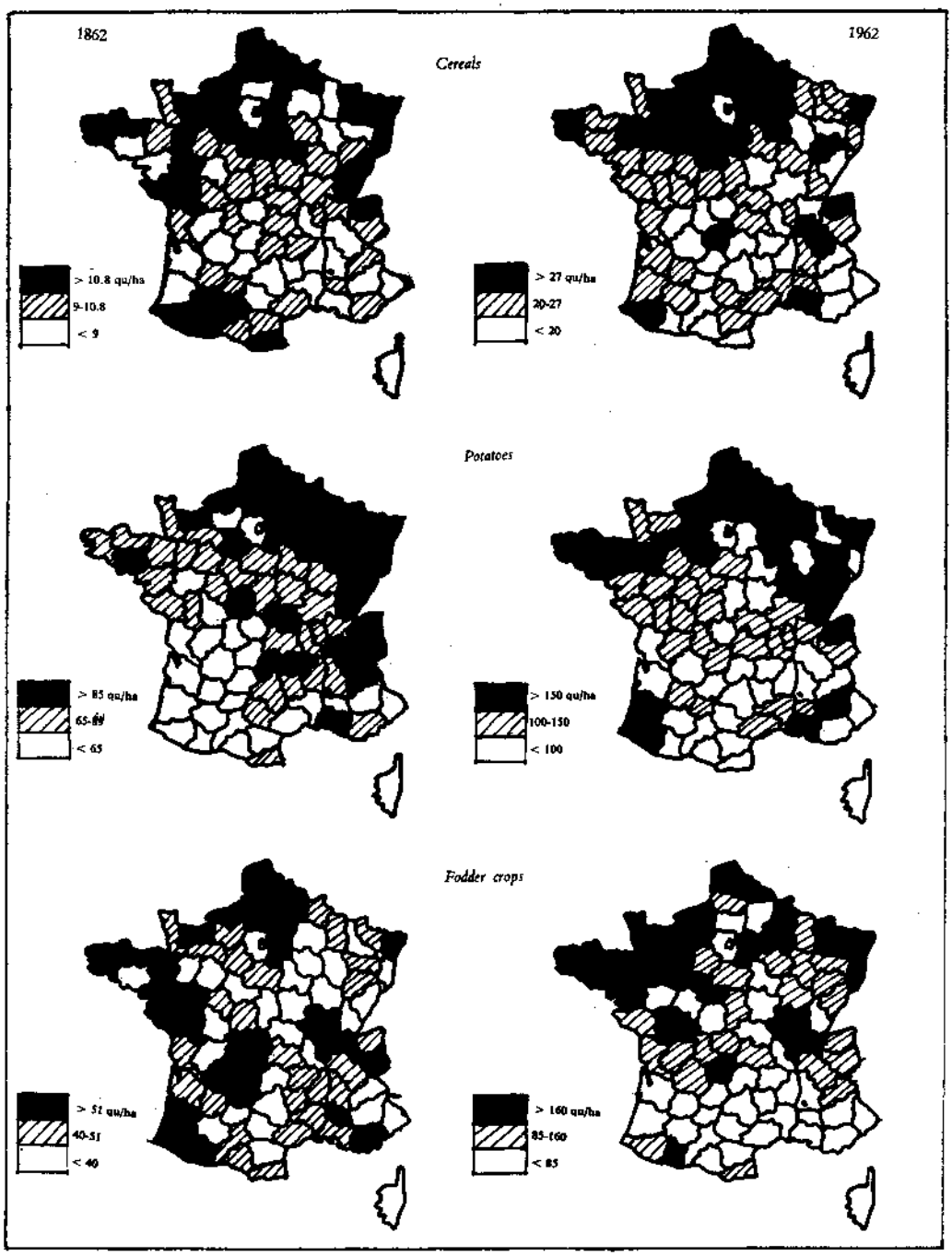
concentration of farming, the improvement of the different species, the use of chemical fertilisers and of machinery. There is generally a close correlation between the level of production and the level of yield: in regions with large volumes of production yields also tend to be high, and also the contrary. In view of the rationalisation of farming, this correlation is closer at a Departmental level in 1962 than it had been in 1862.

The divergences which do appear are particularly interesting, however, for the gaps which they reveal may well indicate either the start or the end of a process of development: high yields in a region which has low overall production may indicate the presence of a small but profitable area of farming, or the start of a new process of expansion, while weak yields in an area of large scale production indicates poor adaptation. In the case of cereals, yields increased by about 25% for France as a whole. In 1862 there were few differences between the Departments, but by 1962 this dispersion had been reduced even further and the typical variation remained small, because the Departments with low total production had gained as much as the others from the improvements in productivity which tended to be spread throughout the country.

High yields are to be found in the East, in some Departments of the South-East and the South-West, which are regions with low overall production. In 1962, high production coincided with only average yields in the centre-West and the South-West: Indre, Indre-et-Loire, Vienne, Mayenne, Lot-et-Garonne (map 4).

In the East, which as a region was well suited to cereal farming, agriculture declined for reasons which were not internal, but resulted from the competition posed by industrialisation. At the same time, the expansion of cereal farming in the South-Western half of the country occurred in areas that were less well suited to cereal farming than were those of the North as far as climate and soil were concerned, although they were well suited

MAP 4 - AGRICULTURAL YIELDS



in terms of the availability of labour and of the economy in general.

The economic division of the East from the West replaced the earlier division between North and South, as a result of the decline of agriculture in the East and its expansion in the West, at a certain cost. The apparently deprived regions of the south-west have now become profitably devoted to cereal farming.

For potatoes, the situation is rather different. In 1862 yields were high where production was abundant. Geographical concentration was higher than in the case of cereals. In the western Departments (Loire inferieure, Maine-et-Loire, Sarthe) which were not major producers, yields were high. Where production found suitable terrain, it expanded, and by 1962 there had been changes in the placement of production, to the advantage of *a*) western Brittany, which had become the principal national potato producer, *b*) the North, which showed healthy yields, *c*) the East and the Centre, with lower yields. Some higher yields also occurred in the South-West and the South-East, although these are small producers.

The movements in production did not produce equal improvements in yields. Yields for forage crops as a whole grew at a lesser rate than improvements in quality. The typical variation and the coefficient of variation were very low in 1862, but had increased considerably by 1962. Both a shift and a concentration of production had occurred, but the changes in the zones of production differ from the changes in the zones of high yields, which was from south to north — only in certain central Departments did the two go together. But Normandy, which is a consumer rather than a producer of fodder crops, did also produce very high yields in 1962, which was the reverse of the situation in 1862.

The level of yields results from increases in production and improvements in the methods of cultivation, and the progress benefited the Departments which were only average producers

as well. It would seem then that if levels of yields and productivity are good indicators of economic growth, they do not well reveal disparities between different Departments. It is the differences which result from the quantities produced that serve to determine the importance of particular local farming.

b) Production in relation to the active male agricultural population (Productivity)

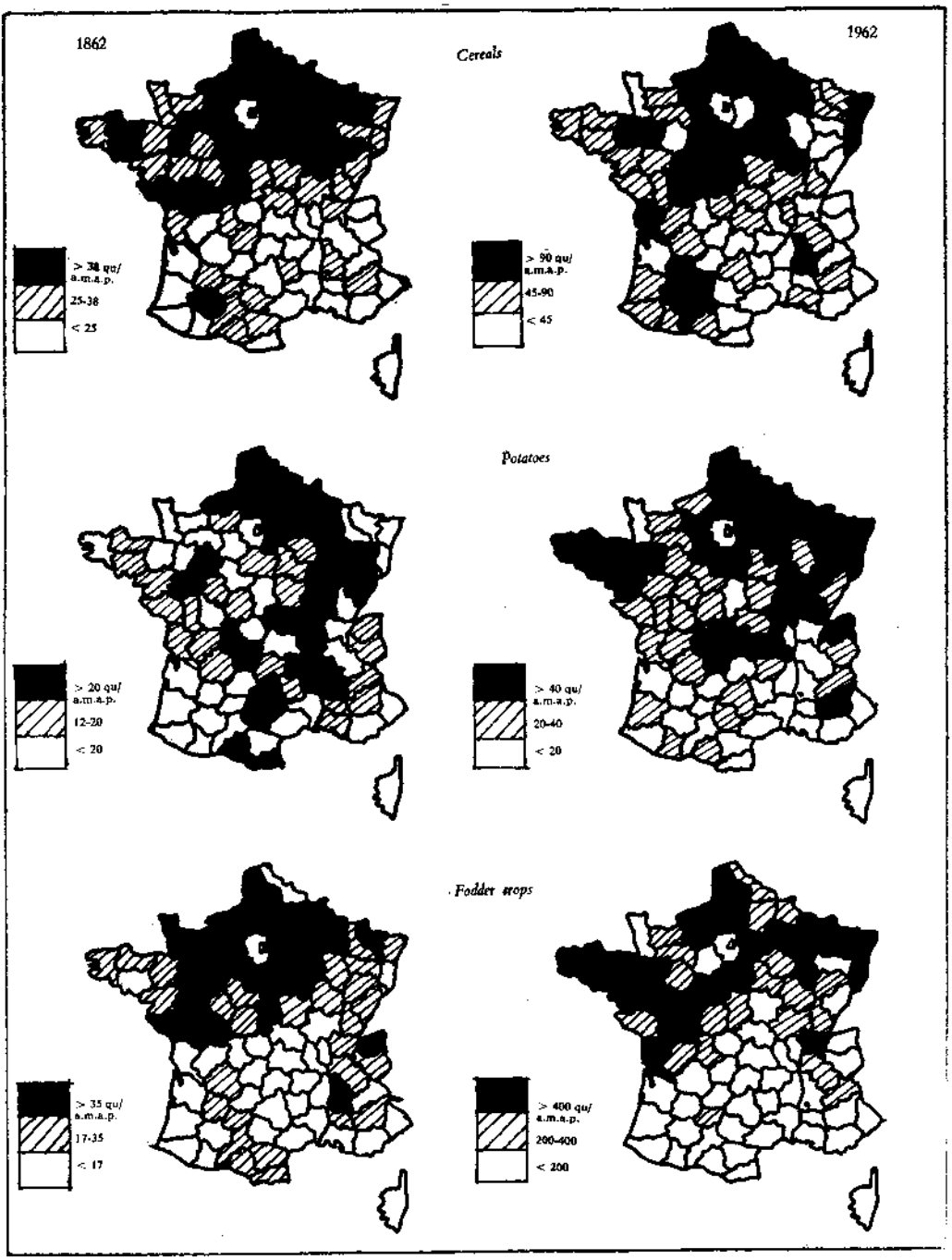
	1862	1962
Cereals		
Median	29.6 qu/a.m.a.p.	72.8
Average	34.4	107.7
Typical variation	17.1	115.5
Coefficient of variation	49.9%	107.2%
Minimum reading	8.9	1.5
Maximum reading	88.6	685.9
Potatoes		
Median	15.8 qu/a.m.a.p.	28.3
Average	18.2	42.7
Typical variation	12.1	42
Coefficient of variation	66.5%	100.7%
Minimum reading	1.8	5.5
Maximum reading	88.6	251
Fodder Crops		
Median	22.3 qu/a.m.a.p.	236.1
Average	30.7	318.4
Typical variation	23.5	308.1
Coefficient of variation	76.4%	96.8%
Minimum reading	2	21.9
Maximum reading	99.8	1990
Head of Cattle		
Median	1.05 head/a.m.a.p.	1.05
Average	1.1	1.09

Typical variation	23.5	308.1
Coefficient of variation	68.7%	55.5%
Minimum reading	0.1	0.1
Maximum reading	5.9	3.1
Id.		
Median	2.5 head/a.m.a.p.	7.5
Average	2.6	8.2
Typical variation	1.36	4.4
Coefficient of variation	52%	54.4%
Minimum reading	0.1	0.1
Maximum reading	6.8	20.9
Head of Pigs		
Median	1.1	3.1
Average	1.25	3.4
Typical variation	0.59	2.82
Coefficient of variation	47.4%	60%
Minimum reading	0.3	0.1
Maximum reading	3.3	11

Productivity in terms of overage output per active male in the agricultural population had improved everywhere, due mainly to the considerable decline in the rural population, combined with the improvement in the quality of products. The indicator is therefore more relevant to the general process of growth than to the differences between the regions, all of which experienced this process of depopulation, which they compensated through the external means supplied by industry. The high levels of growth were generally highly concentrated, and the more backward Departments were either under-populated or under-farmed (see map 5).

As far as livestock was concerned, the density of cattle per hectare shows remarkable stability. The coefficient of variation

MAP 5 - AGRICULTURAL PRODUCTIVITY



qu = quintals; a.m.a.p. = active males in the agricultural population.

is not very high, and in 1962 was lower than in 1862. In national terms, the total stock had grown by some 75%, but its density remained only 22% because the area of grazing land had increased in step.

The labour force employed in livestock rearing remained abundant, and its productivity only increased slightly, both for cattle and for pigs. There was, however, an increase in concentration.

It would seem to be the case that, despite the changes which occurred, there still exists a minimum structure for livestock rearing which is difficult to supercede, and which shows itself especially in a certain hostility towards mechanisation in this period.

c) The environment and the means of progress

1. *The environment*

— maximum height above sea-level	median: 480 meters average: 808 meters typical variation: 987.2 coefficient of variation: 122.2% minimum reading: 71 maximum reading: 4,850

(these data are taken from the observations of the metereological centre)

— rainfall	median: 856 mm/year average: 903 typical variation: 198.2 coefficient variation: 21.9% minimum reading: 606 maximum reading: 1440

(these are averages recorded over extended periods)

— hours of sunshine
media: 1900 hours per year
average: 1976
typical variation: 323.1
coefficient of variation: 16.3%
minimum reading: 1500
maximum reading: 2881

Agriculture has always been close to nature and to the constraints which it imposes. The period in question is the one in which nature has been opposed more effectively by human design than any other. The extent to which man and nature remained in opposition or worked in harmony can be seen from the following:

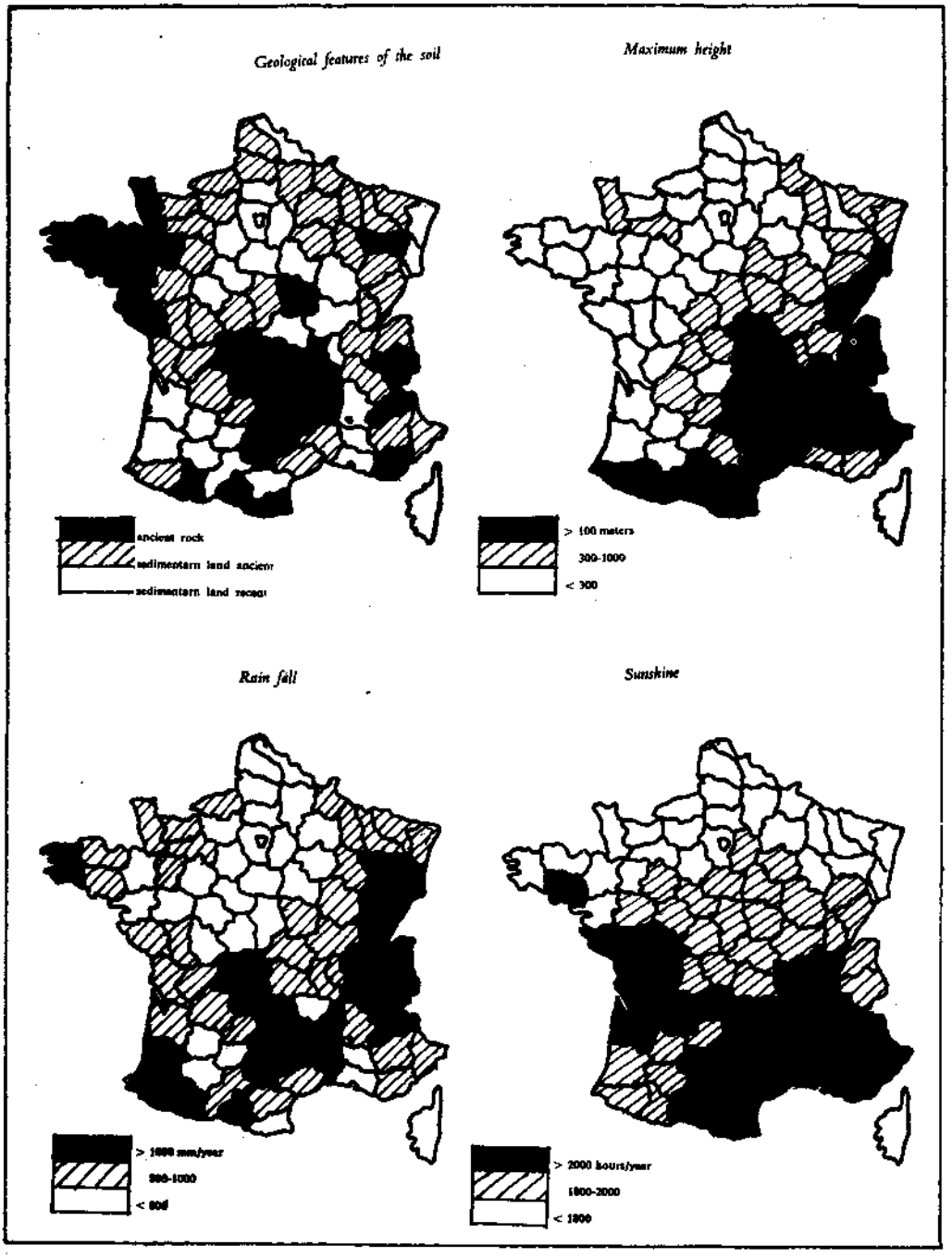
a) The natural environment has been defined in terms of four characteristics: altitude, soil, rainfall, and hours of sunshine. The quality of the soil has not been graded numerically, and a single map serves for reference (map 6). As far as the sun and the rain is concerned, the metereological statistics provide averages going far back over time, so that these figures can be considered as being stable for the period in question.[9] The maximum height is used to indicate the general relief map of each region, and makes it possible to distinguish between the mountain regions and others. However, it proves difficult to bring the administrative frontiers of the Departments into line with their natural boundaries.

The picture of the national territory which emerges from this reveals two divisions between the northern and southern halves, and between the two groups of territory situated on either side of a diagonal running from south-west to north-east.

Type of soil and the relief of the terrain do not coincide;

[9] Source: National Metereological Service.

MAP 6 - THE ENVIRONMENT



the highest areas are on to the south-east of the diagonal (the Alps, the Pyrenées, the Massif Central), but the land is divided into different soil types on a more piece-meal basis. In schematic terms one might distinguish: 1) the ancient rock formations, predominantly in the Centre and the West (this being a low-lying region), a little in the Alps and the Pyrenées; 2) the ancient sedimentary soils which take uo the greater part of the North; 3) the more recent sedimentary soils which correspond to the great river valleys.

Climate matches the relief map; the heaviest rainfall occurs in the area to the south-east of the diagonal and in the Atlantic regions, Brittany in particular. The amount of sunshine declines moving from South to North, so creating another division, with some smaller zones of medium sunshine in the South-West and the Alps, together with a sunny micro-climate in the Morbihan. However, taken as a whole France is a temperate country without any major extremes (as is shown by the low coefficients of variation).

The natural factors are not then strongly differentiated, and have not played a determinant role in the ways that the different regions have been populated, except where altitude formed an obstacle to communications and coincided with poor soils. It is rather the combination of all these factors which determined the distribution of cultivation, and which imposed the constraints which themselves either prevented or encouraged the impetus which economic growth brought to bear on the reorganisation of farming.

The main cereal zones were in the driest and sunniest zones, and on the low-lying sedimentary soils of the northern half; they also pushed into the ancient rock area of Brittany. Moderate altitude and relative dryness also favoured the establishment of cereal farming in the lower parts of the South-West, even though yields there were less good. The evolution which occurred was characterised by an abandonment of the less sought after

cereals, such as rye, which the poorer land had previously been devoted to, and this was now given over to other crops such as potatoes or fodder crops. All the northern half was suitable for cereal production, and the shift which occurred within this territory from the east towards the West resulted largely from industrialisation, although the Nord-Pas-de-Calais was spared because here the variety of activity tended to create new prosperity.

The production of potatoes which in 1862 had been complementary to that of cereals and was concentrated mainly in the eastern half, had by 1962 become an element in the rotation of labour intensive crops, and was centred on the poorer soils of the ancient rock formations (Brittany and the Massif Central). The fodder crop zone was still much the same as the cereal zone: the best areas were in the northern half. Between 1862 and 1962 there was a shift from the North-East to the North-West. As far as the climate is concerned, it seems that the most favoured regions were the wetter ones along the Atlantic seabord. Livestock rearing was situated either in the same place or next to the zones of fodder production, and in particular all along the South-West to North-East diagonal.

Natural factors did then determine the siting of particular types of cultivation; some found themselves rigidly confined by the climatic frontiers, such as the olive whose most northern limits remained firmly fixed. The higher altitudes did not favour large scale cultivation, as they were normally accompanied by more severe climate and more restricted and interrupted space. In some cases, however, the higher land could be adapted and used for other forms of farming, as in the case of livestock rearing on the northern part of the Massif Central. These same factors also tended to restrict crop mobility.

Industrialisation and the decline in agriculture's role served to upset the line which divided the territory from north to south. France's geographical situation meant that the north, the East and the South were all able to benefit from proximity to other

developed European nations, whereas the West had only a seaboard, with no outlets and no direct and close contacts. The agricultural map of France is characterised by dichotomy; between mountains and plains, between wet and dry regions, sunny and overcast, between labour intensive farming and mixed farming areas, between areas of vegetable and areas of animal production, and between agricultural and industrial regions, the two normally being separated. Superimposing these different divisions, one reaches an organisation of the territory in four groupings, which are subdivisions of the main division:

1) the North-West, a low-lying and wet region suited to large scale production of vegetable crops. The northern half is the most heavily populated, but is polarised towards the Paris region;

2) the North-East, again low-lying, but colder and drier, with a tendency for industry to expand, in contact with other countries and with a rich farming economy;

3) the South-West, which lay outside the poles of industrialisation and the thoroughfares of European trade, with a warmer but damp climate, was a region in which farming was to become established only more recently.

4) the South-East, geographically the most varied zone, and with the advantage of a dry and warm climate, but disadvantaged by altitude. It also benefitted from a large population and from contact with the Mediterranean. This is the zone of specialised farming, such as wine, fruit, vegetables and flowers.

2. *The means of progress*

The pattern of development followed by agriculture took the form of a change in methods and a shift towards the West, but it was as a result of the pressure of industrialisation and the help of new farming techniques which offset the fall in the work-

force and made it possible to improve productivity and increase the yield of the land.

a) Units of traction

	1862	1962
Median	38.9 thousand	54.4
Average	40.9	55.6
Typical variation	20.4	23.2
Coefficient of variation	49.9	41.8
Minimum reading	9.9	3.8
Maximum reading	92.5	101.4

To compare agricultural machinery and equipment over a century in which such great progress was made is in itself very difficult, because one is dealing with totally different objects. However, traction has always been auxiliary to agricultural labour, even though it was provided by animal power in 1862 and machine power in 1962. In this field, the transformation was completed within the course of the period in question. We have used a single unit of measure: using the potential power of each form of traction, we have used a coefficient of 1 for horses, of 0.60 for mules and donkeys, 0.50 for oxen, with a tractor in 1962 rated at 6 units.[10]

In 1862 the means of traction depended on the presence of cattle rearing and was tied to geographical constraints. In general, horses were used in the North, oxen in the South, with mules and donkeys in auxiliary roles. The change from animal to tractor took place gradually, and the two coexisted for a long time. Between 1862 and 1962 there was only a total increase in potential traction power of some 25% (leaving aside any reference to actual use and cost of upkeep). On the other hand,

[10] 'Les grandes mutations récentes de l'agriculture française', Commentaire, Etudes du CNEEMA, n. 424, feb. 1977.

the concentration of the means of traction followed that of the cultivated areas. The coefficient of variation was low in 1862, but even lower in 1962.

The principal zones in which the use of traction was concentrated have not greatly changed. In 1862 the largest number of units of traction were in the North, the North-East, and the West down to the Dordogne, the medium zones being in the North, the South-West and the Rhone valley. In 1962, the highest densities were in the North and the West (see map 7).

The traction factor has a fairly stable structure, therefore, and did not show any important change over the course of the century, like the evolution of agricultural production itself (taking into account, of course, the degree of uncertainty of the figures which relate simply to the stock, of both animal and mechanical nature, without any reference to usage).

b) Fertilisers

	1862	1962
Nitrogen fertilisers		
Median	5.6 thousand tons	4.2
Average	5.8	7
Typical variation	2.5	7
Coefficient of variation	42.6%	100.6
Minimum reading	1.5	70
Maximum reading	15.3	28.9
Phosphate fertilisers		
Median	2.2	10.2
Average	2.4	11.8
Typical variation	1.5	9
Coefficient of variation	42.5%	75.7%
Minimum reading	0.6	0.5
Maximum reading	5.5	39.9

Potassium fertilisers

Median	5.6 thousand tons	6.9
Average	5.9	9
Typical variation	2.4	8.4
Coefficient of variation	41.2%	93.6%
Minimum reading	1.5	0.1
Maximum reading	14	34.6

Fertiliser constituted a means of changing and improving both crops and the land. It originated from the original natural cycle of regeneration of the humus by means of the dung heap, itself a bye product of the combination of livestock rearing with cereal growing. The muck heap provides an input on the land which varies with the kind of animal used, but including nitrogen, which encourages plant growth, phosphorous acid (P2 05) which gives them strength and vitality, and potassium (K2 O) which helps establish balance and good health in plan life and improves yield.[11]

As agriculture began to become more specialised and as the former pair of livestock rearing and cereal growing began to become geographically separated, the chemical industry was able to provide individually and in pure form the previous components of the dung heap, supplies being made possible by the national and international trade in organic fertilisers, which in turn resulted from the development of land and sea transportation. Thereafter the technique of using fertilisers consisted both in providing the means to reconstitute cultivated land and also in adapting land for the production of particular crops.

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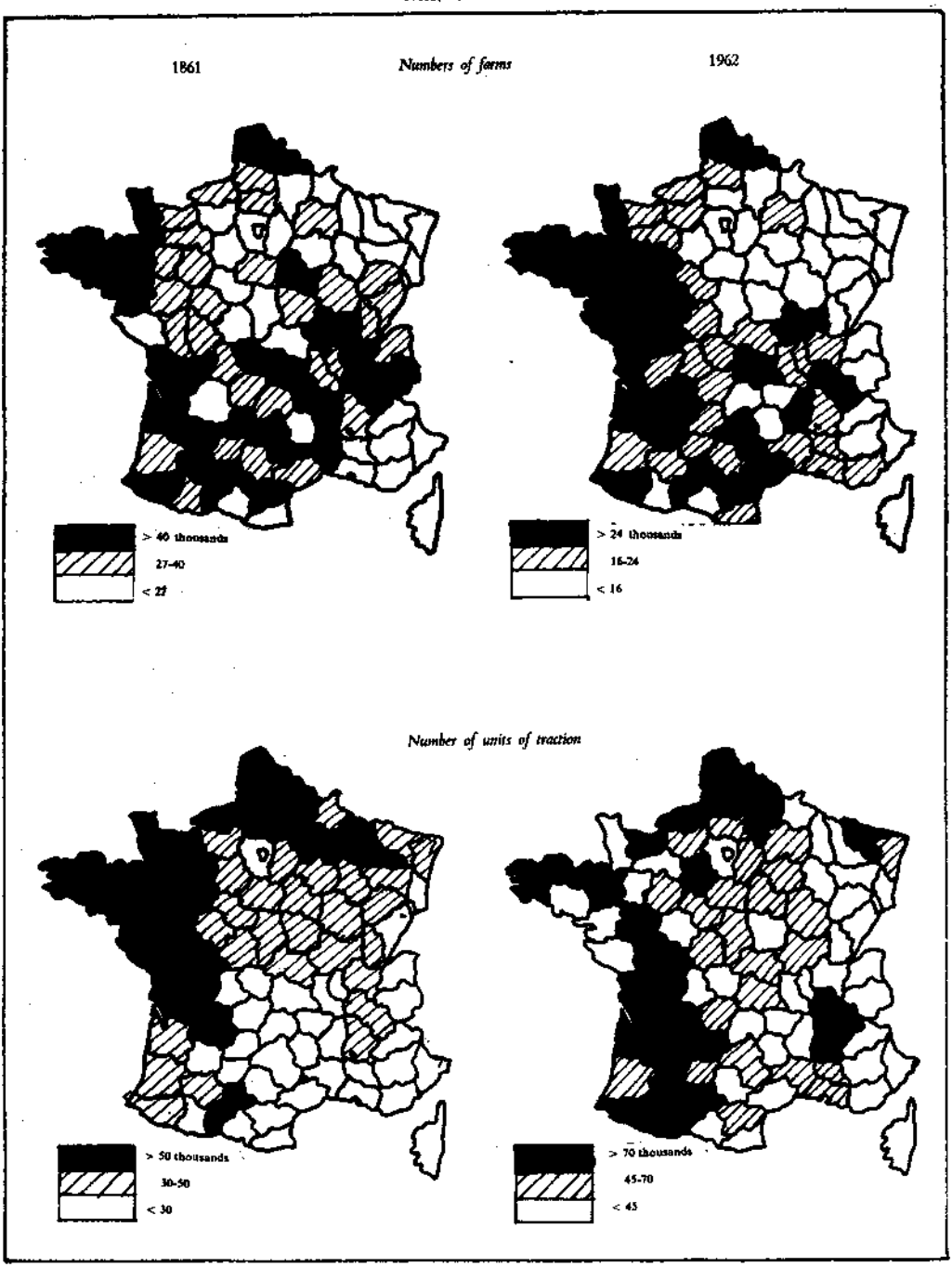
[11] S. PONTAILLER, *Etudes de fumure*, Ed. de la Tourella 1965; J.G. GABRAUD, *Les engrais*, Durand 1955; L. CAILLE, *Les engrais*, Masson 1897.

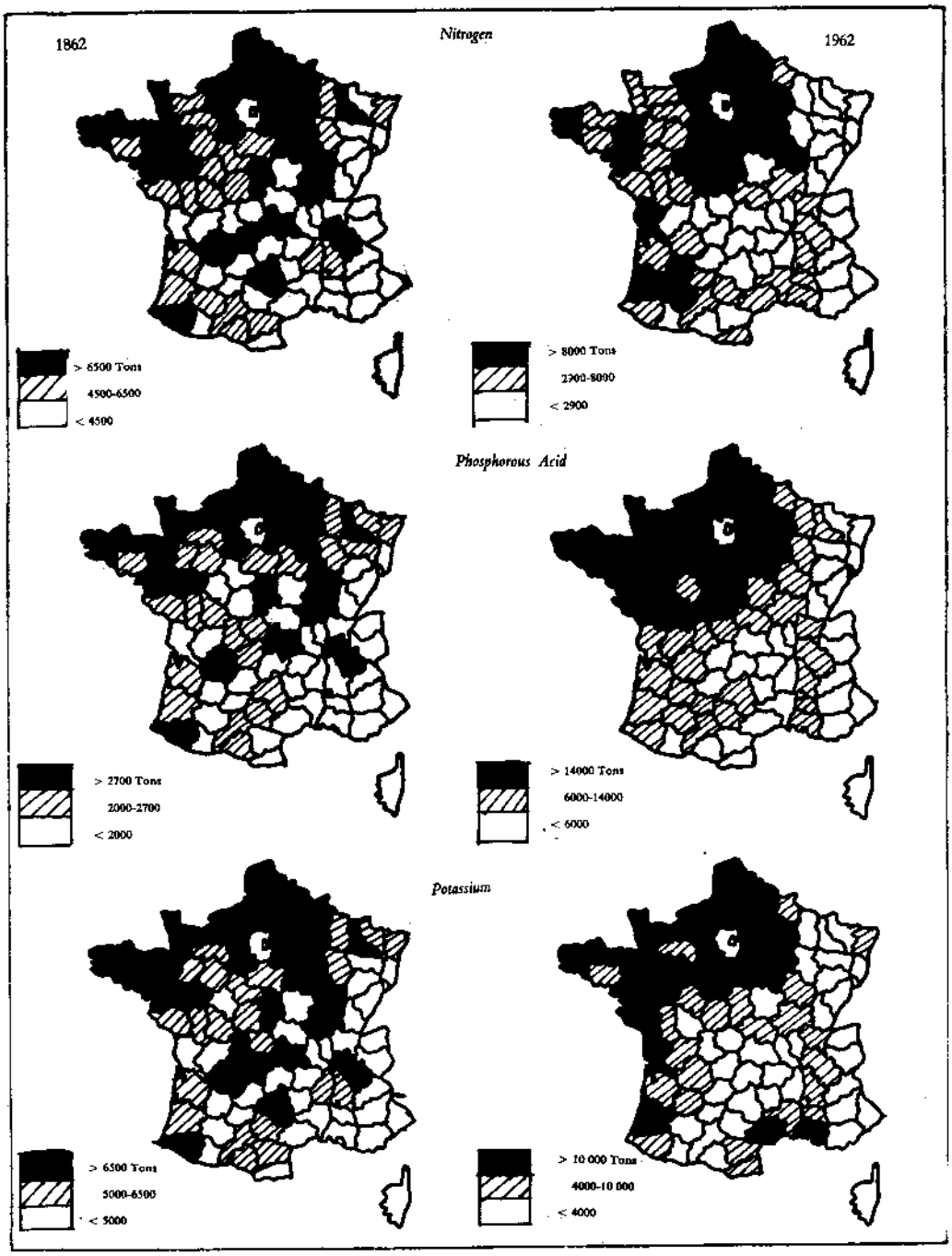
MAP 7


1861
Numbers of farms
1962
> 40 thousands
27-40
< 27
> 24 thousands
16-24
< 16
Number of units of traction
> 50 thousands
30-50
< 30
> 70 thousands
45-70
< 45

The quantities of pure products used in 1862 have been estimated on the basis of the composition of the dung heap according to the types. of animal. These figures need to be treated with some caution, due to the fact that there were losses involved in the use and conservation of the dung heap which we cannot asses, as also in the product per beast. But in contrast to the figures provided by the chemical industry in 1962 (at which time we have assumed the dung heap to be superceded, which is clearly inaccurate), the following observation may be made: — a drop in the share of nitrogen (from 41.1 % to 24.9 % of the total), and of potassium (from 42.1 % to 32.3 %), but an increase in the proportion of phosphorous acid (from 16 % to 42.8 %). In national terms, consumption of nitrogen increased by about 20 %, that of potassium by 50 %, but the quantities of phosphates quintupled. At a Departmental level, there had been very widespread dispersal in 1862, and this had decreased by 1962 (as is shown by the increase in the typical variations). In 1862 the dung heap was a general product which was generally used on the spot. Chemical fertilisers, however, were supplied from outside. The different Departmental distribution of the pure components of the dung heap was entirely a result of the type of animals used, assuming that all dung heaps were used on the spot. One could also point out that with the exception of the east and the west they were used throughout the country (map 8).

In 1962 the use of fertilisers had followed the pattern set by the shifts in the leading crops, and the highest consumption was in the north and the west. Nitrogen was consumed most heavily in the north and the Paris basin, and a little in Brittany and the South-West. Phosporous acid was used heavily throughout the northern half, except, in the east, as was also the case with potassium, which was also used in the vine growing region sof the south.

MAP 8 - CONSUMPTION OF FERTILISERS



c) The number of farms

	1862	1962
Median	33.8 thousand	20
Average	36.6	21.4
Typical variation	14.1	10.1
Coefficient of variation	38.4%	47.2%
Minimum reading	12	6
Maximum reading	74	46.1

In the mid-XIXth century the structure of French agriculture had already been transformed by the process of economic growth, but it was still heavily dependent on natural and environmental circumstances. In the period which followed, the rural population contracted heavily and often in ways that were not related to the local development of the urban population, or in other words without any compensation within the confines of the Department itself. Labour ceased to be a privileged factor in agricultural production at the very moment when industry provided the means for replacing or modifying natural environmental features. In most regions, agriculture began to move ahead when other conditions were favourable and when competition from other forms of activity did not present an obstacle. Concentration occurred in the west while in the centre, except in a few favoured Departments, the decline was general. In the North, on the other hand, agriculture was able to prosper alongside industry. In the Paris basin it also began to develop, despite the strong attraction exercised by Paris.

The evolution was neither uniform nor harmonious in the period. The reduction in the numbers of agricultural labourers was often subject to delay and resistance, and at a Departmental level this often prevented the modernisation of this branch. The means of production also underwent changes, and the number of farms also changed accordingly. The differences are small,

but they do allow us to distinguish between the regions where farms were numerous, and small, and the others. In 1862 these small farms were distributed mainly throughout the southern half, as well as in Brittany and the north, whereas in 1962 they were to be found throughout the western half — that is, in the most agricultural zone. It would not then seem that intensity of production and modernisation of production had gone hand in hand with any concentration of farming units. But one should be wary of the general figures, because a small number of farms in a given Department does not always imply that they were large in size, but in certain cases results from the lack of manpower and the consequent abandonment of the land.

III. The Geographic Zones of French Agriculture

Departmental boundaries ill fit the realities of regional agriculture. Natural boundaries are generally larger than the Departments, which often include different types of land in terms of altitude, climate etc. The agricultural regions have never been grouped around any centre. There is no agricultural pole. Nor are these regions identifiable in terms of any particular type of population, with the exception of Brittany which does have a large non-urban population. The elements of unity are to be found in the past, in the geography of the great trade routes, in geographical or geological unities, or factors such as altitude.

An analysis of the data can provide us with a Departmental agricultural typology.[12] This can be further developed, but for the moment we have grouped the Departments together and extrapolated the features which we have studied: environment, population, agricultural production and means of production, taking into account also factors of permanence or variation in

[12] *Etablissement d'une typologie des exploitations agricoles*, Statistique agricole, Etudes n. 116, 1973.

time. The regions have been defined in the following manner, and one can see that both the maps and the calculations utilised (based on an anlysis of the principal characteristics show that there are often cases where Departments can be grouped together: the North and the Pas-de-Calais, the Bas-Rhin and the Haut-Rhin, the Breton Departments, Haute-Vienne, Creuse et Lot, etc. These groupings also correspond to previously existing historical, geographical and economic unities. In the case of other Departments, however, also partnerships can also be found, varying from case to case.

In this fashion it is possible to identify 7 regions, each with a degree of unity and internal cohesion deriving from a series of shared characteristics. In addition, there are 5 transitional regions, which are centripetal from the former.

a) The compact regions are:

1. The *Nord*, the smallest of the regions, formed from only two Departments: Nord and Pas-de-Calais. It is exceptional in that a rich agricultural economy coexists with a strong and traditional industrial sector. The agricultural and the agricultural populations live side by side without conflict of interest. The region draws advantage both from its position in Europe and from the good working land which it contains.

2. Normandy (Seine-Inferieure, Calvados, Orne, Manche); this is a region with a historical unity which specialises in livestock rearing, even though in the past the cultivation of cereals drew it close to the Paris basin. Its population is highly diversified, and it contains an important urban and industrial sector in the Seine-Inferieure.

3. Brittany: properly defined, this includes the Ille-et-Vilaine, the Côtes-du-Nord, Finistere, Morbihan, Loire-Inferieure. It is an exceptional region, with its own geological ethnic and historical unity. It has benefited from a pattern of development

which has encouraged farming, even though this was something of a handicap at the beginning of the period in question because of the distance between the region, its numerous but scarcely urbanised population, with its climate and poor soils, and the new poles of industrialisation. Due to its eccentric position which prevented it taking part in the first phase of the general process of growth, it has also exerted a strong influence over other neighbouring regions with a structure different from its own.

4. *The Massif Central* is geologically similar to Brittany (they are both ancient rock formations), but its central position has produced a different situation. The region is subject to strong external pressures of attraction, and this is aggravated by the fact that its population density is slight. Three zones can be identified:
— the South: Aveyron, Lozere, Cantal, Ardeche, which share Mediterranean characteristics;
— the West: Creuze, Correse, Haute-Vienne, Lot, Indte, the last of which tends to be drawn towards the North;
— the East: Allier, Haute-Loire, Puy-de-Dome.

The same dispersion is reflected in the structure of the agricultural and rural population the greater part of which has moved away. Certain industrial and urban centres have been retained (Le Creusot, Clermont-Ferand, St-Etienne), but the rest has all gone to Lyon, Marseilles, and Paris. Agricultural decay is now a *fait accompli* in the region.

5. *The Mediterranean strip*: this is formed by the coastal Departments running from Spain to Italy; the western Pyrenees (which also forms part of the South-West, although by climate it is more Mediterranean), the Aude, Hèrault, Gard, Bouches-de-Rhône, Var, Alpes-Maritimes. Despite its elongated shape, the unity of this region lies in its climate, its history, the type of crops grown there. It is orientated towards the sea and foreign trade, as well as being linked with the north by the Rhône

corridor, while the Alpes Maritimes also form part of the alpine block. It is a highly urbanised region, and has been since the Roman period, although there is little industrialisation except in the Bouches-de-Rhône, and its agriculture is specialised and adapted to the climate. The vine holds sway, together with other high value crops. The urban and the scanty rural population exist side by side without difficulties.

6. *The Alps*; the region is made up of the Basses-Alpes, the Hautes-Alpes, the Alpes-Maritimes, Savoie and Haute-Savoie, and Isère. This is a mountainous region, from which its cohesion derives, and for centuries its agriculture has had little potential. The region is poor, and a part of it has only formed part of the French state since the mid-XIXth century (the two Savoys and the county of Nice), it is under-populated and has not succeeded in adapting to modern agriculture because this is difficult to introduce at these hights. The region has, therefore, sought prosperity in other sources, most notably in industries based on electrical power, and in tourism.

7. *The East*: this is a massive region which brings together the provinces of Alsace and Lorraine (Haut-Rhin, Meurthe-et-Moselle, Vosges), Champagne (Marne and the Haute-Marne) which also forms part of the Paris basin of which it is an extension, and the Ardennes, which are shared with the Pas-de-Calais in the north. In this region industry has dominated economic development, reducing farming to a very secondary role, except in the case of certain specialised products, such as quality wines.

b) The transitional regions are as follows:

8. *The Paris basin*: this is made up of a large number of small zones, each of which are subject to a double force of attraction: the centripetal attraction which Paris exerts on the population, which tends to hinder agricultural development, and

the centrifugal forces exerted by the surrounding regions on its agriculture. The regions are:

— in the North: the Somme, the Oise, the Aisne, forming a transitional band towards the Nord and the Pas-de-Calais. They are heavily populated, and produce cereals and other crops. Agriculture is specialised and well equipped;

— the West: the Eure, the Eure-et-Loire, form a transitional region around Normandy, and have the same agricultural features as the north but a lower population density;

— the South: the Indre, the Loire-et-Cher, the Loiret, the Cher, the Nievre and the Yonne — this is a vast region with a very diversified population structure and production structure;

— the East: the Seine-et-Marne, the Marne, the Aube and the Yonne, which form part of the northern cereal zone but are also influenced demographically by industrialisation in the east.

There are also a few Departments which geographically form part of a number of the zones of attraction, and hence link them together — such as the Somme and the Oise in the North, the Eure in Normandy, the Yonne, the Indre-et-Loire in the South, and the Marne in the East.

9. Attached to Brittany, but quite distinct from it, is a *western region*, formed from Mayenne, the Sarthe, the Maine-et-Loire, the Indre-et-Loire, the Vendee, Vienne, Charente, and Charente-Inferieure. This is a vast zone of transition, opening towards the South-West (the Charentes), the centre (Indre-et-Loire, Vienne), but which finds its unity in the fact that it forms part of the agriculture of the West, its population is scarcely urbanised, while industry is limited and mainly recent. The climate too is cold and wet, the land low-lying. It is a transit region. Its agricultural products are varied, with livestock taking pride of place.

10. *The South-West*: this covers the mountainous zone covering the Departments of the Basses-Pyrénées, the Hautes-

Pyrénées, the Ariége, and the Pyrénées orientales, and a lower region formed by the Haute-Garonne, the Gers, the Gironde, the Landes, the Dordogne, the Lot-et-Garonne, the Tarn, and Tarn-et-Garonne. Its force of attraction affects the Charentes, although they do not belong to the *langue d'oc* like the other parts of the region. Agricultural prosperity in this region is something of fairly recent origin. It has been encouraged by the restructuring of the national economy, which has given new impetus to the development of agriculture in the western half. The main achievements have been the reclamation of the Landes during the last century and the development of the potential of the Garonne valley.

The region is handicapped by its eccentric position, by a low degree of urbanisation and by heavy rural depopulation. It embraces a wide range of agricultural terrain, and opens towards the neighbouring regions. But agricultural specialisation has placed these Departments in a situation of inferiority, since they are relatively poor due to the absence of any adequate industrial presence.

11. *The South-East*: Ain, Ardèche, Drôme, Vaucluse, Isère, Rhône, Loire, together form a vast and varied region which includes mountains on either side of the Rhône valley, the Ardèche and the Loire being in the Massif Central, Isère in the Alps. This is a transit and link region, and its agriculture is equally varied, tending to specialise in products with high added value made possible by the climate in the lower areas (fruits and vegetables), but much less developed in the mountains. The population structure is also very varied, and is concentrated around the Lyon region.

12. *The Centre-West*: this includes the Haute-Saône, the Saône-et-Loire, the Cote d'Or, the Doubs, and the Jura. This too is a transit region, which extends the former towards the

North, linking on one hand with the Paris basin and on the other with continental Europe, and as such it has always been historically and geographically a transit region. It forms part of the northern part of the territory, with a cool climate. Industry has driven out certain branches of agriculture and prevented the modernisation of what has remained.

Conclusion

Industrial development benefited those regions which have had openings towards the rest of Europe, whereas agriculture developed more in those that were cut off. The starting point in the mid-XIXth century was one when agriculture was being fully transformed and had embarked on the road to modernisation, even though its structures were still archaic in so far as population, which was still vast, livestock rearing and methods of cultivation were concerned. By 1962 the modernisation and adaptation of agriculture had not occurred, even though the means for doing so — mechanisation — had already largely been established, while the agricultural population had developed sufficiently, so that only new attitudes were needed. As J. Pautard has written: '...the mechanism of the creation of regional disparities in agriculture would seem to be closely related to the process of growth in the economy as a whole'.[13]

The Departmental diffusion of this process of growth did not result in an agricultural revolution, but in an evolution typified on one hand by a degree of definite progress, in step with what had happened in the other sectors of the economy, but also by a situation of increasing independence on the means of production which were being produced by industry, by the need for capital

[13] J. Pautard, *op. cit.*

without any possibility of self-financing, and by the increasingly subordinate position of the rural population. The resulting geographical shifts brought about a division of the territory between a North-Eastern zone which had the advantage of being industrialised and a South-Western zone where prosperity was dependent on agriculture.