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Grain Production and Expenditure On Medieval English Estates

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GRAIN PRODUCTION AND EXPENDITURE ON MEDIEVAL ENGLISH ESTATES

By

Michael Keith Sims

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ABSTRACT

GRAIN PRODUCTION AND EXPENDITURE
ON MEDIEVAL ENGLISH ESTATES

By

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This paper examines the use of grain to meet production expenses on the estates of two abbeys; Beaulieu and Bec-Holluin. In the past some scholars have not taken into account in-kind expenses, other than seed, when examining productivity on medieval estates. By examining a complete yearly account of the English estates of both these abbeys it is shown that non-seed expenses can be quite high. Labor costs and fodder consume especially large amounts of some grains, particularly oats and barley. Overall, about forty-five percent of the grain harvest on these estates are used to meet production expenses, a much higher figure than if just seed is taken into account. The paper then constructs a general model for large estate grain production, which is then used to make estimates about production and post-expense surplus for estates where this data is not available.

ACKNOWLEDGEMENTS

I must thank Professor Emily Tabuteau for her patience and assistance in getting me here. It took a while, but it's finally done. I also thank my parents, Bradley and Marie Sims, for all the years of encouragement and support. Without you, I would be nowhere.

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INTRODUCTION

In the study of medieval agriculture it is an unfortunate reality that the available information is often incomplete. Few complete sets of accounts or surveys have survived to allow detailed economic analysis, either on the micro- or macro-economic scale. Our understanding of medieval farm implements is largely based on some unclear descriptions, a few illustrations and scattered archeological finds. Archeobotany has only recently begun to expand our knowledge of the medieval diet beyond the imprecise written sources. Written sources giving insight into the life of the serf are few and far between. It is thus often necessary to make estimates about unavailable information, whether it be acreage, crops planted, production expenses, tool types or whatever.

In this paper I intend to examine one factor that could influence several of these estimates: the amount of grain production normally used to meet production expenses. Those who calculate the minimal area of land necessary to produce a specified amount of grain sometimes assume that the only deduction for expenses they have to make in their calculations is for seed.[1] This assumption might be reasonable when dealing with peasant producers, although even there one must make a deduction for the tithe.[2] However, small producers probably depended almost exclusively on their own labor. I will argue that because large estates were forced to depend on a great deal of compensated labor the grain expended on this labor is too great to be ignored in calculations of productions expenses. This factor would also affect calculations showing the likely usable surplus produced by a known amount of land.

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[1]Kathleen Biddick, *The Other Economy* (Berkeley: University of California Press, 1989), p.138.
[2]J. Z. Titow, *English Rural Society* (London: George Allen and Unwin Ltd., 969), pp. 80-1.

This paper will examine this question by looking at the manner in which the monasteries of Beaulieu and Bec collected and used the grain produced on their estates. Particular attention will be paid to the amount of grain production that is used to meet labor expenses. It will be shown that the percentage of grain used for expenses varies for different types of grain. Wheat tends to be used little for meeting production expenses, while a majority of the barley and oats crops are often used for this purpose. In general, about forty-five percent of the overall grain output is used to meet expenses. This is a percentage too large to be ignored. I will also show that while different types of estates might produce different amounts of various crops and use them in different amounts to meet expenses, they all tend to use about forty-five percent of overall production to meet expenses. The specific picture presented by the estates of Beaulieu and Bec will then be used to create a more general model of grain production and consumption on a large English estate. I will then use this model to make estimates about grain production and land requirements for some estates for which this information is unavailable. Such estimates are admittedly very rough, especially as they are based on only two examples, but if treated only as estimates they can be of use where such information is totally missing. I will also make some general observations about Beaulieu's overall grain consumption, showing that they gave away large amounts of grain while also having to buy large amounts to meet their own needs.

ESTATES OF BEAULIEU ABBEY

Beaulieu was a Cistercian abbey founded in 1204 by King John.[3] The abbey was located in the New Forest on the southern coast, directly across from the Isle of Wight. Like almost all monasteries, Beaulieu was endowed with

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[3]J. K. Fowller, *A History of Beaulieu Abbey* (London: The Car Illustrated, 1911), p. 13.

extensive land holdings to support the monks. Since Beaulieu was a Cistercian abbey, one might expect that a large amount of the labor would be done by lay brothers (*conversi*) and thus the monks would be less dependent on compensated labor than I will show. However, the *conversi* functioned primarily as supervisors and the bulk of the work was done by the paid full-time employees (*familia).* If this is true for a Cistercian abbey, with its access to *conversi* labor, then it is not unreasonable to argue that it would also be true for other large estates without this advantage.

The primary documents that this paper will examine are the accounts for Beaulieu Abbey for the year from Michaelmas (Sept. 29) 1269 to Michaelmas 1270, as published by the Royal Historical Society.[4] These accounts are based on two manuscripts, one in the British Library dealing with all of the accounts and one in the Bodleian Library dealing just with the accounts for the manor of Faringdon.[5] Both versions of the accounts have suffered some excisions, but by collating the two manuscripts almost the whole set of accounts has been reconstructed. Most of the gaps that cannot be reconstructed are in the livestock sections of some of the accounts and so are not of concern here. Only in the account for the manor of Colbury is there a major, non-reconstructable gap for the grain accounts, and even here the figures for wheat are still almost intact. The only other important manuscript problem is some discrepancies between the two versions of the account for the grange at Coxwell in the manor of Faringdon. The magnitude of the differences is less than two percent of the total output, however, so there should be little effect on the overall numbers. I have chosen to use the numbers from the British Library

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[4]S. F. Hockey ed., *The Account-Book of Beaulieu Abbey* (London: Royal Historical Society, 1975).
[5]Ibid., p. 1.

accounts because they include an entry for malt that is missing from the Bodleian and thus they seem to be the more complete.

There is one other possible problem with using these accounts as evidence. Internal evidence in the accounts shows that these were intended to be a set of exemplars.[6] Apparently the abbey intended to keep only this one set of written accounts and in the future use tallies to keep track of the values of the accounts.[7] It could be argued that therefore this set of accounts is actually an artificial accounting construct whose figures are not the actual accounts but instead useful fictions. This seems unlikely for a number of reasons. The accounts add-up properly to within a very small error. If this is an artificial construct, it was one that was made with very great care. In fact, to make fictitious numbers add up this precisely might be much more work than using real figures. In addition, the best exemplar for later accounts would be a real set of accounts. In an artificial set of accounts items might be missed or forgotten, while this would be much less likely with a set of real accounts. Finally, there is nothing in the accounts themselves that indicate they are anything but real. There are no ridiculous sums, no obviously unreal entries. In the absence of any concrete reason to doubt the authenticity of the accounts, it seems best not to do so.

The first set of accounts to be examined is those from the manor of Faringdon. This royal manor had originally been granted to the Cistercians by John in 1203 as a site for an abbey.[8] When John made the grant founding the abbey at Beaulieu the following year, however, he transferred the manor to the possession of this new abbey.[9] Faringdon was about fifty miles almost due

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[6] Ibid., pp. 38, 163.
[7] P. D. A.. Harvey, *Manorial Records* (London: British Record Association, 1984), p. 26.
[8] Fowler, p. 8.
[9] Ibid., p. 11.

north of Beaulieu in the county of Berkshire. Faringdon was not simply a royal manor, it was a part of ancient demesne, as the residents successfully proved in 1241 in a suit against their new landlord, in which they complained about certain undefined "injustices."[10] The manor was sufficiently large and important and distant so that abbey set up a subsidiary *camera* at Faringdon. In terms of production, the Faringdon properties are second only to the abbey's home granges. The accounts give a picture of a manor much closer to the norm for a secular estate than most of Beaulieu's other properties. This is not surprising, for its status as a part of the ancient demesne would have made it more resistant to change than any of the other lands.

The accounts for the manor include those for the granges at Shilton, Little Faringdon, Inglesham, Wyke and Coxwell, as well as two mills at Rydon and Kyndelwere, the church of Faringdon and the trading center at Great Faringdon. The account for Great Faringdon deals only with receipts for tolls, fines, etc., from the borough at Faringdon, and so will not be examined here. All the other accounts are of interest. The pertinent data from the accounts is presented in Appendix A. Some of the headings are self-explanatory, but others require some clarification. The organization of the tables somewhat reflects the organization of the accounts. The left four categories, "Production", "Purchase", "Tithe" and "Last Year", i.e., surplus from the previous year, represent the four categories the accounts use for the accumulation of grain. "Production" normally refers to actual agricultural production, except in the case of the mills, where it represents grain collected as the fee for milling. The meanings of the other three accumulation categories are fairly clear.

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[10]Robert s. Hoyt, *The Royal Demesne in English Constitutional History: 1066-1272* (New York: Greenwood Press, 1968), p. 220.

The next four categories represent the main ways in which this grain was then dispensed. "Sold" and "Seed" are relatively self-evident in their meanings. "Labor" is a more complicated category. This category includes the allowance made to the *familia* , grain used at the various boons through the year, as well as for other miscellaneous agricultural labor. It does not include the grain used to feed the resident *conversi* or monks at the court, as these are not strictly agricultural expenses. Where possible, the allowances for shepherds, swineherds, and other non-grain related employees have also been excluded. The purpose of this paper is to look at the expenses strictly of grain production, so it seems best to leave out these other workers. Fortunately the two largest granges, Wyke and Coxwell, itemize their *familia,* thereby allowing this exclusion to be made. The category for "Fodder" includes only those entries related to grain production or distribution. Fodder for the abbot's horses, for visitors, or food fed to non-draught animals like pigs has been excluded. It should be noted that all the numbers do not add up. Some expenses, such as gifts, pensions for widows, and others mentioned above are not related to grain production and so do not show up in the table. The sale of grain does not directly apply to grain production either, but since it is how almost all of the non-expense grain was disposed of, it has been included.

The final two columns are the percentage of grain output used to meet labor expenses and the percentage used to meet all three types of agricultural expenses on the table, seed, labor and fodder. For these purposes, grain output is assumed to include only actual production. The purchased grain does not represent annual productive capability, nor does last year's surplus, so they are excluded from the calculation.

Figures 1 and 2 summarize the total output of all grains for the whole

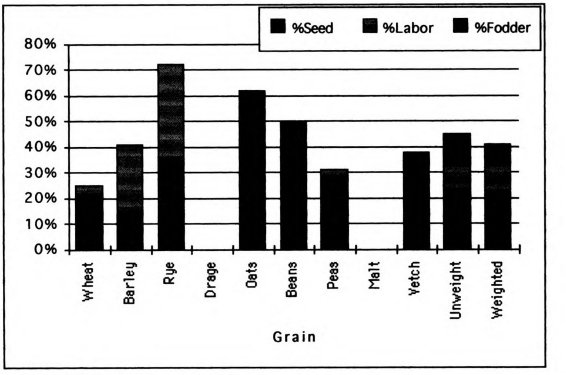

Figure 1: Faringdon Grain Use

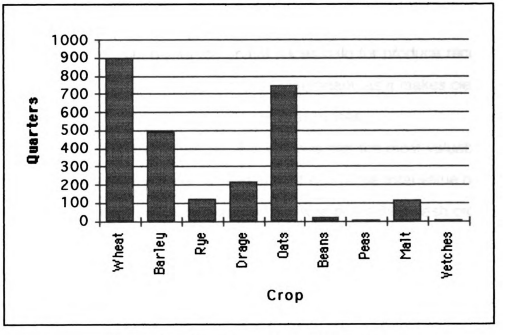

Figure 2: Faringdon Grain Production

manor and the total usage for the various classes of expenses. It should be noted that while the charts do provide numbers for grain production and seed use, these cannot be used to determine grain yields. The production numbers represent the grain gathered in the fall of 1269, as Michaelmas is the traditional date for the end of the harvest.[11] It would have been impossible to have had the grain threshed and the totals calculated so quickly, so it must be assumed that production totals are for the harvest which is just being finished as the account begins. The seed totals are for those planted in the late autumn of 1269 and spring of 1270. Therefore, the production totals are from the 1269 growing season and the seed totals are from the 1270 growing season and so are not usable for calculating exact grain yields. The right side of Figure 1 shows weighted and unweighted totals for all grain production on all the granges of Faringdon. The unweighted totals are simple sums of all the grains. In the weighted totals the quantity of each grain is multiplied by its approximate market value. These values are based on standard values that Beaulieu used for accounting purposes, along with the actual prices paid for produce recorded in the accounts.[12] The use of weighted totals is important, as it makes clear how the abbey used its lower value grains to meet expenses.

Looking at the individual crops, it is obvious that the most valuable crop produced was wheat. Wheat constituted almost half of the total value of all crop production, slightly over 5000 shillings. Wheat was primarily a cash crop: only about quarter of it was used to meet expenses, and most of that was in seed. Rye, drage and beans demonstrate similar patterns, with a quarter or less of the crop going to meet expenses, and most of that being in seed. Peas and vetches were produced in such small amounts that no meaningful analysis is possible.

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[11] H. E. Hallam, *The Agrarian History of England and Wales Vol. II* (Cambridge: Cambridge University Press, 1988), p. 839.

[12] These values are 5 shillings/quarter for wheat, 3s/q for barley, 5s/q for rye, 3s/q for drage, 2s/q for oats, 4s/q for beans, 3s/q for peas, 3q/s for malt and 3.5s/q for vetches.

None of these crops was used in any important way to meet expenses, other than for seed.

It is in the figures for oats, barley and malt that use of grain to meet production expenses must be sought. Oats was produced in quantities second only wheat, but only Wyke sold it in any large amounts. Instead, almost seventy percent of all oats went to meet expenses. There are several reasons for this. Oats is a very low yielding crop, usually producing a little over twice the amount of seed planted.[13] Thus a higher percentage of the output must be reserved as seed; in these accounts it is about a third of total output. The other main use for oats was as fodder. It seems that Faringdon must have been making extensive use of horses as draft animals by this time because a great deal of oats is used as fodder for the manor's horses. On three of the granges, Shilton, Little Faringdon and Inglesham, use of oats exceeded output by between one and a half to two times, requiring the purchase of additional oats.

Barley, on the other hand, was used primarily as a means of compensating labor. Fully half of the barley output was used to pay for labor costs. Much of this went directly to the *familia*. In fact, barley was the only grain given to them. Barley, along with wheat, was also the primary grain baked for the harvest and planting boons. Fully sixty percent of the barley went to meet various production expenses. This number might have been even higher, but the barley account for the church of Faringdon has been damaged, leaving only the production numbers and one labor expense.

The other main crop used to meet expenses was malt. Of course, malt is not an actual crop itself, but rather a grain product. However, these accounts treat it as another grain and do not generally tell us what grain it is that is being malted. Normally this would have been barley; but, as will be seen, Beaulieu's

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[13]J. Z. Titow, *Winchester Yields* (Cambridge: Cambridge University Press, 1972), p. 4.

brewhouse used a mixture of wheat and oats, so it is probably best not to speculate about what was being malted and simply treat malt as a separate crop. Malt cannot be used as seed, but over sixty-five percent of what was produced was used at the various boons throughout the year. Almost all of this malt was produced and brewed at Coxwell, far more than Coxwell itself could have used. All of the granges were operating under the same rules, so it seems unlikely that Coxwell's workers were virtually swimming in ale while the others did without. Probably Coxwell was the brewing center and from it the ale was distributed to the other granges. It is the only grange that clearly had its own mill, as an allowance for a miller is included in the accounts, and this mill could have processed the malt.

However, if Coxwell did produce ale for all the granges, it is the only indication of cooperation between the granges. There is no record of grain transfers between the granges. This is somewhat surprising, as Wyke had such a huge oats surplus while several of the other granges had oats shortages. Yet Wyke sold its oats rather than giving it to the other granges. It even appears that it did not sell the oats to the other granges, as it sold its oats for a somewhat lower price than the other granges paid for their purchases. This lack of cooperation does call into question Coxwell's role as a brewing center, but there seems to be no other explanation for its consumption of so much ale.

As a whole, the manor of Faringdon used about forty-five percent of its total grain output to meet expenses. About twenty percent went for seed, sixteen percent for labor, and nine percent for fodder. These numbers are somewhat smaller if given as weighted values rather than simple amounts, as it was the cheaper grains, oats and barley, that were primarily used to meet non-seed expenses. Even in the weighted totals, however, almost thirty-nine percent of the total value of the grain output went to meet grain production

expenses, and of this less than half was in seed. Clearly, seed was not the only important production expense met by using grain on this manor.

As a final note on the manor of Faringdon, it is possible to make a few estimates about the tenants' production from the tithe numbers. The church at Faringdon collected most of the tithe from the manor, except for the granges of Inglesham and Coxwell. Inglesham had its own vicar, whose food allowances are in the accounts, but it is not clear why Coxwell collected its own tithe. In any case, multiplying the tithe totals can give some idea as to the tenants' production of crops. The tithe was not necessarily exactly a tenth of tenant production, but it does give a rough estimate for numbers that are otherwise unknown. The tenants produced approximately 1100 quarters of wheat, 1350 quarters of barley, 220 quarters of rye, 340 quarters of drage, 270 quarters of beans and 200 quarters of oats. As in the demesne production, wheat and barley are the dominant grains. The most striking difference is the lower production of oats by the tenants. It is likely, however, that the estimate for oats is low. No tithe of oats was collected at either Inglesham or Coxwell. Yet it seems very unlikely that the tenants on those granges did not grow this grain, as oats will grow on poor soil where almost nothing else will. Thus it is possible that a tithe on oats was simply not collected on all the granges at Faringdon, making the estimate of production too small. Even if the estimate is correct, it appears that tenant grain production was moderately larger than demesne production, so tenants almost certainly held a majority of the land, but probably less than three-quarters of it.

The granges making up the next group of accounts are not a distinct group like Faringdon. Instead, they are a collection of properties acquired by Beaulieu at various time in various ways. Two of them, Burgate and Soberton, follow a more or less classical manorial pattern in their accounts. Colbury might

have followed this same pattern, but almost the whole account is missing. The forth of these accounts, Cornwall, is unlike any of the others. It is this unusual one that will be examined first.

The property that is called Cornwall by the accounts was granted to the abbey in 1235 by Richard, Earl of Cornwall.[14] Richard was the son of King John, founder of the abbey. The property is located on the Lizard peninsula, on the southern tip of Britain, about 175 miles from the abbey. This property was not a typical manor with a large demesne worked by tenants. This grange did have a small demesne, but its primary income was in rents and tithes collected from the tenants. Most of the grain output from this grange consisted of in-kind rents, not production on the demesne. Since this grain came in without any real expense, it would be expected that expense costs on this grange would be lower. The data confirm this expectation. Other than rye, almost all of which was fed to the workers, all of the grains show expense levels far below those for Faringdon. The numbers would be more in line with those from Faringdon if the grain collected from tenants were excluded from the calculations, but that would be a mistake. After all, renting land out to tenants in return for in-kind rents as simply a different way of producing grain on the grange for the landlord. Since this paper is examining grain production, it is appropriate to include these numbers. It is interesting to note that the grains collected as rent are primarily barley, oats, and, in lesser amounts, wheat. These are the same three grains primarily grown on the Faringdon demesnes, although wheat appears to have played a smaller role here and oats a larger one. This is consistent with the findings for the estates of Tavistock Abbey in the south-west of England, where oats was the dominant crop.[15]

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[14]Hockey, p. 13.

[15]H. E. Hallam, *Rural England 1066-1348* (Brighton: Harvester Press, 1981), pp. 171-2.

The other three granges in the second group, Burgate, Soberton and Colbury, were acquired by the abbey through purchase.[16] These three granges display a pattern of grain consumption and use very similar to those from the granges at Faringdon, as shown in Appendix B. Wheat , barley and oats are the three grains with the highest production. As at Faringdon, the highest percentage of the crop used for expenses, largely for seed and fodder, is for oats. Barley was also heavily used to meet expenses, especially as the primary grain given to laborers. Wheat, while produced in large amounts, is not generally used in large amounts to meet expenses. At Burgate the percentage of wheat used for expenses is almost forty percent, but this is all in seed. Unlike what happened at Faringdon, at Soberton relatively little wheat was sold; instead, 127 quarters were kept in the barns for the next year.

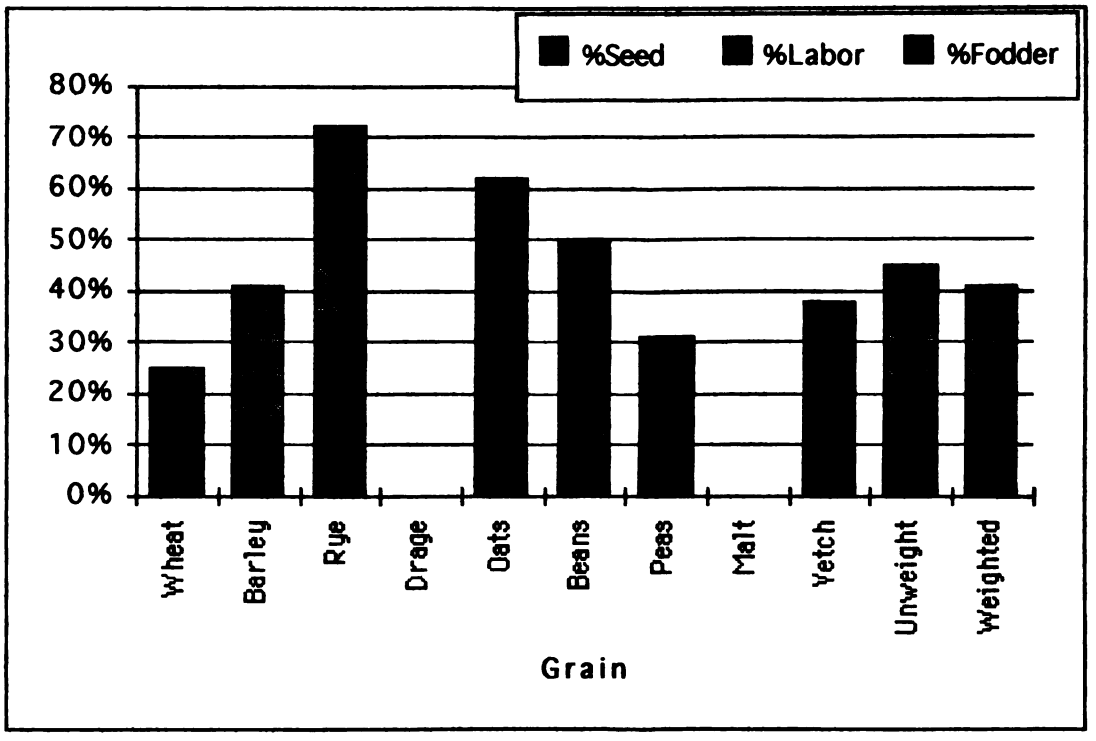

Figure 3: Other Grange Grain Use

[16]Hockey, pp. 14-5.

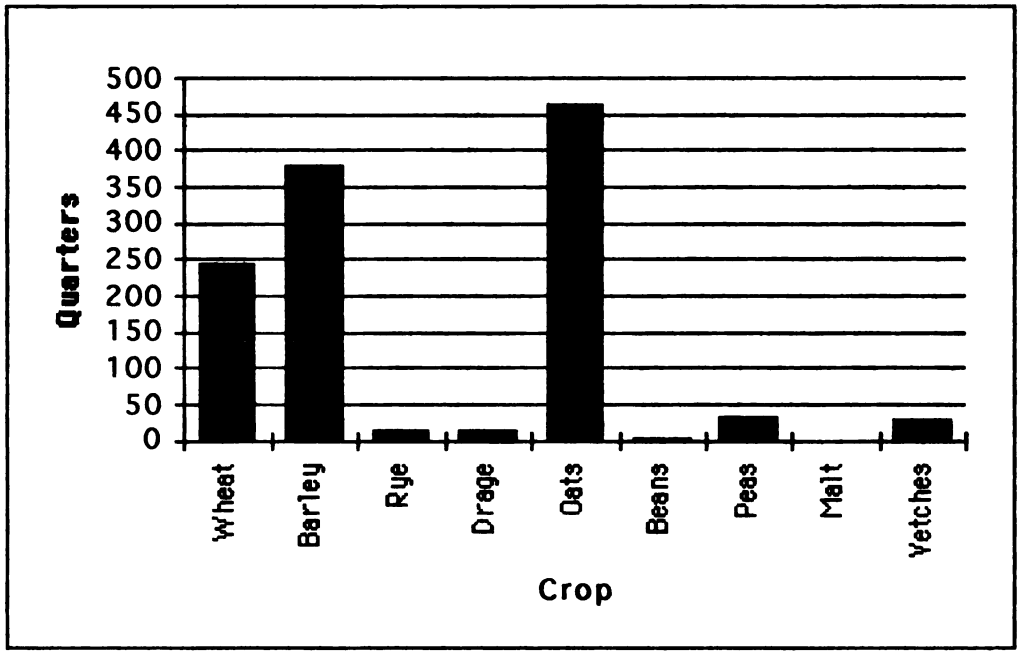

Figure 4: Other Grange Grain Production

The totals for percentage of grain used as expenses is somewhat lower for these granges than at Faringdon, as shown in Figure Three. Only the percentage for rye is significantly higher, but this was grown in such small amounts that even such a wide variation is not too significant. These lower numbers are to be expected, because of the low-expense production system on the Cornwall grange. The general importance to the abbey of these outlying granges was probably considerably less than that of Faringdon, as their combined output was only slightly more than a third of Faringdon's.

The combined totals for both of these groups of granges are summarized in Figures 5 and 6. Wheat is the most heavily produced crop and is little used for expenses other than seed. Oats is grown almost as much as wheat, and almost exactly two-thirds is used in expenses, mainly seed and fodder. Barley is a close third and makes up the bulk of the crops used to compensate laborers. Rye, drage, vetches, peas and beans are all grown in lesser amounts

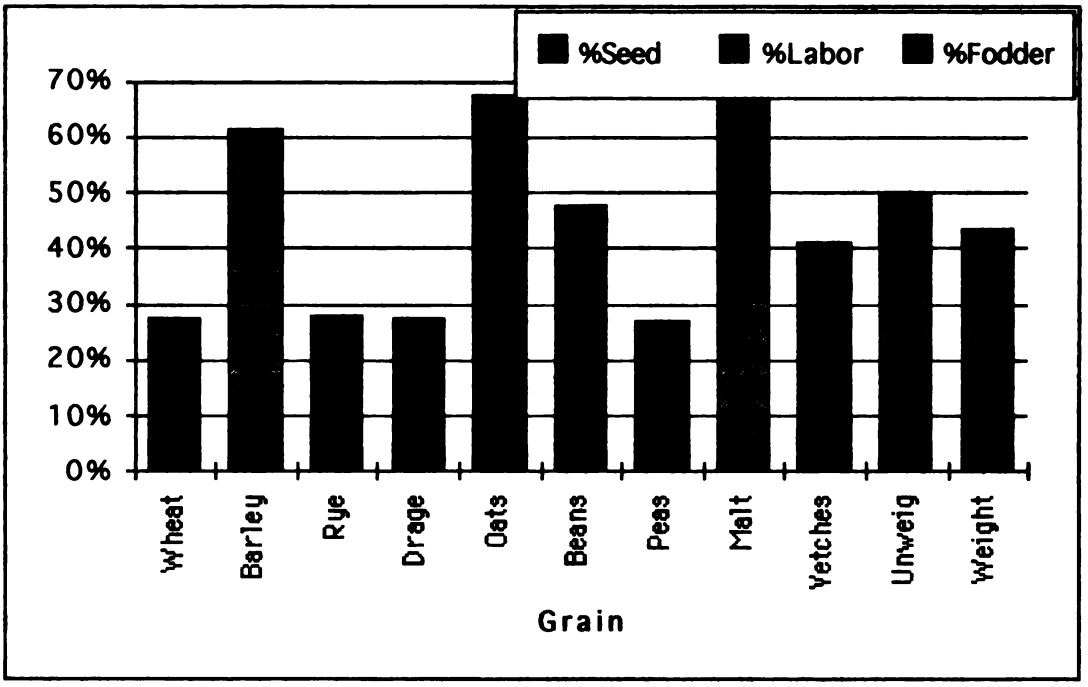

Figure 5: Combined Grain Use

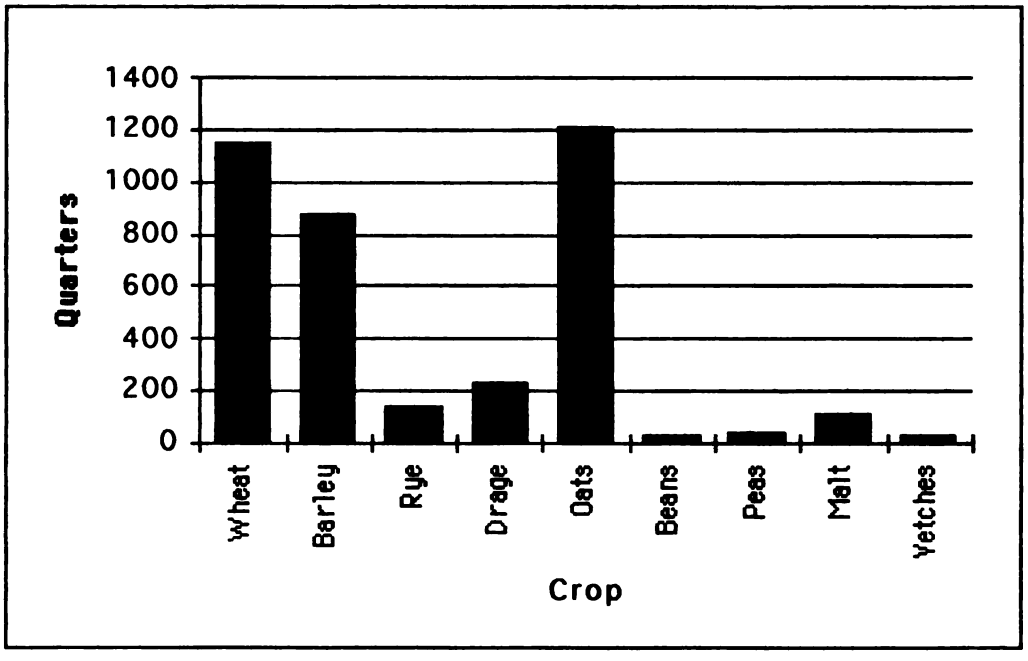

Figure 6: Combined Grain Production

and follow the basic behavior of wheat, with little used to meet expenses other than seed. Since the outlying granges produced no malt, the totals are identical with those from Faringdon. Looking at the weighted and unweighted totals for all grains, they are almost the same as on the Faringdon table. Adding the outlying granges into the totals therefore only strengthens the evidence that non-seed expenses cannot be ignored.

The third group of granges is completely unlike the first two groups. These last six granges make up the Great Close of Beaulieu: Holbury, Sowley, St. Leonards, Beufre, Hartford and Otterwood. These granges are situated in the New Forest in the immediate vicinity of the abbey, either on land from the original grant or on land confirmed to the abbey by Henry III in 1246.[17] These six granges directly supplied the abbey with grain, and in return received food liveries from the abbey. As a result, their accounts are very different from those of the other granges. The individual accounts and the totals for all six granges are summarized in Appendix C. Production and use of grain by these granges are shown on Figures 7 and 8.

These granges did not pay any labor expenses directly out of their grain production. The *familia* was given bread from the abbey's bakehouse. These granges also did not sell any of their grain. Almost everything that was not needed for seed was sent on to the abbey's granary. A detailed look at the expenses for these granges must therefore wait until after the abbey's granary, bakehouse and brewhouse have been examined, as these offices were responsible for collecting the grain, processing it and redistributing it back to the granges.

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[17]Ibid., p. 15.

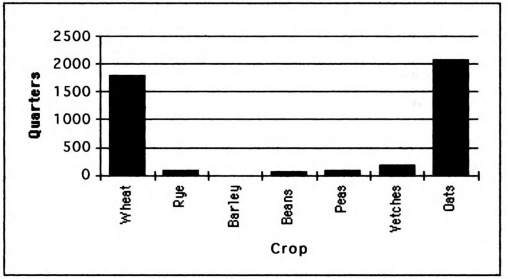

Figure 7: Home Granges Grain Production

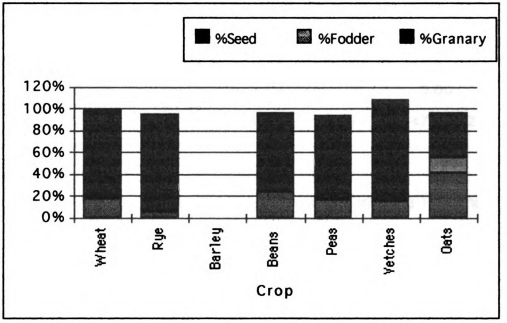

Figure 8: Home Granges Grain Use

It is possible to make some general observations about these granges before looking at the granary. Far more than the other granges, the granges of the Great Close specialized in growing just two grains, wheat and oats. Practically no barley was produced. This is understandable if barley is understood to be a grain grown primarily to compensate workers. Since workers on these granges were given bread from the bakehouse, rather than raw grain, these granges could do without producing barley. Evidently, the monks themselves did not choose to consume barley. Even their ale, as will be discussed later, was made from a mixture of wheat and oats. Of the other crops, only vetches were grown in any large amount.

Table 1: Granary Crop Distribution

Grain	*Total*	*Bakehouse*	*Brewhouse*	*Sold*	*Department*	*Gruel*
Wheat	1963.63	1339.50	312.00	136.75	15.88	
Rye	83.38	83.38				
Barley	194.00	166.00		2.63	0.13	
Beans	68.00	49.25			18.88	
Peas	106.75	98.75			8.00	
Vetches	240.88	240.88				
Oats	1336.00		550.00	28.00	447.88	262.50

The distribution of crops by the granary is summarized in Table 1. It should be noted that the totals for oats, wheat and barley are considerably higher than those supplied by the six home granges. This is because the abbey purchased large amounts of each of these grain. This does not cause any problems, however, as the expense totals will be compared with the original production numbers and not the totals in the granary. Looking at Table 1, it is immediately obvious that most of the grain was sent to the bakehouse. The majority of the production of all grains except oats was sent to the bakehouse. The second largest destination for grain was the brewhouse, which consumed sizable

portions of wheat and oats. The use by the brewhouse of this grain and its redistribution as ale will be examined later, for, as ale was not given to the farm laborers, this examination can be put off for the moment. Only wheat was sold in any large amounts, but the amounts were far smaller than the amounts purchased, so the abbey obviously found ways to consume all of its grain production and more. The "Departments" heading includes all the various departments and workshops of the abbey, including the forge, the shoemaker, the cellar, the piggery, the skinner, etc. The departments used almost 450 quarters of oats, all of which was sent to the stables as fodder.

A large amount of oats was made into gruel and then sent back to the granges. Unfortunately, it is not clear who then consumed this gruel. It is listed simply as being used up in expenses of the *domus.* The two most likely candidates for the consumers of this gruel are the *conversi* and the *familia.* All other allowances and liveries to these two groups are clearly marked as such, however, so it is not clear why it would not have been done in this case as well. The amounts also seem too high to be intended for the *conversi* alone, ranging between two and a half and six quarters per *conversus.* Perhaps both groups, *conversi* and *familia*, consumed the gruel. The uncertainty requires that the gruel be left out of expenditures on labor.

For the primary consumer of grain, the bakehouse, the use of the various grains is summarized in Tables 2 and 3. The grain was used to bake bread of four qualities. In descending order, these are conventual, hospital, clermatin and familial bread. As Table 2 shows, the top three grades of bread were all baked solely from wheat. These grades differed only in the quality of the wheat used to make them. The final grade of bread, the familial bread, was made from

a mixture of variety of grains and even legumes. Familial bread also had extra bran thrown in, probably as filler.[18]

Table 2: Bread Grain Content

Grains	*Breads*			
	Conventual	*Hospital*	*Clermatin*	*Familial*
Wheat	428.00	354.50	176.00	374.25
Rye				83.38
Barley				166.00
Beans				49.25
Peas				98.75
Vetches				240.88
Bran				67.25
Totals	428.00	354.50	176.00	1079.75
Weighted Tot	2140.00	1772.50	880.00	4122.40

Table 3: Bread Use

	Conventual	*Hospital*	*Clermatin*	*Familial*
Conversi	63.38			
Refectory	257.75	3.63		
Guest House	50.00	90.00	75.00	
Departments	3.90	147.70	24.15	89.65
Sec. Infirmary	30.00	15.00		
Infirmary	0.25	0.81		
Porter	6.00	13.25	2.30	126.00
Familia	11.40	19.18		677.00
Non-Ag Labor	1.10	27.40	9.10	
Cust. Granges		37.13	12.88	
Totals	423.78	354.09	123.43	892.65

Table 3 summarizes how these various grades of bread were then used. Conventual, the highest grade, was consumed primarily by the members of the abbey itself. Over seventy-five percent of it was either consumed in the refectory or sent out to the *conversi* managing the granges. Most of the rest was sent either to the guest house, where it was probably served to the guests

[18]It is ironic that the familial bread, despite using low grade wheat, was in fact probably much healthier than the higher grades. The high content of legumes would have contained a lot of protein and a variety of nutrients, the extra bran would have contained more roughage, and the mixture of grains would have provided a wider variety of nutrients.

of the highest status, or to the secular infirmary. Hospital bread was sent in large amounts to the guest house, or *hospicium*, as one would guess from the name, but it was sent in even larger amounts to the various departments of the abbey. Unfortunately these departments did not record the bread as food but instead entered the bread's value among their receipts, so it is impossible to tell how the various departments then made use of the bread. The same accounting problem arises with the bread sent to the custodians of the granges: its monetary value is recorded but its use is lost among all the other expenditures. Hospital bread also appears to have been the bread normally given to specialized laborers doing work around the abbey. Clermatin bread was evidently a very low grade of wheat bread probably given mostly to the lower status visitors at the guest house. The wheat used to make it was so poor that out of the 176 quarters about a third was removed as bran, which is why the total in Table 3 is so much lower than that in Table 2. Finally, the familial bread was the bread that was given to the *familia* of the abbey's six home granges. It was also the primary bread given to the porter to distribute as alms to the poor, as well as being used by the departments. Like the clermatin bread, 110 quarters of the familial bread is listed as being thrown out as excess bran. This is also the place in the accounts where missing grain was recorded. Seventy-eight quarters of grain are listed as missing under the familial bread heading. It seems likely that the familial bread was essentially made of all the leftover grain not needed elsewhere, so it is a reasonable place to record any shortages. The deduction for bran and the shortage combined explain the difference between the totals for familial bread in Tables 2 and 3.

With totals for familial bread, it is now possible to add the labor expenses on the home granges to those found in Appendix C. Unfortunately, because familial bread is a mixture of many different crops individual grains cannot be

considered when looking at labor expenses. Table 4 presents the labor expenses on the home granges as part of the total production of all grains. The production numbers are weighted by the value of the grains produced, while the labor expenses are weighted by the average value of grains put into the familial bread.[19]

Looking at the percentage of labor versus total production, it can be seen that the numbers are highly variable and fit no clear pattern. The two largest granges, Beufre and St. Leonards, have relatively low labor expenses, which might be explained as the result of the economy of size. However,

Table 4: Home Grange Labor Cost

Grange	*Product.*	*Weighted*	*Labor*	*Weighted*	*%Labor*	*%Weighted*
Holbury	396	1329	27	103	6.80%	7.74%
Sowley	174	619	39	148	22.30%	23.94%
St.Leonard	1558	5411	196	747	12.56%	13.81%
Beufre	1182	4065	170	649	14.37%	15.95%
Harford	566	1864	145	555	25.68%	29.78%
Otterwood	445	1547	100	383	22.55%	24.77%
Totals	4321	14834	677	2585	15.67%	17.43%

Holbury has even lower labor costs although it is the second smallest of the granges. The only consistent pattern among the home granges is that the weighted percentages are higher than the unweighted ones. This is understandable, as much of the production on the home granges is of low value oats, while labor costs are met with the relatively higher valued wheat, barley and legumes.

The entries for bread sent to the granges also provide evidence that most of the work being done on the granges was being done not by *conversi* but

[19]This value, 3.818 shillings/quarter, is shown at the bottom of Table Nine and is a weighted average of all the crops in familial bread.

rather by paid laborers. The entries tell how many *conversi* and how many members of the *familia* were being provided bread. It is clear from these entries that the hired laborers greatly outnumbered the members of the order on all the granges. The home granges had a total of twenty-seven *conversi* living on them. They also had at least ninety-three members of the *familia*, but vagaries in the denoting of workers makes it possible that there might have been as many as one hundred and twenty. Even if the smaller total is correct, the *conversi* were outnumbered more than three to one by permanent wage laborers. This is further supported by the accounts for the Faringdon grange of Wyke, which had two *conversi* and fifteen *famuli*. This is the only one of the non-home granges which specifically states the number of resident *conversi*, but it is unlikely that the other distant granges had a higher proportion of *conversi* than the home granges. Several of the accounts were attested by reeves rather than by a member of the order and may these granges may not have had any member is residence. Given these numbers, it is evident that Beaulieu depended on wage labor for most of its agricultural work.

It is now possible to go back and make some comparisons between expenses on the home granges and on the other granges. Figure 9 summarizes the weighted and unweighted totals for all grains on the home granges, on the other granges, and on all the granges combined. An examination of the table shows that the home granges had higher seed and labor expenses and higher overall expenses, but lower fodder expenses. The higher seed expense is understandable due to the high percentage of low-yielding oats grain on the home granges. The difference is greatly reduced when weighted totals are used, due to the relatively low value of oats. The lower fodder totals for the home granges might be a result of their proximity to each other and the abbey,

which might have allowed them to share horses when necessary and also limited the distance they had to carry produce.

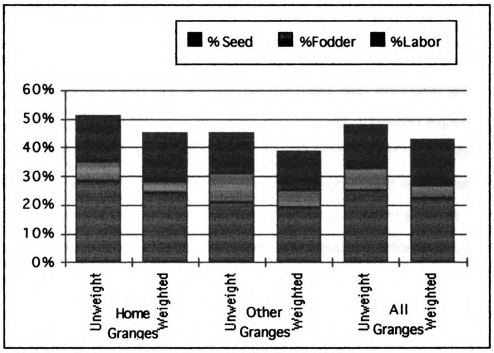

Figure 9: Beaulieu Total Grain Use

The labor expenses raise other issues. While the unweighted totals are quite close, the weighted numbers are further apart. This is no doubt because on the other granges the *familia* was paid primarily with low price barley, while on the home granges they were paid with a mixture including more expensive grains. Still, it is surprising that the home grange totals are not higher than they are. The other granges probably had the advantage of requisitioning labor from their tenants. The Faringdon granges certainly had this advantage, as fines to avoid customary labors are recorded in the accounts.[20] At Faringdon the abbey had essentially made a capital investment of half or more of its land in return for

[20]Hockey, p. 21.

free labor and the usual rents and payments.[21] Yet even without this "free" labor, three of the six home granges had labor expenses at or below the level at Faringdon. Clearly the Cistercian granges could be more efficient than a more conventional manor in the use of labor, although we lack a manorial survey that would enable us to quantify this.

Looking at the larger issue of overall expenses, the home granges once again support the importance of taking into account non-seed expenses. On these granges the unweighted total for expenses was over fifty percent of total production, with the weighted total nearly that high. Seed expenses made up slightly more than half of this, with labor making up most of the rest. Although the inability to break up the labor expenses by grain is unfortunate, the numbers continue to support the contention that non-seed expenses cannot be considered trivial.

Table Five: Ale Use

	GoodAle	*SecondAle*	*Totals*	*Grain Equivalent Wheat*	*Oats*
Total Production	191.37	120.66	312.03	312.03	550.05
Refectory	142.70		142.70	142.70	251.55
Conversi		15.00	15.00	15.00	26.44
Guesthouse	36.00	76.00	112.00	112.00	197.44
Porter	0.33	1.66	1.99	1.99	3.51
Sec. Infirmary	1.50	18.50	20.00	20.00	35.26
Small Expenses	4.50	1.50	6.00	6.00	10.58
Departments	2.70	0.50	3.20	3.20	5.64
Labor	0.60	3.15	3.75	3.75	6.61
Sold	0.80	5.80	6.60	6.60	11.63
Gifts	6.16	2.16	8.32	8.32	14.67
Total Expenses	195.29	124.27	319.56	319.56	563.33

(Ale totals are in dolia, grain in quarters)

[21] see above, p. 9.

While these accounts provide no more information on the main theme of this paper, several other interesting observations can be made about the abbey's use of grain based on these accounts. A detailed breakdown of the abbey's grain use shows the monks to be more than adequately supplied to meet their needs, while still having a lot of surplus to give to the poor and host guests. Before this breakdown can be done an examination must be made of the brewhouse account, for large amounts of grain were processed there and redistributed to various departments as ale.

The brewhouse used two grains, wheat and oats, to produce the malt necessary to make the ale. 312 quarters of wheat and 550 quarters of oats produced a total of 310 dolia of ale.[22] The distribution of this ale is detailed in Table 5 The ale was divided into two grades, referred to simply as good ale and second ale. The actual production numbers for the two grades of ale are 257 dolia of good ale and 53 dolia of second, but about 67 dolia of the good ale were mixed with the second ale. The numbers in Table 5 reflect this transfer. As the table shows, the majority of good ale was consumed by the monks themselves at the refectory, and most of the rest was used by the guesthouse. The guesthouse was also the primary consumer of second ale, with most of the rest either sent to conversi out at the granges or used by the secular infirmary. The second section of Table 5 shows the grain equivalents of the ale production and expenses, that is, the amounts of wheat and oats necessary to produce the ale. With these numbers, and those from Tables 3 and 4, it is now possible to make estimates of how much grain was devoted to various uses by the abbey.

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[22] 1 dolium = 240 gallons

Table 6: Beaulieu Grain Consumption

	Wheat	*Oats*	*Mixed*	*Total*
Refectory	404.00	251.50		655.50
Conversi	78.40	26.40		104.80
Guesthouse	327.00	197.40		524.40
Porter	23.55	3.50	126.00	153.05
Sec. Infirmary	65.00	35.30		100.30
Departments	194.85	453.50	116.70	765.05
Labor	71.95	6.60	677.00	755.55
Misc.	71.90	298.90		370.80

Table 6 shows the consumption of wheat, oats, and the mixture of grains and legumes used to make familial bread for different types of expenditures. Between the refectory and the food sent out to the *conversi* on the granges, the members of the monastery personally consumed just over 482 quarters of wheat and nearly 278 quarters of oats. The monks gave away almost as much as they consumed. The abbey's guesthouse functioned as a hospice for all classes of guests, though the higher classes got better food and treatment.[23] The porter actually functioned more as an almoner, giving away food and old clothing as well as choosing thirteen poor men to be fed and housed in the guesthouse every night. When consumption in the secular infirmary is also included, the total amount of grain given away by the abbey is about 425 quarters of wheat, 235 quarters of oats and 126 quarters of mixed grains.

The various departments and workshops of the abbey consumed the largest quantity of grain. By far the largest amount was consumed by the stables, which used over 453 quarters of oats as fodder. Wheat and mixed grains were consumed by fifteen different departments, the largest consumers being the shoemaker/tanner and the skinner. Labor expenses consumed only slightly less grain than the departments. The *familia* consumed large amounts of mixed grain and a little wheat, while about 40 quarters of wheat was used to

[23]Hockey, p. 33.

meet non-agricultural labor expenses. Miscellaneous consumption included 50 quarters of wheat and 262 quarters of oats which were sent back to custodians of the granges for the expenses of the *domus*. As noted above, the actual use of this grain cannot be determined, so it must be left in the miscellaneous category.

An examination of these numbers indicates several things about the abbey's grain supply. It might seem that the monks were well supplied with grain, since they were able to give away about as much grain as they personally consumed. In fact, however, the granary purchased a net of 335 quarters of wheat, 372 quarters of oats, and 316 quarters of the other grains.[24] This is somewhat more than what they gave away. Thus the abbey actually had a slight shortage in grain that had to be made up through purchases. It is unfortunately impossible to know whether this was a bad year and so such purchases were uncommon, or whether this was standard practice. In any case, the home granges evidently could not be counted on always to supply the abbey with all the necessary grain. The fact that the monks were willing to purchase the additional grain and its inclusion in the accounts as a normal expense indicate that abbey's charity was considered part of everyday business.

ESTATES OF BEC ABBEY

In order to test whether the conclusions drawn from the accounts of Beaulieu Abbey have any general validity, it is useful to compare these accounts to ones from other sources. Unfortunately, accounts giving such complete detail are relatively rare and difficult to find. Other, less detailed, accounts have survived, and so it is in such accounts that comparisons must be sought. One relatively complete set of accounts that has survived is that for the

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[24]Ibid. pp. 286-9.

English properties of the French abbey of Bec-Hellouin. The abbey provided two Archbishops of Canterbury to serve under the new Norman dynasty and played a leading role in the reform of the Norman and English churches.[25] As a result it received several properties in England from the crown and from members of William's court.[26] The accounts for sixteen of Bec's manors for the year 1288-9 survive,[27] and these accounts will be compared with those from Beaulieu.

The estate systems of the two abbeys were different in a number of ways. Beaulieu was a Cistercian abbey and made use of lay-brothers and hired workers on its granges, with tenants only on the outlying granges. Benedictine Bec depended on tenant labor on all its manors, as well as full-time *familia.* [28] Bec itself had sufficient grain supplies from its closer French possessions and so did not depend on its English properties to supply any grain but instead sold all the surplus.[29] In this it clearly differed from Beaulieu, whose home granges which supplied food to the monks. Bec's English properties were also widely scattered around the countryside,[30] with manors stretching from East Anglia to Devonshire. All of the manors listed in the accounts were under the authority of the Prior of Ogbourne, who was responsible for managing the estates and collecting the revenues.[31] However, the geographic distances between manors prevented them from being operated as an interdependent system; instead, the individual manors sold their excess produce at nearby markets.[32] This is like

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[25]Sally Vaughn, *The Abbey of Bec and the Anglo-Norman State 1034-1136* (Bury St. Edmunds: Boydell Press, 1981), pp. 1-2.
[26]Marjorie Morgan, *The English Lands of the Abbey of Bec* (London: Oxford University Press, 1946), pp. 138-150.
[27]Marjorie Chibnall ed., *Select Documents of the English Lands of the Abbey of Bec* Camden series 3, vol. LXXIII, (London: Royal Historical Society, 1951).
[28]Morgan, pp. 77-91.
[29]Ibid., pp. 41-2.
[30]Ibid., p. 38.
[31]Ibid., p. 39.
[32]Ibid., p. 49.

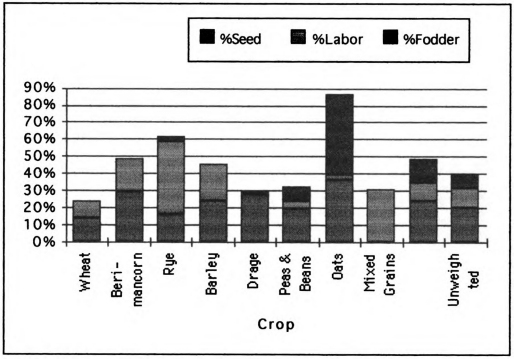

Figure 10: Bec Grain Use

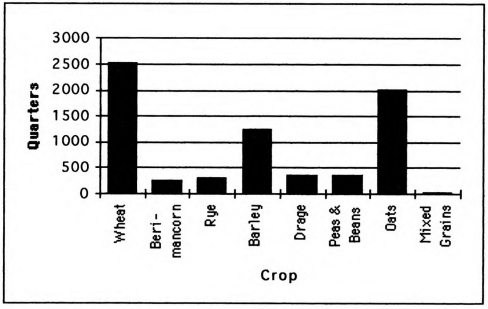

Figure 11: Bec Grain Production

the outlying granges of Beaulieu but very different from its home granges. Comparison of two such different sets of accounts should help to clarify whether the results from Beaulieu's accounts are consistent with more typical, non-Cistercian estates.

The production and expenditures of different grains on the estates of Bec are detailed Appendix D. The totals for these estates are summarized in Figures 10 and 11. There are striking similarities between these totals and those found in Figures 5 and 6, which show the grain totals for Faringdon and Beaulieu's outlying granges. As on the Beaulieu granges, wheat had the highest production, followed closely by oats, with barley a more distant third. Approximately a quarter of the wheat went to meet expenses, a far lower total than for either barley or oats. Oats had the highest percentage going to meet expenses, due both to a high seed percentage and to a large need for fodder. In fact, the fodder requirements were even higher on the Bec estates, consuming almost half the oats crop. Barley was the most important grain in meeting labor expenses. Unlike the Beaulieu granges, however, Bec used both wheat and rye in large amounts as well as barley to compensate the *familia.* The wheat percentage is about the same, but on the Bec estates rye played a much larger role in meeting labor expenses. Even if the barley and rye totals in each table are combined, the totals for the Bec estates are somewhat lower.[33] It is apparently not just a matter of using rye instead of barley to meet labor expenses on the Bec estates, their overall labor costs were actually lower. As Figure 10 shows, labor expenses on the Bec estates were about eleven percent of production versus fourteen percent on the Beaulieu granges. In all three

[33]On Bec estates, total rye & barley production equals 1562 quarters, labor expense equals 399 quarters, labor percentage equals 25.5%. On Beaulieu granges production equals 1169 quarters, labor expense equals 417 quarters, labor percentage equals 35.7%.

categories of expenses the overall totals are similar, the weighted totals being even closer than the unweighted.[34] No totals differ by more than two percentage points. The similarities between the Bec estates and Beaulieu's non-home granges is not unexpected, as they played similar roles in their respective abbeys' manorial systems. The grain on all of them was meant primarily for sale or to meet production expenses.

When the weighted totals for the Bec estates are compared with those from all of Beaulieu's granges, including the home granges, the totals become even more similar. It is only in the labor expenses that the difference becomes larger. As noted above, this is undoubtedly because Beaulieu's home granges lacked the "free" tenant labor that both the Bec estates and the other Beaulieu estates had at their disposal. Taking into account this difference, the general picture presented by the Bec accounts is consistent with that from the Beaulieu accounts. They give further evidence for the importance of taking into account non-seed expenses when examining manorial accounts and calculating net production of grains. This is especially true for barley and oats.

ESTATE MODEL AND USE

Using these totals, one can produce a model for the distribution of grain production and expenses on an English manor in the late thirteenth century. The percentages of grain production can be derived, as well as the average percentage of each grain used to meet production expenses. Using Titow's numbers for approximate grain yields per acre,[35] it is also possible to calculate the percentage of the arable planted with each category of grain. These percentages are displayed in Table 7.

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[34]The same figures were used to weight the Bec accounts as on the Beaulieu accounts, with a value of 2s. / quarter used for berimancorn. As with the other values this was calculated from the prices occurring in the accounts.

[35]Titow, *Winchester Yields*, pp. 121-35, 149.

Table 7: Model Grain Percentages

Grain	*%Tot. Prod*	*%Used Exp.*	*%Acreage*	*Yield/Acre*
Wheat	34%	25%	39%	1.20
Barley	20%	49%	13%	2.21
Oats	29%	79%	32%	1.25
Others	17%	38%	16%	1.45

The "Others" category on this table includes rye, drage, peas and the other crops which were grown only sporadically and so do not merit their own category. With this table, manorial surveys can be used to make estimates of grain production and use where the accounts do not exist.

An example of this possible application is Christopher Dyer's work on the estates of the bishopric of Worcester.[36] As he notes in this work, these estates do not have an existing series of accounts from the pre-1348 period, although records and surveys do show the size of and profits from these estates for several years.[37] Dyer asks at one point "What use did they make of the demesne?"[38] Unfortunately, he lacks any accounts to tell him much detail. With the figures calculated in this paper, however, it is possible to make some estimates. Dyer states that the total demesne arable land in 1290 was about 6,460 acres.[39] He also states that the survey of 1299 indicates that throughout the estates of the bishopric a two-field rotation was used.[40] Thus the area of demesne in production in 1290 was probably about 3230 acres. Applying our numbers to this area, with some modifications discussed below, yields the results displayed in Table 8.

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[36]Christopher Dyer, *Lords and Peasants in a Changing Society* (Cambridge: Cambridge University Press, 1980).
[37]Ibid., p. 52.
[38]Ibid., p. 67.
[39]Ibid.
[40]Ibid., p. 68.

Table 8: Worcester Estimates

Crop	*Acreage*	*Production*	*Profit(Qu.)*	*Profit Value(£)*
Wheat	1001	1202	901	225
Barley	420	929	474	71
Oats	1292	1615	339	34
Others	517	749	465	70
Total	3230	4495	2179	400

Thus the total profit from grain sales for the bishopric of Worcester in 1290 could have been around £400. Grain sales were probably less than this, as the bishop and his entourage would have consumed much of the grain themselves. The necessary records to show what the bishop consumed do not exist, but some estimate is possible. The prior and convent of Westminster Abbey consumed about 900 quarters of wheat, 540 quarters of barley and 1095 quarters of oats per year.[41] This is on the same magnitude with the above figures for Beaulieu. It is unlikely that the Bishop of Worcester's household could have consumed much more than a whole convent, so this can be used as a maximum figure. This amount of grain would cost about £420, leaving about £20 worth of grain to buy. These figures indicate that the bishop could have probably fed his court from his own estates some of the time, but perhaps not always.

This total is consistent with the income numbers for the estates. The total income for c. 1290 was £1170.[42] The total income from rents in 1299 was £700,[43] leaving about £470 to account for. Other than grain income, the bishop's main income source on the estates would have been his sheep herds, and in c. 1290 he had 5650 sheep.[44] If about seventy-five percent of these

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[41]Barbara Harvey, *Westminster Abbey and Its Estates in the Middle Ages* (Oxford: Oxford University Press, 1977), p. 142.
[42]Dyer, p. 54.
[43]Ibid., p. 73.
[44]Ibid., p. 70.

sheep were old enough to be shorn,[45] then they would have produced wool worth about £135 a year.[46] This means the grain values must make up £335 to balance the books, about £65 less than our figures. The difference might result from a difference in rental levels between 1290 and 1299 or from a poor fit with our model. Most likely the difference is at least partly caused by variations in the quality of the harvest. Estate incomes certainly were highly variable, as the bishopric recorded an income of £1192 in 1299 but only £850 in 1302. It is likely that such a large difference is result of a bad harvest, rather than variations in rental levels. Given such wide variations, an estimate within £65 is not unacceptable.

The figures in Table 8 were calculated by statistics changed from the percentages in 7 in two ways. The figures on grain consumption calculated in this paper are based on estates found mostly in southern central England. By this time estates in this area were making heavy use of horses for plowing, about thirty percent of plow team were made up of horses.[47] In the area of the Worcester estates the number was only about ten percent.[48] Since horses consume about six times as much oats as oxen,[49] the fewer number of horses would have reduced the amount of oats needed for fodder. The difference would reduce the oats necessary as fodder by forty percent, or about nineteen percent of total oats production. This increased profits by about £14. Another adjustment that has been made was to increase the percentage of acreage planted with oats and decrease that planted with wheat. This is

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[45]Biddick, p. 101.
[46]Ibid., p. 109.
[47]John Langdon, *Horses, Oxen and Technological Innovation* (Cambridge: Cambridge University Press, 1986), p. 93.
[48]Ibid.
[49]John Langdon, "Horses and Oxen in Medieval England", *Agricultural History Review* Vol. 30, pt. 1 (Leeds: British Agricultural History Society), p. 33.

consistent with data from Worcester which shows that oats usually exceeded wheat in acreage planted, unlike the area on which our data is based.[50]

Another example of the use of these estimates is its application to the estates of the Fitzalan Earls of Arundel. A comprehensive survey of the earl's estates exists for the year 1301, but there are no accounts to go with it.[51] The surveys states that the total income from the estates was £1291.[52] Of this, £390 was from rents and £100 from various feudal dues.[53] This leaves £800 to account for from other sources. Most of this can be accounted for in agricultural production. The Fitzalan estates in 1300 had about 5200 acres in demesne production and at least 2850 sheep. The sheep population was almost certainly higher, because on some of the estates a shepherd is recorded, but we have no total for sheep on the same manor. Thus there are almost certainly more sheep than are attested in the records. A second survey from circa 1405 records about 14,000 wool-producing sheep on the Fitzalan estates, although the estates had expanded somewhat by that time.[54] Even taking into account this expansion, it is clear that 2850 is a low estimate for the size of the herd in 1300. Using Biddick's numbers, these 2850 sheep would have produced about £65 worth of wool. If the actual flock was even half the size of the c. 1400 flock, the wool produced would have been worth at least £212.

The Fitzalan estates are concentrated in Sussex and Shropshire. By this time the three-field system was common in Shropshire,[55] and many Sussex estates had twenty percent or even less of their demesne in fallow.[56] At least

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[50]Hallam, *Agrarian Hist..*, pp. 354-62, 380-2.
[51]Marie Clough, ed., *Two Estate Surveys of the Fitzalan Earls of Arundel,* Sussex Record Society Vol. 67 (Lewes, U.K.: Sussex Record Society, 1969)
[52]Ibid., p.90.
[53]Ibid., pp. 89-90.
[54]Ibid., pp. 94-101.
[55]Hallam, *Agrarian Hist.*, p. 414.
[56]Ibid., p. 321.

3500 acres of the Fitzalan estates were probably in production each year. These two counties were also places where oxen were predominate,[57] so the same adjustment to oats production should be made as was done for Worcester. The percentages of acreage planted with each grain have not been modified because while in Shropshire oats were more common than wheat,[58] in Sussex the tendency was in the opposite direction.[59] The two tendencies balance each other out. The results of the calculations are in Table 9.

Table 9: Fitzalan Estimates

Crop	*Acreage*	*Production*	*Profit(Qu.)*	*Profit Value(£)*
Wheat	1365	1638	1229	307
Barley	455	1007	513	77
Oats	1120	1400	560	56
Others	560	812	503	76
Total	3500	4857	2805	516

If we assume the larger size for the sheep herd, then the combination of wool and grain values account for almost the whole of the unaccounted £800. This is consistent with the prevailing theory of demesne exploitation, which considers this time to be part of the "high farming " era when landlords maximized profits from direct exploitation of the demesne.[60] This is indicated by agricultural production worth twice the rent collected. The above figures for the bishopric of Worcester, however, have rents exceeding production by almost two to one, so the combined evidence is inconclusive.

This approach to grain expenses can also be of use when the amount of grain is known, and the amount of land necessary to produce it is want we wish to calculate. In her book *The Other Economy* Kathleen Biddick calculates the

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[57]Langdon, *Horses, Oxen and Tech.*, p. 88.
[58]Hallam, *Agrarian Hist.*, pp. 458-72.
[59]Hallam, *Rural England*, p. 84.
[60]Titow, *English Rural Society*, p. 51.

amount of land necessary to meet the grain consumption needs of the monks of Peterborough Abbey.[61] Based on data from Ramsey Abbey, she estimates the necessary grain to be 288 quarters of wheat, 160 quarters of barley and 80 quarters of oats.[62] However, she bases her calculations on net yields J. Z. Titow calculated for tenant grain production, rather than for demesne production. Titow's numbers include reductions for seed and for the tithe, but nothing else.[63] As has been shown in this paper, these are not the only reductions that must be made for demesne production, and the tithe reduction is not an appropriate reduction for a monastic estate. Fortunately, earlier in the book Biddick provides a detailed breakdown of how the grain produced in the estate is used, including how much is used to meet expenses.[64] Thus it is not even necessary to use estimates for these percentages. The difference between Biddick's and the new estimates are shown in Table 10.

Table 10: Biddick Estimates

	Wheat	*Barley*	*Oats*	*Total*
Biddick	741	288	288	1317
New Estimate	900	218	320	1437

The actual difference between the two sets of numbers is not great, the new numbers are only about ten percent higher. Even if the numeric difference is not great, the methodology behind the new estimates is more sound, as it is based on demesne rather than peasant production figures.

CONCLUSION

These examples demonstrate the usefulness of approach I have developed and used in this paper. Using yield ratios calculated by Titow twenty

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[61]Biddick, p. 138.
[62]Ibid.
[63]Titow, *English Rural Society, pp.* 80-1.
[64]Biddick, p. 73.

years ago, scholars have been able to calculate approximate gross yields of grains on medieval demesnes.[65] Without detailed accounts, however, calculating net yields has been almost impossible. Using my approach, it is now possible to approximate the net productivity of a designated amount of land. This is more useful than gross yields as the net yield represents the amount grain available to the owner for consumption and sale, i.e., the owner's disposable income. These estimates are only very rough and can be altered by a number of factors, including the draft animals used, the proportion of land planted with each crop and amount of land left fallow. Even a rough estimate is better than none, however, and these factors can be compensated for in some cases. Finally, when accounts do exist, as for Peterborough, this approach can be used to calculate very accurate net yields, or as in Biddick's book, the area needed to produce a given amount of grain.

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[65]Titow, *Winchester Yields*

APPENDICES

Appendix A

Table 11: Faringdon Detailed Accounts

	Prod.	Purchase	Tithe	Last Yr.	Seed	Sold	Labor	Fodder	% Lab	%Exp
Shilton										
Wheat	106	3			18	88	3		3%	21%
Barley	70	5			12	21	42		60%	77%
Drage	92				35	57			0%	38%
Oats	19	21			7			23	0%	156%
Lit. Far.										
Wheat	91	16			16	90	1		1%	19%
Barley	76	9			17	38	31		40%	62%
Drage	126				28	97			0%	23%
Oats	12	13			10			15	0%	209%
Inglesham										
Wheat	74	10	22		23	72	8		8%	33%
Barley	65	12	41		14	67	36		34%	47%
Beans	5		9		1	13	0		1%	6%
Oats	16	15			7			16	0%	144%
Wyke										
Wheat	402	12		10	68	331	3		1%	18%
Rye	17				3	11			0%	18%
Barley	185	43			17	1	107		58%	68%
Beans	5	1			3	1			0%	56%
Peas	5			0	1	4	1		10%	20%
Vetches	4				1	1		2	0%	71%
Malt	12						12		100%	100%
Oats	488			2	171	217	3	89	1%	54%
Coxwell										
Wheat	207		24	30	36	148	62		27%	42%
Rye	104		11		24	92			0%	21%
Barley	72	57	35		16	37	84		78%	93%
Beans	12				5	2	1	1	11%	61%
Oats	213	16		13	52	19	1	121	1%	82%
Malt	34	28					62		182%	182%
Church										
Wheat			64		7	46	7		11%	21%
Rye			11		1	10			0%	9%
Barley			59				6		9%	9%
Drage			34			34			0%	0%
Beans			19		0	19			0%	1%
Oats		5	20		5	10		10	0%	73%
Mills										
Wheat	21					17	3		16%	16%
Barley	29					25	3		11%	11%
Malt	66					66			0%	0%

All Amounts are in Quarters. 1 Quarter = 8 Bushels.

Table 12: Faringdon Totals

Crop	Total Output	Seed	Labor	Fodder	Expenses	%Seed	%Lab	%Fod	% Exp.
Wheat	900	168	87	0	255	19%	10%	0%	28%
Barley	496	75	308	0	383	15%	62%	0%	77%
Rye	121	28	0	0	28	23%	0%	0%	23%
Drage	218	64	0	0	64	29%	0%	0%	29%
Oats	748	251	4	274	529	34%	0%	37%	71%
Beans	21	8	1	0	11	39%	7%	0%	50%
Peas	5	1	1	0	1	10%	10%	0%	20%
Malt	112	0	74	0	74	0%	66%	0%	66%
Vetches	4	1	0	2	3	14%	0%	50%	71%
			Totals for		All Grains				
Unweighted	2625	595	474	276	1346	23%	18%	11%	51%
Weighted	9192	1935	1593	514	4087	21%	17%	6%	44%

Appendix B

Table 13: Other Granges Detailed Accounts

	Prod.	Purchase	Tithe	Tenants	Last Yr.	Seed	Sold	Labor	Fodder	%Lab	%Exp
Cornwall											
Wheat	7			34	2	3	34			0%	7%
Rye	5				1	1		5		108%	121%
Barley	65			103	1	5	148	16		10%	13%
Drage	14						14			0%	0%
Beans			7				7			0%	0%
Peas			4				4			0%	0%
Oats	33			96		6	96	1	15	1%	17%
Burgate											
Wheat	32	11				13	31			0%	40%
Rye	9	3				4	7			0%	47%
Barley	81					11	43	22		27%	41%
Peas	11					2	9			0%	16%
Vetches	3					2	2			0%	50%
Oats	78	5				40	37		6	0%	59%
Soberton											
Wheat	142				39	27	17	11		7%	27%
Barley	132				18	36	25	66		50%	77%
Beans	2	0				1	1			0%	38%
Peas	24	4			0	7	17	1		2%	31%
Vetches	25				1	9	4			0%	37%
Oats	258	11				94	34	1	127	0%	86%
Colbury											
Wheat	30	8				9	29			0%	30%

Table 14: Totals For Other Granges

Crop	Output	Seed	Labor	Fodder	Expen	%Seed	%Lab	%Fod	%Exp
Wheat	245	52	11	0	62	21%	4%	0%	25%
Barley	381	52	105	0	157	14%	27%	0%	41%
Rye	14	5	5	0	10	35%	37%	0%	73%
Drage	14	0	0	0	0	0%	0%	0%	0%
Oats	465	140	2	148	290	30%	0%	32%	62%
Beans	2	1	0	0	1	50%	0%	0%	50%
Peas	32	9	1	0	9	28%	3%	0%	31%
Malt	0	0	0	0	0	0%	0%	0%	0%
Vetch	28	11	0	0	11	38%	0%	0%	38%
Unwei	1178	269	123	148	539	23%	10%	12%	45%
Weigh	3609	785	397	296	1478	22%	11%	8%	41%

Table 15: Totals for Faringdon & Other Granges

Crop	Output	Seed	Labor	Fodder	Expense	%Seed	%Lab	%Fod	%Exp
Wheat	1145	220	97	0	317	19%	8%	0%	28%
Barley	877	127	412	0	540	14%	47%	0%	61%
Rye	135	33	5	0	38	24%	4%	0%	28%
Drage	232	64	0	0	64	28%	0%	0%	28%
Oats	1213	391	6	422	819	32%	0%	35%	68%
Beans	23	9	1	1	11	39%	4%	4%	48%
Peas	37	9	1	0	10	24%	3%	0%	27%
Malt	112		74	0	74	0%	66%	0%	66%
Vetch	32	11	0	2	13	35%	0%	6%	41%
Unweig	3803	864	596	426	1885	23%	16%	11%	50%
Weight	12801	2720	1990	850	5565	21%	16%	7%	43%

Appendix C

Table 16: Home Granges Detailed Accounts

	Production	Last Year	Seed	Fodder	Granary	%Seed &Fodder	%Granary
Holbury							
Wheat	155		24		128	15%	83%
Barley	3					0%	0%
Peas	4		3		1	69%	25%
Vetches	43	10	10		43	23%	100%
Oats	191	4	48	15	130	33%	68%
Sowley	---	---	---	---	---	---	---
Wheat	83		8		74	10%	90%
Peas	5		1		3	11%	67%
Vetches	13		3		9	26%	74%
Oats	75		29		46	38%	62%
St. Leonards	---	---	---	---	---	---	---
Wheat	656		53		604	8%	92%
Rye	60		3		53	5%	89%
Beans	41	1	11		31	27%	75%
Peas	33	1	7		24	21%	74%
Vetches	23		4		20	15%	85%
Oats	746	4	254	81	400	45%	54%
Beufre	---	---	---	---	---	---	---
Wheat	500		96		405	19%	81%
Rye	9				8	0%	93%
Beans	20		6		13	28%	63%
Peas	32	2	4		29	11%	89%
Vetches	69		8		62	11%	89%
Oats	552	6	238	99	210	61%	38%
Hartford	---	---	---	---	---	---	---
Wheat	208		83		126	40%	60%
Rye	14		1		13	7%	93%
Beans	9		1		8	6%	89%
Peas	5				4	0%	81%
Vetches	28	7	4		31	12%	109%
Oats	302	4	172	59	56	76%	19%
Otterwood	---	---	---	---	---	---	---
Wheat	202		53		150	26%	74%
Rye	6		1		5	18%	82%
Beans	3		0		2	14%	76%
Peas	8		1		6	14%	74%
Vetches	13		2		11	16%	84%
Oats	213		109	40	34	70%	16%

Table 17: Totals for Home Granges

Grain	Product.	Seed	Fodder	Granary	%Seed	%Exp	%Granary
Wheat	1804	316	0	1485	18%	18%	82%
Rye	88	5	0	79	6%	6%	89%
Barley	3	0	0	0	0%	0%	0%
Beans	72	17	0	53	24%	24%	73%
Peas	87	15	0	67	17%	17%	77%
Vetches	189	30	0	175	16%	16%	93%
Oats	2079	849	292	876	41%	55%	42%

Table 18: Totals for All Beaulieu Granges

Home Gra.	Product	Seed	Fodder	Labor	Expense	% Seed	%Fod	%Lab	%Exp
Unweight.	4321	1231	292	677	2200	28%	7%	16%	51%
Weighted	14834	3519	584	2585	6688	24%	4%	17%	45%
Other Gra									
Unweight.	4163	864	425	596	1885	21%	10%	14%	45%
Weighted	14152	2720	855	1990	5565	19%	6%	14%	39%
All Grang.									
Unweight.	8484	2095	717	1273	4085	25%	8%	15%	48%
Weighted	28986	6239	1439	4575	12253	22%	5%	16%	42%

Appendix D

Table 19: Bec Detailed Accounts

	Production	Seed	Labor	Fodder	%Seed	%Lab	%Fod	%Exp
Cotesford								
Wheat	34	18	5		52%	14%	0%	66%
Rye	70	8	53	9	11%	75%	12%	98%
Drage	52	30			57%	0%	0%	57%
Oats	50	28	2	20	56%	4%	40%	100%
Adreston								
Wheat	110	30	41		27%	37%	0%	64%
Rye	9	6	6		65%	68%	0%	132%
Peas	21	9			42%	0%	0%	42%
Barley	10	5			47%	0%	0%	47%
Drage	9	5			56%	0%	0%	56%
Oats	129	32	5	36	24%	3%	28%	56%
Wedon								
Wheat	150	24	9		16%	6%	0%	22%
Rye	120	8	24		6%	20%	0%	26%
Mixed Grains	34		10		0%	31%	0%	31%
Peas	27	8	2	5	31%	7%	19%	57%
Drage	180	21		7	12%	0%	4%	16%
Oats	173	66	3	73	38%	2%	42%	82%
Swnecumb								
Wheat	88	22	14		25%	16%	0%	41%
Mancorn	49	26	17		54%	34%	0%	88%
Barley	72	28	18		39%	26%	0%	65%
Drage	9	4			45%	0%	0%	45%
Oats	68	47	2	76	70%	3%	113%	186%
Waneting								
Wheat	417	27			6%	0%	0%	6%
Barley	216	10	42		5%	20%	0%	24%
Beans	44	5	1	11	12%	2%	26%	39%
Oats	50	11	3	28	21%	6%	56%	83%
Bledel								
Wheat	252	28	10		11%	4%	0%	15%
Mancorn	23	3	11		13%	45%	0%	58%
Barley	44	8	12		19%	28%	0%	46%
Beans	10	6			61%	0%	0%	61%
Oats	79	39	2	58	50%	3%	73%	125%
Rislep								
Wheat	962	101	168		11%	17%	0%	28%
Barley	7				0%	0%	0%	0%
Beans&Peas	190	20	6	13	10%	3%	7%	20%
Oats	913	213	16	454	23%	2%	50%	75%
Wretham								
Rye	108	14	23		13%	21%	0%	35%
Barley	149	46	23		31%	16%	0%	46%
Oats	79	42	6	37	53%	8%	46%	107%

Table 19 (Continued)

	Production	Seed	Labor	Fodder	%Seed	%Lab	%Fod	%Exp
Lesingham								
Wheat	13	3			23%	0%	0%	23%
Barley	144	43	32		30%	22%	0%	52%
Peas	36	13	2		36%	6%	0%	41%
Oats	61	33	2	20	54%	3%	33%	90%
Blankenham								
Wheat	71	5			7%	0%	0%	7%
Rye	68	14	26		20%	38%	0%	58%
Barley	59	23			39%	0%	0%	39%
Peas	7	2	1		25%	18%	0%	44%
Oats	75	42	3	30	56%	4%	40%	99%
Cumbe								
Wheat	100	19	2		19%	2%	0%	21%
Bericorn	103	26	25		25%	24%	0%	48%
Barley	134	29	8		22%	6%	0%	28%
Oats	79	35	3	38	45%	4%	48%	97%
Hungerford								
Wheat	81	10	5		13%	6%	0%	19%
Bericorn	40	7			17%	0%	0%	17%
Barley	47	7	19		15%	40%	0%	55%
Drage	14	4			27%	0%	0%	27%
Oats	35	11	3	14	30%	9%	39%	78%
Querle								
Wheat	90	15	6		17%	6%	0%	23%
Barley	156	41	49		26%	31%	0%	58%
Berimancorn	30	4			13%	0%	0%	13%
Drage	60	21		0	36%	0%	1%	36%
Peas & Beans	18	5	2		28%	11%	0%	39%
Oats	98	54	1	41	55%	1%	41%	98%
Anna								
Wheat	58	11	3		20%	5%	0%	24%
Bericorn	6	5			71%	0%	0%	71%
Barley	103	24	26		23%	25%	0%	48%
Drage	26	12		2	45%	0%	6%	51%
Oats	56	49		20	88%	0%	36%	125%
Povinton								
Wheat	82	26	0		31%	0%	0%	31%
Barley	98	31	34		31%	35%	0%	66%
Peas&Beans	7	3	2		41%	32%	0%	73%
Oats	56	26	1	6	46%	2%	11%	58%
Muleburn								
Wheat	8	6			77%	0%	0%	77%
Bericorn	12	7			61%	0%	0%	61%
Barley	18	7	3		38%	17%	0%	55%
Oats	16	14		1	85%	0%	6%	91%

Table 20: Bec Totals

Totals	Product	Seed	Labor	Fodder	%Seed	%Lab	%Fod	%Exp
Wheat	2516	345	261	0	14%	10%	0%	24%
Beriman corn	263	77	52	0	29%	20%	0%	49%
Rye	306	49	132	9	16%	43%	3%	62%
Barley	1256	301	267	0	24%	21%	0%	45%
Drage	349	96	0	9	28%	0%	3%	30%
Peas & Beans	361	71	17	30	20%	5%	8%	32%
Oats	2014	741	51	950	37%	3%	47%	86%
Mixed Grains	34	0	10	0	0%	31%	0%	31%
Totals	7098	1680	790	997	24%	11%	14%	49%
Weight	24660	5013	3055	2057	20%	12%	8%	41%

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