

REGIONAL DIFFERENCES IN CROP PRODUCTION IN  
MEDIÆVAL KENT

BY ANN SMITH

THE archives of the Chapter Library of Canterbury Cathedral include a collection of Beadles' rolls (serjeant's comptotus rolls, bailiffs' account rolls or manorial accounts) which relate to 31 of the 33 manors<sup>1</sup> held by Canterbury Cathedral Priory in Kent during the mediæval period.

The following description of crop patterns on the Priory estate in the period 1271-1379 is based on a geographical analysis of four of the many sets of figures relating to agricultural production and management which are contained in the rolls.<sup>2</sup> The rolls have already been studied in detail by R. A. L. Smith<sup>3</sup> in his work on the organization of the Priory estate. R. A. L. Smith's central theme was financial administration and in considering the costs of the agrarian economy he was led to describe methods of agriculture. However, he did not make a detailed statistical analysis of agricultural production to which the rolls are particularly well suited. T. M. Bishop<sup>4</sup> and F. R. H. du Boulay<sup>5</sup> have written accounts of mediæval agriculture on single manors in Kent using beadles' rolls; and R. A. Pelham<sup>6</sup> has shown the value of a mediæval estate document, less detailed than the beadles' rolls, for a geographical study of agriculture in Sussex.

However an exhaustive analysis of the information contained in the large number of beadles' rolls which exist has still to be done.<sup>7</sup>

THE DOCUMENTARY EVIDENCE

The beadles' rolls are the annual accounts made by the stewards of the Priory manors which were sent to Canterbury for audit each

<sup>1</sup> No rolls are available for the Barton or for the joint manor of Seasalter with Whitstable. A list of the other manors appears on Fig. 1.

<sup>2</sup> This article derives from part of the author's thesis, 'A geographical study of agriculture on the Kentish manors of Canterbury Cathedral Priory, 1272-1379' (University of Liverpool, M.A. thesis, 1961).

<sup>3</sup> R. A. L. Smith 'Canterbury Cathedral Priory' (Cambridge University Press, 1943).

<sup>4</sup> T. M. Bishop 'The rotation of crops at Westerham 1297-1350' (*Economic History Review*, IX, 1938).

<sup>5</sup> F. R. H. du Boulay 'Late continued demense farming at Otford' (*Arch. Cant.*, LXXII, 1959).

<sup>6</sup> R. A. Pelham 'The agricultural geography of the Chichester Estates in 1388' (*Sussex Arch. Colls.*, LXXVIII, 1937).

<sup>7</sup> A detailed analysis is to be found in J. A. Raftis 'The Estates of Ramsey Abbey' (*Pontifical Inst. of Medieval Studies and Texts* No. 3. 1957, Toronto).

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Michaelmas (September 29th). Numerous detailed rolls are available for the reigns of the first three Edwards (1272-1379), and the few less detailed rolls which exist for earlier and later dates have been omitted from the study.

On the inside of each roll is recorded the receipts and expenses of the manor and on the outside is the grange exit in which is recorded the agricultural production of the demesne.<sup>8</sup> Crops and stocks in kind and animal products are enumerated and it is part of the former information which will be analysed here. As the extract below shows there are two sections for each crop, the first describing the total quantity of the crop held on the manor, and secondly a statement of what was done with the crop.

*Extract from the beadles' roll for Monkton, 1315-1316*

Fruementum: Idem respondit de CVii semis de exitu frumenti apud Moneketon. Et de XXVii semis de Vi buss de exitu frumenti apud Brokeshende. Et de i sema iii buss de excremento seminis. Et de ii semis ii buss de emptis.

Summa CXXXVii semis ii bus

Wheat: The same answers for 107 seams of wheat of the issue of Monkton. And for 27 seams, 6 bushels of wheat of the issue of Brokesend. And for I seam 3 bushels left over from sowing. And for 2 seams, 2 bushels bought.

Total: 138 seams 2 bushels.

Inde: In semine apud Moneketon super LXX acras XXXVii semis super acram di sema et ii semis ultra in toto. Item in semine apud Broke super xv acras, viii semis, super acram di sema et di sema ultra in toto.

Thence: In seed at Monkton over 70 acres 37 seams over the acre half a seam and two seams beyond this amount. Item in seed at Broke over 15 acres 8 seams over the acre half a seam and half a seam beyond this amount.

From the above information for every manor the following items were extracted for the year 1291 which was chosen to represent the beginning of the period.

- (i) The acreage sown for each crop.
- (ii) The number of bushels sown per acre.
- (iii) The number of bushels sown of each crop.
- (iv) The number of bushels harvested in the following year 1292.

Where the beadles' roll is not extant for 1291 the year nearest in date was chosen. To ensure that the year chosen was representative of

<sup>8</sup> The demesne was that part of the manor retained by the Priory and farmed by its servants; the rest of the manor being leased to tenants.

normal conditions on the manors the statistics were checked against the results of a standard deviation analysis of rolls for the period 1285-1296. Where relevant agricultural production in 1291 was compared with that of 1371, a date chosen to represent the end of the period; and the figures for this latter date received a similar statistical treatment.

#### COMPOSITION OF THE SOWN DEMESNE ACREAGE

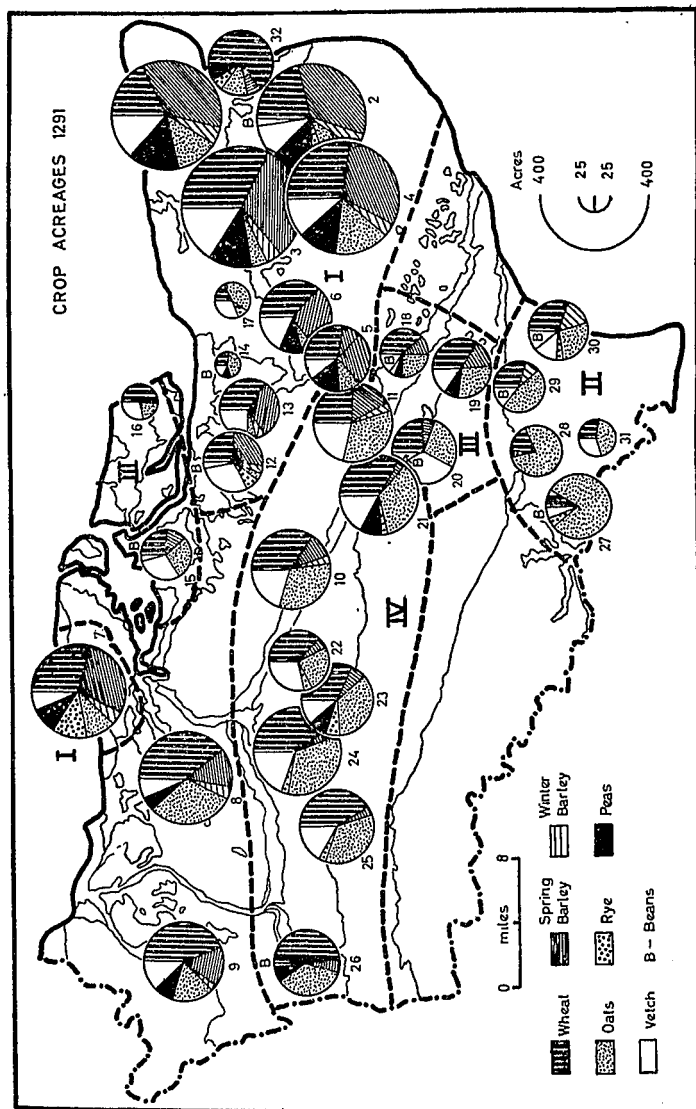
In order to compare the crop patterns of the manors, the acreages under individual crops on each manor were expressed as percentages of the total sown demesne acreage and plotted as proportional pie graphs (Fig. 1, and Appendix A). As the manors were distributed throughout Kent, they serve as samples of regional conditions on different geological outcrops, and hence on different soil types. The location of the manors in relation to the geological formations is given in simplified form below Fig. 1. The numbers given in brackets after each manor in the text, refer to their numbering on the maps. In fact many manors were situated at the junction of two geological formations or held land in more than one place; and therefore a description of their location and of their different soil qualities would be long and detailed and has been omitted. The significance of the location of individual manors will become apparent within the text.

In 1291 four distinct groups of manors with the same crop economies were apparent and showed a close correlation with geology. One manor Cliffe (7) had an acreage pattern which could be related to one of these groups, although it lay some distance from the group, and four manors Blean (17), Lydden (32), Meopham (8) and Orpington (9) had unique acreage patterns.

Barley was the dominant crop on a group of manors situated in the northern half of East Kent (Group I) and lying on Chalk or Thanet Beds. Wheat was of secondary importance except at Monkton (1), and Copton (13) where legumes exceeded wheat in acreage. On all the manors oats were relatively unimportant. Cliffe (7) situated on the isolated Chalk outcrop in the Hoo Peninsula, also had the same pattern as this group.

Lydden (32), and Blean (17) were anomalies within the above group. The small acreage of wheat, in contrast to the moderately large acreages of oats and rye, reflects Lydden's situation within the ill drained Sandwich marshes, for both crops were favoured in the medieval period on economic margins of cultivation.<sup>9</sup> At Blean, which lay wholly on the very stiff London clay, oats was by far the most important crop, and rye was again prominent, but the wheat acreage was greater than at Lydden.

<sup>9</sup> R. A. L. Smith, *op. cit.*, 137-138.



*Chalkland Manors.* 1. Monkton; 2. Eastury; 3. Ickham; 4. Adisham; 5. Godmersham; 6. Chartham; 7. Cliffe; 8. Meopham; 9. Orpington; 10. Hollingbourne; 11. Welles.  
*Manors on Thanet Beds and Bricearth.* 12. Elverton; 13. Copton; 14. Ham.  
*Clayland Manors.* 15. Barksore; 16. Leysdown; 17. Bleau; 18. Brook.  
*Lower Greensand Manors.* 19. Mersham; 20. Great Chart; 21. Little Chart; 22. Loose; 23. East Farleigh; 24. West Farleigh; 25. Peckham  
*Marshland Manors.* 27. Ebony; 28. Appledore; 29. Ruckinge; 30. Agney cum Orgerswick; 31. Fairfield; 32. Lydden.  
 Manor 26, Westerham, has been omitted from this particular study as it did not belong to Canterbury Cathedral Priory.

Figure 1.

On the manors of Romney Marsh (Group 2) oats were dominant particularly at Appledore (28) and Ruckinge (29). The acreages of wheat and barley were approximately equal and within the marsh were surprisingly high considering the ill drained nature of the reclaimed marshland. R. A. L. Smith found that from the late thirteenth century onwards the Priory made efforts to increase the acreage and yield of the more profitable cereals on its marshland manors, by marling the land heavily and buying in seed corn.<sup>10</sup> Minor but significant features of the arable economy of this group were the presence of rye and beans and the absence of peas; also the prominence of barley as a winter crop whereas elsewhere it was chiefly spring sown.

Group 3, comprises manors in two separate areas. Intermediate in position between the two groups already described, were the clayland manor of Brook (18), and the western Lower Greensand manors of Mersham (19), Great Chart (20), and Little Chart (21), all of which had fairly heavy soils. Fringing the North Kent marshes and situated on the London Clay were the manors of Barksore (15), and Leysdown (16). On all these manors wheat ranked first in acreage with oats as the secondary grain crop but exceeded in acreage by legumes. Beans were again of minor importance.

A mid-Kent group of manors (Group 4) comprised the eastern Lower Greensand manors of Peckham (25), East and West Farleigh (23 and 24), and Loose (22) whose soils were relatively light; together with Welles (11) and Hollingbourne (10), which lay on Chalk marls. Wheat was the major crop but was nearly equalled by oats. The barley acreage was very small, although noticeably larger on the two chalkland manors than elsewhere, and was exceeded by the legume acreage.

Finally two chalkland manors, Meopham (8) and Orpington (9) had unique acreage patterns, a reflection of their differing physical situations. Orpington was situated on thin soils which included valley gravels, whilst Meopham lay on Clay-with-Flints.

Wheat ranked first in acreage on both manors, and their barley acreages which were approximately equal were greater than on the manors of the previous group. However, the oats acreage on the heavy soils at Meopham was second only to that of wheat, whereas Orpington grew very few oats and had quite a large acreage under legumes which were grown to maintain the fertility of the light soils.

In 1371 (Appendix B) several crop patterns had altered, chiefly the result of changes in the acreages of barley and oats. These changes again show a regional distribution. An increase in legumes also occurred on some manors reflecting their increasing use in crop rotations.

<sup>10</sup> R. A. L. Smith, *op. cit.*, 178.

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A similar legumes increase was observed during the same period at Westerham by T. A. M. Bishop.<sup>11</sup>

In 1371 barley was far less dominant and was only the first-ranking crop on those chalkland manors, which had soils derived from deposits of Brickearth and Thanet beds and on the clayland manor of Brook. On the other chalkland manors (Godmersham (5), Chartham (6), and Cliffe (7)), wheat had replaced barley as the dominant crop. However, the barley acreage showed an increase on the Lower Greensand manors, particularly on those western manors lying on light soils.

Oats had declined in acreage by 1371. On manors on the Lower Greensand and Chalk marls oats had ranked second to wheat in acreage in 1291, but by 1371 it had fallen below barley and legumes. On the clayland manors oats had also declined and on Romney Marsh it was only dominant at Ruckinge (29) and Ebony (27). At Agney cum Orgarswick (30) they were exceeded in acreage by barley and wheat, and at Appledore (28) by wheat. This increase in the acreages of the more profitable cereals on the marsh was possible in 1371 because as the reclaimed land gradually dried out it was no longer necessary to grow so much oats, 'the usual crop on new land'.<sup>12</sup>

The range of crop economies described above chiefly reflects the soils preferences of individual crops but also their commercial and utilitarian value.

The bulk of the grain was sold and therefore obviously grain crops would occupy the major part of the sown acreage. Wheat fetched the highest prices with barley next in value.<sup>13</sup> A small amount of grain was also used for human consumption whilst oats was used as fodder for horses and cows. Barley was particularly important since it was used for brewing ('in braseum'), and was issued to the farm servants as payment for their services ('lib. famulus'). Although the leguminous plants were used for human consumption ('in potage') they were primarily used for stock fodder. The animals were sometimes fed on the fields ('in campo') particularly on the chalklands,<sup>14</sup> or the crops were threshed and used as winter fodder ('in potage').

As today wheat was easily the most important grain crop, and had a very regular distribution being a major crop on all the manors. Its importance reflects both its commercial value and its adaptability to a variety of soils.<sup>15</sup> It was the dominant crop on manors on the heavier

<sup>11</sup> T. M. Bishop, *op. cit.*

<sup>12</sup> R. A. L. Smith, *op. cit.*, 178.

<sup>13</sup> Thus at Ickham in 1371 wheat sold for 6s. a quarter, and barley for 4s.

<sup>14</sup> For example in the account roll for Adisham (Edward III, 45-46) it is stated that no vetches were harvested from 25 acres because they were fed to sheep in the field—'de xxv acras nil quia forage—multones in campo'.

<sup>15</sup> A. D. Hall and E. J. Russell, *The agriculture and soils of Kent, Surrey and Sussex* (H.M.S.O., 1911), 140.

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soils of the clays and chalk marls, as well as on manors on the lighter soils of the Lower Greensand. It was also important on the manors of Romney Marsh and on the manors of the chalklands and Thanet Beds, although on these latter manors it usually ranked second to barley.

In contrast to wheat, barley was an important crop only on the chalkland manors of East Kent, and particularly on those manors which had fertile soils derived from Brickearth and Thanet Beds. This grain is essentially a light land crop.<sup>16</sup> This explains why acreages were small on the clayland and marshland manors. The Report of the Land Utilization Survey of Kent<sup>17</sup> contains the following summary of the distribution of barley-growing in the county in the early 1930s—'in contrast to wheat the growing of barley is very markedly localized on the chalky and sandy loams of East Kent including Thanet. There is some on most parts of the chalk belt but very little in the Weald proper, south of the chalk scarp, where soils are too heavy and too poor.' This might equally well be a description of barley-growing on the manors of Canterbury Cathedral Priory in the medieval period. The presence of soils suitable for barley-growing in close proximity to Canterbury was fortunate, since the Priory used large quantities of the grain for brewing and for payment to its servants. The Bartoner's accounts, described by R. A. L. Smith,<sup>18</sup> record the quantities of grain sent to the Priory. They reveal that the bulk of the grain came from the East Kent manors.<sup>19</sup> This probably explains why barley-growing was not more important on the light soils of the Lower Greensand manors since they lay at a considerable distance from Canterbury.

Oats showed a much more even distribution than barley since it was a useful crop being suited particularly to heavy, ill-drained soils. Thus it was dominant on the marshland manors and of secondary importance on the Chalk marls and clays. On the lighter soils of the Lower Greensand and Chalk, acreages were small since the more profitable grains, wheat and barley, were suited to these soils.

Rye was of minor importance and was only grown on poor lands. For example acreages occur on the marsh soils of the manors of Romney Marsh, and on the lighter soils at some Lower Greensand manors such as Peckham (25).

Legumes were particularly important on the claylands and marshes since beans was a heavy land crop.<sup>20</sup> The emphasis on bean-growing on the Romney Marsh manors is interesting since this area today is

<sup>16</sup> A. D. Hall and E. J. Russell, *op. cit.*, 143.

<sup>17</sup> L. D. Stamp (edit.), *The Report of the Land Utilization Survey of Britain*, part 85—Kent 1943, 578.

<sup>18</sup> R. A. L. Smith, 'The Barton and Bartoner of Christ Church, Canterbury'. (*Arch. Cant.*, LV, 1942.)

<sup>19</sup> R. A. L. Smith, *op. cit.* The Bartoners Account for 1311-12 is printed.

<sup>20</sup> L.U.S. Report, *op. cit.*, 578.

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noted for the growing of beans for stockfood.<sup>21</sup> Elsewhere beans was chiefly a garden crop and consequently was not included in the percentage calculations.<sup>22</sup> Peas were absent or insignificant on many bean-growing manors as for example those of Romney Marsh since their place in the rotation was taken by beans.

The influence of the edaphic factor can be considered further by studying the number of bushels sown per acre (Fig. 2), and particularly by analysing crop yields (Fig. 3).

Fig. 2. The number of Bushels sown per acre in 1291.

<i>Manor</i>	<i>Spring Barley</i>	<i>Winter Barley</i>	<i>Oats</i>
<i>Chalkland Manors</i>			
1. Monkton	7	6	3½
2. Eastry	6	5	3
3. Ickham	6	5	3
4. Adisham	6	—	3
5. Godmersham	6	—	3
6. Chartham	6	—	3
7. Cliffe	6	5	3
8. Meopham	4	3	4
9. Orpington	4	3	4
10. Hollingbourne	5	5	3½
11. Welles	5	5	3½
<i>Manors of Thanet Beds and Brickearth</i>			
12. Elverton	6	5	3
13. Copton	6	—	3
14. Ham	—	6	3
<i>Clayland Manors</i>			
15. Barksore	5	5	3
16. Leysdown	—	5	3
17. Blean	—	—	3
18. Brook	5	—	3½
<i>Lower Greensand Manors</i>			
19. Mersham	5	—	3½
20. Gt. Chart	5	—	4
21. L. Chart	5	—	3½
22. Loose	5	—	3
23. E. Farleigh	5	—	3½
24. W. Farleigh	5	—	3½
25. Peckham	5	—	3½
<i>Marshland Manors</i>			
27. Ebony	—	4	4
28. Appledore	—	4	4
29. Ruckinge	—	4	4
30. Agney cum Orgarswick	5	4	4
31. Fairfield	5	—	—
32. Lydden	6	5	5

<sup>21</sup> G. H. Garrad, 'A survey of the Agriculture of Kent'—(*County Agricultural surveys*, no. 1, Royal Agricultural Society, 1954, 82.)

<sup>22</sup> For example at East Farleigh in 1308 (Edward II, 1-2) three bushels of beans were planted 'in gardina'.



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FIG. 3. Yields per bushel sown, 1291.

A—Actual yield per bushel sown.

B—The actual yield per bushel sown of each crop expressed as a percentage of the total yield of all four crops.

Manor	Wheat		Spring Barley		Oats		Peas and Vetch		Total
	A	B	A	B	A	B	A	B	
<i>Chalkland Manors</i>									
1. Monkton	4.2	44	2.0	21	2.7	30	0.7	7	9.6
2. Eastry	3.7	39	2.0	21	2.8	30	1.0	10	9.5
3. Ickham	4.9	48	2.4	24	2.2	21	0.7	7	10.2
4. Adisham	2.6	37	1.9	26	1.5	22	1.0	15	7.0
5. Godmersham	2.8	28	3.6	36	2.2	22	1.5	14	10.1
6. Chartham	2.1	31	1.9	28	1.8	27	1.0	14	6.8
7. Cliffe	2.0	30	2.4	36	1.3	20	1.0	14	6.7
8. Meopham	3.8	36	2.6	24	2.1	19	2.4	21	10.9
9. Orpington	3.3	31	3.2	29	2.7	23	1.9	17	11.1
10. Hollingbourne	1.9	28	2.0	29	2.2	32	0.8	13	6.9
11. Welles	2.0	28	2.1	30	1.3	18	1.9	26	7.3
<i>Manors of Thanet Beds and Brickearth</i>									
12. Elverton	2.9	36	2.6	32	1.5	18	1.1	14	8.1
13. Copton	5.5	38	4.0	27	4.5	31	0.7	4	14.7
14. Ham	1.6	19	3.2	37	2.0	24	1.7	20	8.5
<i>Clayland Manors</i>									
15. Barksore	2.0	22	2.6	29	2.3	26	2.2	23	9.1
16. Leysdown	3.7	42	—	—	2.6	29	2.5	29	8.8
17. Blean	—	—	—	—	—	—	—	—	—
18. Brook	4.8	39	2.5	20	3.8	30	1.4	11	12.5
<i>Lower Greensand Manors</i>									
19. Mersham	3.1	30	3.3	33	2.6	26	1.2	11	10.2
20. Gt. Chart	3.1	30	2.8	27	2.7	27	1.7	16	10.3
21. L. Chart	1.3	23	2.0	36	1.7	31	0.6	10	5.6
22. Loose	2.3	26	2.8	32	1.6	18	2.2	24	8.9
23. E. Farleigh	3.3	47	1.6	23	1.6	23	0.5	7	7.0
24. W. Farleigh	1.5	23	1.7	26	1.8	27	1.6	24	6.6
25. Peckham	2.7	39	1.5	22	1.4	20	1.3	19	6.9
<i>Marshland Manors</i>									
27. Ebony	2.8	41	—	—	4.1	59	—	—	6.9
28. Appledore	2.5	29	2.6	31	2.7	32	0.7	8	8.5
29. Ruckinge	3.5	29	4.0	33	3.3	27	1.4	11	12.2
30. Agney cum Orgarswick	2.3	23	3.4	34	2.8	28	1.5	15	10.0
31. Fairfield	3.8	46	—	—	3.4	41	1.1	13	8.3
32. Lydden	2.7	35	2.4	32	2.0	27	0.4	6	7.5

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### THE NUMBER OF BUSHELS SOWN PER ACRE

The sowing rates of barley and oats varied on individual manors and can be correlated with their relative importance in the demesne arable economy. This suggests an awareness of soil potentialities and adaptation of agricultural practices with this in view.

The manors which sowed the largest number of bushels per acre of barley were those in East Kent on which barley was the dominant crop. These manors sowed 6 or 7 bushels of spring barley per acre and 5 or 6 bushels of winter barley. Chalkland and Lower Greensand manors where barley was moderately important sowed 5 bushels of both spring and winter barley per acre. On Romney Marsh, where barley was not important in 1291 since the soils were newly reclaimed, four bushels of winter barley and five of spring barley were sown. However, in 1371 when much more barley was sown on the marsh the sowing rate of winter barley increased from four to five bushels per acre.

The differences in the sowing rates of oats although small show a gradation the reverse of that for barley. Thus on the manors of Romney Marsh where oats was the dominant crop, four bushels were sown per acre; whilst on the chalkland manors where oats were unimportant only three bushels were sown per acre.

A standard sowing rate of four bushels per acre of wheat is puzzling since it was the major crop in the economy, but it is probably a reflection of its adaptability to varied soils. The minor crops, rye, peas, beans and vetch show no significant regional variations in sowing rates.

### CROP YIELDS

Since the sowing rates for individual crops varied regionally the yield per bushel sown was analysed (Fig. 3) rather than the yield per acre sown. Ideally the average yield per bushel sown for a consecutive number of years should have been studied thereby eliminating the distortions caused by the occurrence of good and bad years. However, as account rolls for a sufficient number of consecutive years occurred so rarely this was not possible, and therefore the analysis was restricted to the year 1291.

To make possible comparison between the manors the yields per bushel sown of wheat, spring barley, oats and peas/vetch were expressed as a percentage of the sum of the yields of all four crops on each manor. Rye, winter barley and beans were not grown in sufficient quantities on enough manors to make yield calculations worthwhile. The actual yield has also been tabulated because the percentage analysis presents the yields of a particular crop relative to the yields of the other crops on the manor, and therefore masks the presence of high or low total yields on a manor. Therefore despite the fact that the actual crop yields

of 1291 may have been influenced by abnormal weather conditions they have been calculated and are referred to where relevant.

The percentage yields of wheat showed the largest range varying from 23-47 per cent. since large acreages of wheat were widely grown it must sometimes have been cultivated on soils which were not particularly suited to it and consequently yields would be low. It would seem also that the sowing rate of four bushels per acre which was almost universal on the manors, did not always give satisfactory results.

Wheat yields in general decreased westward and southwestward from N.E. Kent. On the manors lying on the drift-mantled lower slopes of the Chalk together with two of the Lower Greensand manors, and Brook and Meopham, wheat comprised over 35 per cent. of the total yield. The latter manor (8) lay on Clay-with-Flints which 'with careful farming and manure will yield excellent crops of corn and especially of wheat'.<sup>23</sup> Brook (18) lay on the Gault Clay which is rather less intractable than the London Clay on which wheat yields were lower. On all these manors wheat was first-ranking in yield and many actual yields were high. Thus wheat was particularly suited to the soils derived from Brickearths and Thanet Beds and yet the manors on these soils concentrated on barley-growing. The remaining manors with wheat percentage yields of 35 per cent. and below were situated on the thinner chalk soils, on the Lower Greensand and on Romney Marsh. Significantly yields were slightly higher at Mersham (19) and Great Chart (20) which lay on the heavier Lower Greensand soils east of the Medway. Wheat was first-ranking in yield only on three manors and actual yields were also quite small; and yet, because of the commercial value of the crop, wheat occupied a larger acreage than any other crop except on the manors of Romney Marsh.

The spring barley percentage yields ranged from 20 to 36 per cent. Thus the highest percentage yield for barley was eleven per cent. less than that of wheat, a reflection of the former crops' smaller degree of adaptability. The highest values (27 per cent. and over) occurred on Romney Marsh manors, and on some manors on the Lower Greensand Chalk, Thanet Beds and Brickearth. Barley was the first-ranking yield on these manors and many of the actual yields were high. These facts correspond with Hall and Russell's findings that 'the most favourable barley soils lie on the Lower Greensand' and that 'the light loams derived from the lower drift-mantled Chalk are next in favour'.<sup>24</sup> However it has already been explained that owing to the organization of the estate economy barley acreages were small on the Lower Greensand. The increase in barley acreages on Romney Marsh manors in 1371 suggests that the high yields obtainable from these soils had been

<sup>23</sup> A. D. Hall and E. J. Russell, *op. cit.*, 140.

<sup>24</sup> A. D. Hall and E. J. Russell, *op. cit.*, 148.

recognized. The importance of barley on the chalklands has already been noted.

The lowest percentage values for barley (under 27 per cent.) occurred on manors on the clays, and on the chalklands of N.E. Kent despite the high sowing rate on the latter manors and their importance for barley-growing. A possible explanation is that they were sowing more seed than was necessary and that the larger acreages would tend to lead to lower yields. This apparent anomaly also results partly from the statistical method adopted because wheat is a higher-yielding crop than barley, particularly on these soils, and in consequence the percentage yields on these manors were mostly higher than elsewhere which confirms that barley was grown not only because of the proximity of the manors to Canterbury but also because of the suitability of the soils.

The percentage yields of oats ranged only from 18-32 per cent. and the distribution pattern was relatively simple. Values were lower than for barley and only at Hollingbourne (10) were oats first-ranking in yield. Manors with percentage yields over 25 per cent. were situated on the heavier soils of the clays, Alluvium, Chalk Marls, and western section of the Lower Greensand, or worked reclaimed marsh soils as part of the demense. On practically all these manors the actual yields were fairly high and oats was the second-ranking yield. Thus the highest percentage yields for oats were on the manors where oats was important. Manors with percentage yields for oats of under 25 per cent. were situated on light soils derived from Chalk, Thanet Beds or Lower Greensand. Despite the low yield, oats was an important crop on the Lower Greensand in 1291 but it is significant that its acreage had declined very considerably by 1371 and ranked only fourth in size.

The percentage yields of peas and vetches were extremely low and variable ranging from 4-27 per cent., and it is difficult to assess which soils were most suited to legumes, although yields were generally higher on the light soils.

## CONCLUSION

In the above study an explanation was sought for the distribution patterns of crop acreages on the manors in 1291 and 1371, and it was inferred that they could be correlated with the geological sequence. Crop sowing rates and yields provided further support for this conclusion. Moreover, the picture that emerged was not merely a simple correlation with the major geological formations, for a close relationship between cropping patterns and strata within the major formations, and with drift deposits, was revealed. Thus there were differences in cropping patterns on the Gault and London clays, both major formations;

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whilst the changes from Chalk to Chalk Marl, a strata within the major formation, and from Chalk to Clay-with Flint, a drift deposit, were similarly marked. Thus the Priory estate with utilitarian and commercial value in view, utilized the physical environment to their best advantage organizing arable farming on a rational basis.

APPENDIX A. CROP ACREAGES 1291

<i>Manor</i>	<i>Wheat</i>	<i>Barley</i>	<i>Oats</i>	<i>Rye</i>	<i>Peas</i>	<i>Vetch</i>	<i>Beans</i>
<i>Chalkland Manors</i>							
1. Monkton	72	166	51	—	60	58	—
2. Eastry	89	159	43	18	52	42	9½
3. Ickham	161	177	21	—	46½	92	—
4. Adisham	121	147	68	—	48	56	—
5. Godmersham	56	40	15	—	23½	18	—
6. Chartham	68	54	10	—	18	37	—
7. Cliffe	82	92	24	33	27	25	—
8. Meopham	120	52	86	—	11	22	—
9. Orpington	103	44	39	—	19	29	—
10. Hollingbourne	81	33	78	—	53	and vetch	—
11. Welles	70	52	91	—	58	and vetch	—
<i>Manors of Thanet Beds and Brickearth</i>							
12. Elverton	33	36	3¼	9	36	and vetch	3½
13. Copton	52	47	6½	—	34	and vetch	—
14. Ham	7	—	12	—	—	3¼	4½
<i>Clayland Manors</i>							
15. Barksore	22	10½	24½	—	25	and vetch	2
16. Leysdown	16½	½	7	—	10	—	—
17. Blea	6	—	15	3	—	11	—
18. Brook	29	9	18½	—	3½	4½	11½
<i>Lower Greensand Manors</i>							
19. Mersham	40¼	18	33¼	—	10	19	—
20. Gt. Chart	54	13	68¼	—	73	and vetch	18
21. L. Chart	49	4½	52¼	3	12½	25½	—
22. Loose	46	7½	31	4½	37	and vetch	—
23. E. Farleigh	56¼	11	64	10	14	24¼	—
24. W. Farleigh	102	8	94	5	51	and vetch	—
25. Peckham	44	3½	38	3½	18¼	and vetch	—
<i>Marshland Manors</i>							
27. Ebony	12¼	—	117	6	—	—	8¼
28. Appledore	15¼	—	65¼	3¾	—	—	—
29. Ruckinge	27¼	8½	42¼	—	—	—	13¼
30. Agney cum Orgarswick	37¾	20¼	39	3	1	14	15
31. Fairfield	11½	—	18½	—	—	13	—
32. Lydden	98	10	16	8	13	—	—

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## APPENDIX B CROP ACREAGES 1371

<i>Manor</i>	<i>Wheat</i>	<i>Barley</i>	<i>Oats</i>	<i>Rye</i>	<i>Peas</i>	<i>Vetch</i>	<i>Beans</i>
<i>Chalkland Manors</i>							
1. Monkton	12½	15	3	—	5	4	—
2. Eastry	80	98	10	—	14	32	—
3. Ickham	156	156	12	—	40	44	10
4. Adisham	82	91	16	—	19	31	—
5. Godmersham	48	36	11	—	10	14	—
6. Chartham	62	48	13	—	13	20	—
7. Cliffe	80	72	8	—	18	43 <sup>H</sup>	—
8. Meopham	80	36	36	—	17	16	3
9. Orpington	72	40	26	—	12	14	—
10. Hollingbourne	54	26	13	—	12	18	—
11. Welles	51	35	24	—	25	22	—
<i>Manors of Thanet Beds and Brickearth</i>							
12. Elverton	31	32	3	—	16	12	2
13. Copton	41	42	11½	—	9	24	—
14. Ham	—	—	9	—	—	—	—
<i>Clayland Manors</i>							
15. Barksore	22	—	13	—	10	—	8
16. Leysdown	15	—	7	—	5	1	—
17. Blean	16	3	8	—	5	—	—
18. Brook	12	13	11	—	2	8	2
<i>Lower Greensand Manors</i>							
19. Mersham	47	33	6½	—	11	21	5
20. Gt. Chart	41	17	11	—	13	15	9
21. L. Chart	35	10½	32	—	14	18	2
22. Loose	32	12	12	—	8	12	—
23. E. Farleigh	50	20	18	—	16	24	—
24. W. Farleigh	53	26	22	—	8	19	3
25. Peckham	28	35	24	—	3	17	—
<i>Marshland Manors</i>							
27. Ebony	—	—	87	—	—	4	18
28. Appledore	106	41	91	—	6	10	44
29. Ruckinge	9	9½	19	1½	1	1	11
30. Agney cum Orgarswick	14	31	10	—	5	9	4
31. Fairfield	—	—	—	—	—	—	—
32. Lydden	—	—	3	4	—	2	4

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