HOW GREAT WAS THE GREAT FAMINE OF 1314-22: BETWEEN ECOLOGY AND INSTITUTIONS

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There can be little doubt that the Great European Famine of 1314-22 was a single most severe food crisis in the late Middle Ages. The almost biblical flooding of 1314-17 led to a harsh subsistence crisis that deeply transformed European population, society, economy and ecology. Historians have long been aware of this in relation to the crop failures that occurred in these years, but their studies have tended to stand outside the analytical, and certainly statistical, frameworks that historians have created for assessing the impact of the catastrophe. The present working paper proposes the preliminary re-assessment of three important aspects of the Great Famine, from an English and Welsh perspective. The reason for concentrating on England and Wales is the fact that this region is abundant in a large corpus of statistical data, which either does not survive or does not exist for other regions in Northern Europe.

The first aspect to be examined is the extent of harvest failures within different crop sectors. The second issue is to what degree was the Great Famine of 1314-22 a subsistence crisis. Finally, the third question is: Are we to blame only the crop failures of 1315-7 for the starvation and suffering of the people? I am aware of the fact that the current project is still in its initial stages and that more questions and problems are likely to evolve later. Moreover, it is uncertain whether the similar conclusions can be applied on other regions to have suffered from the crisis in the same years.

My project is based on over 3,000 manorial and monastic accounts compiled between c.1310 and 1350. Manorial accounts were annual financial and agricultural reports, rendered by manorial officials and recorded by local clerks. These accounts record, in a considerable detail, the annual disposal of grain harvest and livestock, as well

as prices, wages and labour output. The monastic accounts, on the other hand, record the annual reception, consumption and redistribution of various foodstuffs, both cereal and non-cereal. In other hand, the two types of documents, surviving in a very large number, complimented each other and they constitute sources of first-rate importance for the students of social, economic and environmental history of late-medieval England and Wales. Apart from that, however, they are the only source of the kind allowing to reconstruct the course of the disaster of 1314-22 on a microscopic level.

Did all crops suffer to the same degree? The contemporary literary sources, mainly chronicles, reported that all grains yielded abysmally low yields, and they did not distinguish between different crops. The manorial accounts, on the other hand, yield a different picture and indicate that there was a clear gap between the winter and spring crops. Let us begin with the winter crops, namely wheat and rye [FIGURE 1].

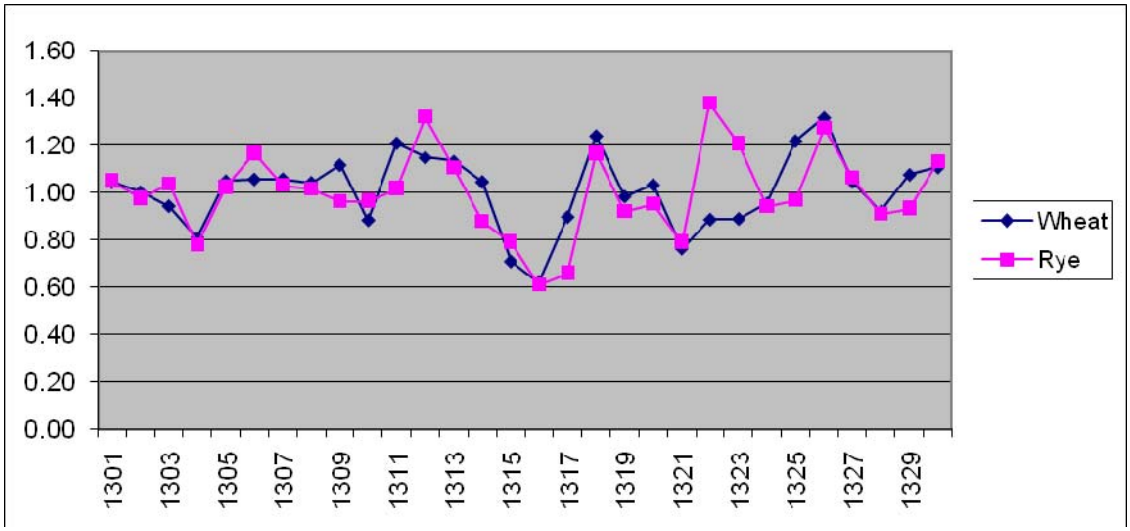

Figure 1. Winter Grain Yields, 1301-1330 ***(as % of previous 31-years)***

As we can see, during the famine years the yields were indeed very low and there were three back-to-back harvest failures. Wheat yields were 30 per cent lower than average in

1315, 40 per cent lower than average in 1316 and 10 per cent lower than average in 1317. Rye yields were 21 per cent lower than average in 1315, 39 per cent lower than average in 1316 and 34 per cent lower than average in 1317. Hence, there can be little doubt that the winter crops were depressed and the English population suffered from scarcity of wheat and rye-based products, mainly bread. But was it also the case with the spring grains, namely oats and barley? [FIGURE 2] As the available evidence suggests, the impact of the bad weather on these crops was rather limited. In 1315, the yields were about only 5 per cent below average for both grains. In 1316, they stood at 15 per cent below average for oats and 21 per cent below average for barley. In 1317, they were about 13 per cent below average for both grains.

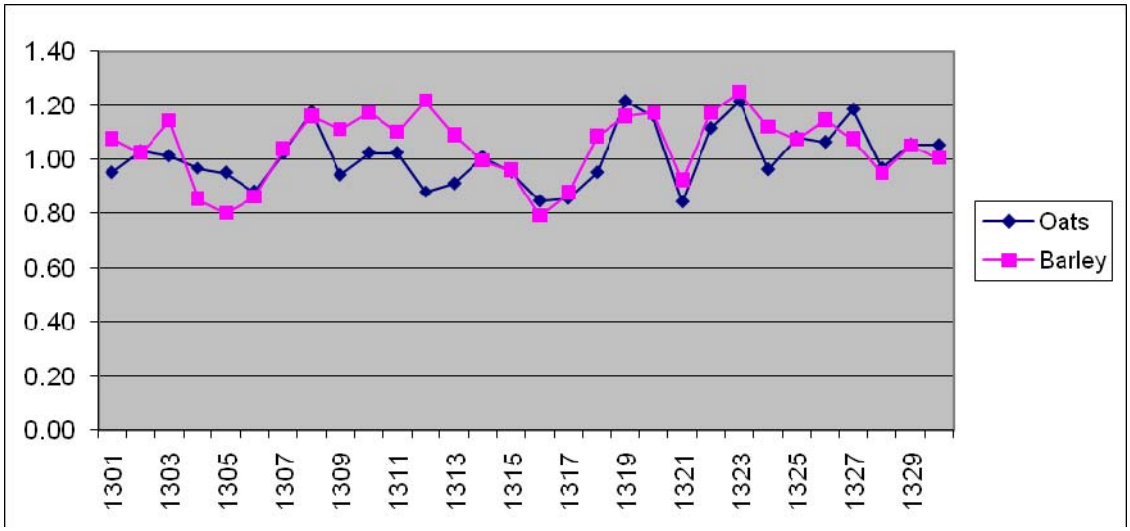

Figure 2. Spring Grain Yields, 1301-1330 ***(as % of previous 31-years)***

In other words, there is a clear gap between the harvests of the winter- and spring crops and there is no doubt that these were the former that suffered the most, while in the case of the latter the yields were somewhat below average. It is likely that this harvest gap reflects a temperature gap between winter and summer and it seems that wheat and rye,

both relatively intolerant grains, suffered more under the freezing rain of winter 1315 and 1316 than their more tolerant spring counterparts did under the torrential summer flood of the same years.

Although these trends reflect the general picture of the harvests in 1315-17, there were in fact some pronounced regional differences. Let us take the wheat harvests as a case study. One should remember that an average wheat harvest between 1270 and 1400 was about 3.75:1.00, while during the famine years, it stood at about 2.50:1.00. A close analysis reveals that the figures indeed varied from place to place. Thus, at Cuxham (Oxfordshire), the wheat yields were as high as 4.39:1.00 (that is, 4.39 bushels reaped per one bushel sown). On the other hand, at Morton (Bucks), an average wheat yield in three years was only 0.85:1.00, namely the seeding exceeded the harvest. In other words, there is clear evidence that some demesnes did much worse than the others, while some manors managed to reap good wheat crops even during the bad years. How can we explain these gaps? It seems that some clues emerge once we run a set of regressions, which take several variables and correlate them to wheat yields [Table 1]. The variables include the crop yields before and after the famine years; the size of animal livestock during the famine years; acreage proportion of each crop (namely, what proportion of the total arable was sown with each crop); the geographic altitude of each settlement; soil type; and the degree of crop diversity. The regressions yield the following results:

Table 1. Wheat Yields, 1315-7 Regressed on Explanatory Variables

Variable	Wheat Yields	Standard Error	R Square
Wheat Yields, 1270-1400	-0.238	0.674	0.056488199
Arable Size	0.084	0.212	0.007026471
Oat Yields	0.618	0.167	0.381859555
Barley Yields	0.689	0.160	0.474059993
Wheat Acreage Proportion	-0.078	0.217	0.006147354
Legume Acreage Proportion	0.253	0.211	0.064160024
Oat Acreage Proportion	-0.145	0.216	0.020918141
Barley Acreage Proportion	0.369	0.203	0.136506759
Spring Crops Proportion	0.207	0.213	0.043035323
Horse Herd Density	0.142	0.210	0.020229224
Oxen Herd Density	-0.268	0.205	0.071853259
Bovine Herd Density	-0.238	0.206	0.056565364
Sheep Flock Density	0.143	0.210	0.02040402
Settlement Elevation	-0.381	0.200	0.144855248
Soil Type	0.358	0.201	0.128495212
Grain Diversity	0.189	0.214	0.035793928
Observations	562		

As we can see, there was a clear correlation between the wheat yields and the proportion of the barley acreage and it seems that the higher was the proportion of the barley acreage the higher were the wheat yields during the famine years. Another variable to have impacted the wheat yields were the settlement elevation. Here we have a negative correlation, which means that as a rule, the manors located on higher altitudes could expect to have lower wheat yields. For instance, the manor of Copton is located on a lowland plain of Kent, and its elevation, for the most part, is 25 feet above the sea level. During the famine years, it managed to obtain high yields, which stood 11 per cent higher than their 1270-1400 average. The Buckinghamshire demesne of Ivinghoe, whose elevation is 400 feet above the sea level, on the other hand, reaped very poor wheat

harvest, which was 58 per cent lower than its average level between 1270 and 1400. This can hardly be surprising, since the winter temperatures are expected to be higher in higher altitude regions than on lowland plains. Finally, the type of soil seems to have had impact on the poverty of harvests also. As a rule, infertile shallow and light soils were affected by the inclement weather more than heavier and deeper ones. As a result, the more fertile lands could be expected to produce higher yields during the famine years. Furthermore, there seems to be little correlation between the non-famine and the famine wheat yields. In other words, those manors that had comparatively high yields before and after the famine years did not necessarily perform better during the great famine. The size of arable acreage had virtually no effect on the famine yields. The coefficient between the yields and livestock density seems to be relatively low to suggest that manuring or sufficient plowing force had enough impact on the yields during the famine years. Legumes, the natural fertilizing agents, seem to have had only a limited impact on the yields. This, in turn, suggests that these were mainly natural factors that influenced the crop yields during the famine years. The lords with large fertilizing and plowing resources still stood helpless facing the vagaries of the inclement weather.

Another aspect of the crisis is its very nature. To most scholars, the Great Famine was undoubtedly a subsistence crisis. Most recently, Bruce Campbell, one of the leading authorities on late-medieval English agrarian history, stated that it was perhaps the harshest subsistence crisis of the last two thousand years. Now, there is no doubt that the bad weather of 1314-6 and the failed harvests of 1315-7 brought about a pronounced shortage of grain, and chiefly winter grain, that is, wheat and rye. A conservative estimate

of mortality rates resulting from the famine is at least 10 per cent for England. But does it mean that the failed harvests created omnipresent grain scarcity? In his influential, if somewhat criticized book *Poverty and Famines*, Amartya Sen spoke about the 'entitlement crisis', whereby famines are brought about not as much by food shortage, as by unequal access, or 'entitlement' to food. In other words, in some cases, famine is 'class-discriminatory', with lower echelons are deprived of an equal access to (scarce) food supply. Was it the case of the Great Famine? In order to answer that question, a close analysis of some monastic accounts is required. As a case study, I've chosen two monastic communities with radically different resources and wealth. The one is Norwich Cathedral Priory, a wealthy ecclesiastical lord with large income from fertile landed estates and tithes in East Anglia. And the other one is Bolton Priory, an Augustinian house with modest income deriving from several farms situated on poor soils of Yorkshire Dales. As Figure 3 reveals, during the famine years, the authorities of Norwich Cathedral Priory managed to secure a steady supply of wheat by increased purchases of the deficient grain. The Priory brethren continued enjoying their daily cereal intake without any disturbance, even though their demesnes harvested and sent less wheat than in the pre-famine years.

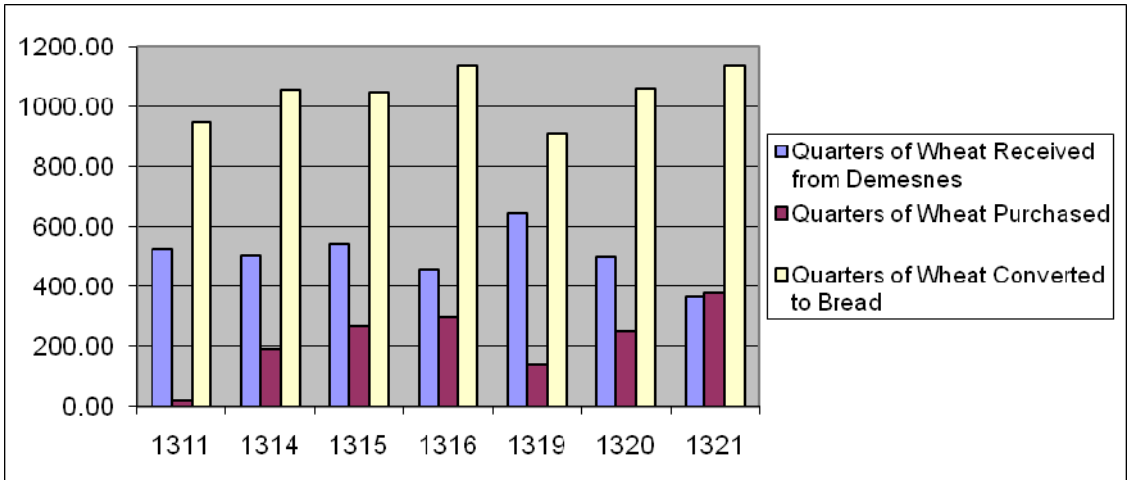

Figure 3. Wheat Received from Demesnes (in Quarters) at Norwich Cathedral Priory, 1311-1321

It should be said that Norwich Catherdal Priory was by no means an exception here. The counterpart accounts from Canterbury Cathedral Priory, Westminster Abbey and Glastonbury Abbey, all large houses and wealthy lords, secured their daily bread supply, despite the agrarian hardships, by increasing the purchase share of the grain supply, on the one hand, and carefully managing grain hoarding. Entirely different situation was at Bolton Priory. The 1310s were hard years for this community, which suffered from both the agrarian crisis and the frequent Scottish raids in the course of Scotland's War of Independence (1296-1328). The crisis basically ruined its wheat supply and the Priory, which suffered from a harsh financial deficit, did not have any means to purchase additional quarters of the grain. It should be noted that there is no doubt that the crisis was one of the main contributors to the temporary dispersion of Bolton monks in 1325 [Figure 4].

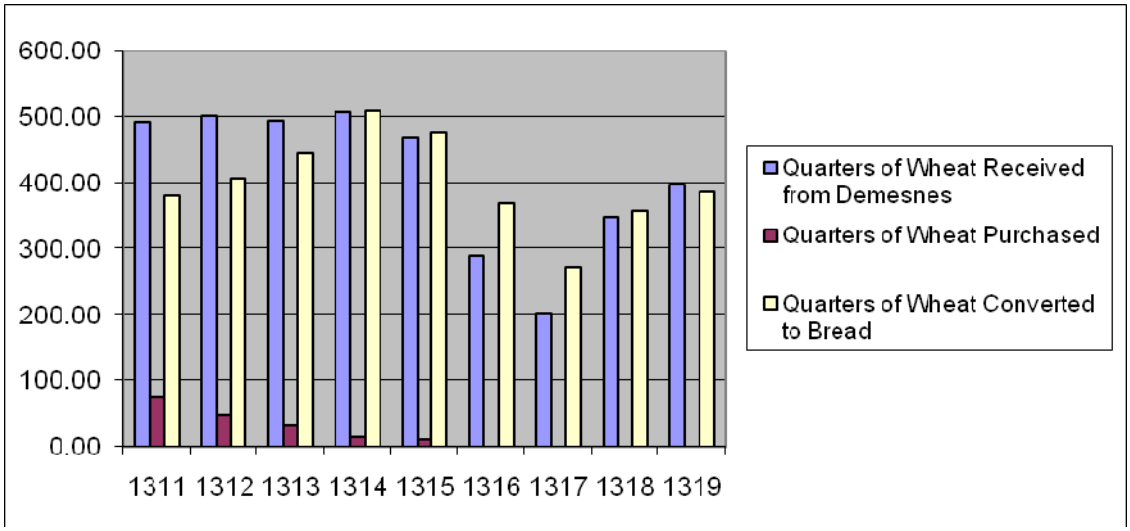

Figure 4. Wheat Received from Demesnes (in Quarters) at Bolton Priory, 1311-1319

This comparison between the wealthy house on the one hand, and the deprived community on the other, clearly demonstrates that the famine indeed discriminated between different social strata and that some wealthy lords continued securing their steady wheat supply, despite the scarcity of this grain. This, in turn, indicates that there may have been a clear element of the entitlement crisis to the Great Famine. To take this point forth, however, a further investigation of the phenomenon is required. One type of material, which is likely to shed much light on here, is purveyance accounts for the famine years. These accounts recorded forced sales of grain to provision the king's army during its ongoing warfare with Scotland. It would be essentially important to see to what degree did the ongoing warfare with Scotland disrupt the access to the grain supply by the lower echelons of the society.

The third and the final aspect of the crisis to be re-assessed in the present paper is the question if only the harvest failures are to be blamed for starvation and famine. It is

often neglected that the Great Famine brought about and went hand-in-hand with another harsh crisis: the great cattle plague, probably Rinderpest, which ravaged Northern Europe between 1315 and 1321 and decimated its bovine stocks. To a large degree the pestilence was facilitated by the destruction of hay and straw by non-stopping rain. Malnutrition must have undoubtedly weakened the bovine population of England. Exposed to colder temperatures and deprived of their most basic kinds of fodder, cattle had to waste more energy to maintain body temperature. This, in turn, was likely to have decreased the animals' resistance to pathogens, within a very short period of time. Malnutrition also tends to delay physical growth in young cattle, chiefly the development of muscles. As a result, younger bullocks and heifers were more likely to have grown into sterile bulls, weak oxen and aborting cows. It should be remembered that the period of growth in cattle is significantly shorter than that in humans and this fact has far-reaching consequences on the well-being of bovine stocks. Normally, it takes about eighteen months for calves to develop into sexually mature animals. A six-month deprivation and malnutrition of a bullock is undoubtedly much worse than a year-long deprivation in a young human.In England and Wales, 63 per cent of bovine animals died between April 1319 and September 1320. The repercussions of the cattle pestilence were profound and omnipresent, as I have shown elsewhere. In particular, it took the lords about 30 years to restock the bovine stocks to their pre-1319 levels and it seems that the peasants never saw their pre-pestilence stocks again. The slow restocking of cows, on the other hand, must have deprived the population of dairy products for at least one generation. Starvation generated starvation. In other words, the Great Famine, first dated 1315-7, then

‘extended’ to 1322, was, in fact, a somewhat longer event, continuing at least until the 1330s and beyond.

These facts bring us to another point. In his magisterial, now classic study of the Great European Famine, William Jordan suggested a possible connection between the agrarian disaster of 1315-22 and the Black Death. The food crisis, he contended, must have weakened the European population and made it more prone to various diseases. Hence, it is not surprising that the survivors of the Great Famine generation succumbed to the pestilence of 1348-51. Perhaps one way to take Jordan’s argument further would be to regard the Great Cattle Plague as a missing link between the Great Famine and the Black Death. The association between protein energy malnutrition and epidemic diseases is often found in human populations, past and present. The murrain, which killed over 60 per cent of cows and heifers, undoubtedly created a severe shortage of dairy products. To make things worse, however, this shortage continued at least until the late 1330s. As we have seen, the replenishment of dairy cattle was a slow and painful process. Dairy products are important sources of protein and they contain such vital types, such as *casein* and *whey protein*. It is now established that shortage of protein, or protein-energy malnutrition (PEM), can have severe implications on human populations, and especially on a child’s development.

In other words, the majority of English population, consisting of rustics, undoubtedly suffered from protein shortage for at least one generation. This was much longer period than the seven years of bad harvests and grain malnutrition (1315-22) and, hence, it is highly likely that its implications were most severe. If protein shortage indeed weakened the immune system of the developing adolescents, is it possible, then, that it

also was that ‘invisible beast’ that made them easily susceptible to the plague some twenty-five or thirty years later? This possible connection between the two biological disasters should by no means be neglected or excluded, and perhaps this could be an appealing venue for both students of the Great Famine and historians of the Black Death.

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