

Mites and merchants: the crisis of English wool and textile trade revisited, c. 1275–1330[†]

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On the basis of 7,871 manorial accounts from 601 sheep-rearing demesnes and 187 tithe receipts from 15 parishes, this article addresses the origins, scale, and impact of the wool and textile production crisis in England, c. 1275–1350. The article argues that recurrent outbreaks of scab disease depressed sheep population and wool production levels until the early 1330s. The disease, coupled with warfare and taxation, also had a decisive role in depressing the volumes of wool exports. Despite this fact, wool merchants were still conducting business with major wool producers, who desperately needed access to the capital to replenish their flocks.

The question of the ‘late medieval crisis’ has long puzzled historians. The essence of the crisis can be summarized as follows. After two centuries of growth and expansion, English and other European economies had reached a phase of decline and/or stagnation, in terms of both aggregate output and per capita income. For a long time, the commonplace interpretations were either demographic or endogenous (technological, institutional, or monetary). For instance, in dealing with the ‘English urban textile crisis’, spanning from the late thirteenth century into the c. 1340s, historians focused on such endogenous factors as the shift of textile production from towns to the countryside, competition with higher quality Flemish and Brabantine cloth imports, technological advantages of the textile industry in the Low Countries, and rising transaction costs linked to ongoing international warfare and the increased burden of taxation.¹ However, one exogenous variable that has altogether been overlooked by scholars is the supply of raw material, namely wool, without which nothing worked.

The aim of this article is to study the causes of the wool shortage and its impact on the English economy on the eve of the Black Death. Given the prominence of sheep rearing and wool production in late medieval England, wool shortage had a tremendous effect not only on the severe depression within the English urban textile industry, but on the pre-Black Death economic crisis in general. English wool was considered both the finest and cheapest in Europe, and it is hardly surprising that it was in high demand on international markets, with the

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¹ Carus-Wilson, ‘Industrial revolution’; Miller, ‘English textile industry’, pp. 72–4, 77; Harvey, ‘English trade’, pp. 369–75; Woodger, ‘Burel weaver’; Childs, ‘English export trade’; Munro, ‘Industrial transformations’; idem, ‘Industrial crisis’; idem, ‘Towns and textiles’.

volumes of exports (primarily by Italian and Cahorsin merchants) peaking during the thirteenth century.² The wool export boom came to a sudden halt from the 1270s, precipitating the depression of the textile industry, and it was not until the 1340s that both sectors had, more or less, recovered. To understand the roots of both crises, the article diverts from the endogenous perspective focusing on spinners, merchants, and policy makers, to an exogenous perspective concentrating on sheep husbandry and wool production. It argues that it was the recurrent outbreaks of sheep mortality from 1275 onwards, caused chiefly by scab but also by other diseases, that depressed the English wool industry to the point where it was no longer able to maintain its expected levels of production, and meet the demands of international wool merchants and consumers. Without sufficient levels of wool production and supply, the English (and European) textile industry could not prosper, as it did before the beginning of the outbreaks. When the figures returned to their pre-1275 levels in the 1330s, the English urban textile industry was in a decayed state and it was not until the following decade, and especially not until after the Black Death, that it revived, through a piecemeal shift from cheaper and coarser to more luxurious and finer cloths.

The impact of scab on wool trade has been already noted by historians. Thus, Eileen Power, in her 1939 Ford Lectures, published in 1941 as *Wool trade in English medieval history*, stated that the wool trade was ‘flourishing . . . in the reigns of Edward I and Edward II’, as ‘is shown by the fact that wool exports mounted steadily though there were serious epidemics of sheep disease during the period’.³ A much less optimistic verdict has been put forth by Noël Denholm-Young in his *Seignorial administration in England*, where he spoke about ‘a period of economic depression’ in the 1280s, whose ‘contributory cause was the general murrain of those years’.⁴ Similarly, T. H. Lloyd, in his classical *English wool trade in the middle ages*, noted that ‘scab continued unabated in the 1280s and besides killing sheep ruined the fleeces of the survivors . . . By the late 1280s the worst effects of the epidemic may have been over, allowing the recovery of exports’.⁵ Finally, in their monograph on advance contracts in the English wool markets, Bell et al. stated that ‘murrain struck in . . . 1277 and 1283, decimating flocks nationwide and bringing economic depression across the country for much of the 1280s’.⁶ Notwithstanding the awareness of the connection between the scab outbreaks and the crisis in the wool trade, the topic has not received enough attention. In particular, the chronology and impact of the recurrent outbreaks need systematic treatment.

The rest of the article is arranged as follows. Section I provides estimates of sheep losses to scab mortality, in several recurrent waves between 1275 and 1330. Sections II and III analyse, respectively, the impact of sheep mortality on the fall in wool production (in both absolute and relative terms) and consequently, on wool price fluctuation over the period. Section IV considers the impact of sheep mortality and wool production decline on the volume of exports. Section V looks at the fortunes of the wool trade between producers and merchants (primarily Italian and Cahorsin firms). Section VI touches upon the impact of wool shortage on

² Broadberry, Campbell, Klein, Overton, and van Leeuwen, *British economic growth*, p. 144.

³ Power, *Wool trade*, p. 36.

⁴ Denholm-Young, *Seignorial administration*, p. 60.

⁵ Lloyd, *English wool trade*, p. 63.

⁶ Bell, Brooks, and Dryburgh, *English wool market*, p. 83.

the urban textile production crisis, and estimates approximate levels of domestic demand and consumption of wool. The findings and conclusions of the article are then placed into their wider historical and historiographical contexts. In particular, they engage with role of environmental factors as triggers of economic crises. In recent years, there has been a growing awareness of the importance of exogenous forces in economic development of pre-industrial societies: a view voiced strongly time and again by economic historians.⁷

This study uses a wide range of archival documents. The core of the sources consists of a manorial accounts database, which includes 7,871 manorial accounts from 601 English sheep-rearing demesnes for the years 1273/4–1349/50, collectively establishing annual trends in sheep population and wool yields (figure 2; for particulars, see appendices I–II, and online appendices S1 and S3). In terms of geographical distribution, the preponderance of demesnes with surviving accounts tends to be scattered towards the south and east, reflecting the general trends in overall coverage of the production and survival of manorial accounts in particular, and the presence of the manorial system in general (figure 1). Contrary to the seigniorial sector, the evidence from the tenancy sector is frustratingly thin, and here we have to rely upon a few surviving tithe account series recording the numbers of lambs and wool rendered by local tenants to ecclesiastical lords, who also happened to be local tithe owners. Here, the work relies on 187 tithe receipts covering 15 parishes (see appendices I–II, and online appendices S2 and S3b).⁸ In addition, the information on wool and textile exports derives from wool export accounts and custom accounts. Likewise, business dealings between wool producers and wool merchants are based on advance wool contracts, already studied by Bell et al.

I

In his *Chronicle*, William Rishanger, a contemporary narrator, tells a rather curious story about the initial outbreak of scab. He stated that in 1274–5, a wealthy Frenchman brought a diseased Spanish ewe into Northumberland that spread heavy mortality among the English flocks. The disease continued, according to Rishanger, for 28 years and there was not a single village in England that was spared.⁹ While the story of the Frenchman with the Spanish sheep may perhaps be dismissed as a scapegoating anecdote, the reference to Northumberland as the point of origin is most illustrative. A close analysis of all the surviving manorial accounts, recording the annual numbers of sheep on demesnes, indicates that the disease indeed was spreading from the north to the south. As indicated in the accounts of Isabella de Fortibus, countess of Devon, it reached Cumbria by

⁷ Campbell, 'Nature as historical protagonist'; idem, *Great transition*.

⁸ The manors in question are: Sedgeford, Norfolk (Norfolk Record Office (hereafter NRO), DCN 60/33/5–13, Lest IB/16, DCN 60/33/14–17, DCN 62/2, Lestr/IB/17–20, and DCN 60/33/28); East Meon Church, Hampshire (Hampshire Archives and Local Studies (hereafter HALS), 11M59/B1/38–102; Barton Priors, Hampshire (HALS, DC/J1/2–18 and DC/J2/3/2–11); Moundsmere, Hampshire (Winchester College Archives (hereafter WCA), 14,486–14,530); Stubbington, Hampshire (WCA, 15,376–15,387); Kildwick and Long Preston, Yorkshire (Kershaw and Smith, eds., *Bolton Priory compotus*); the Peak District parish accounts are Staffordshire Record Office, Lichfield Branch, DC E.11, 18–9, 21–2 and G6.

⁹ Riley, ed., *Willelmi Rishanger Chronica*, p. 84.

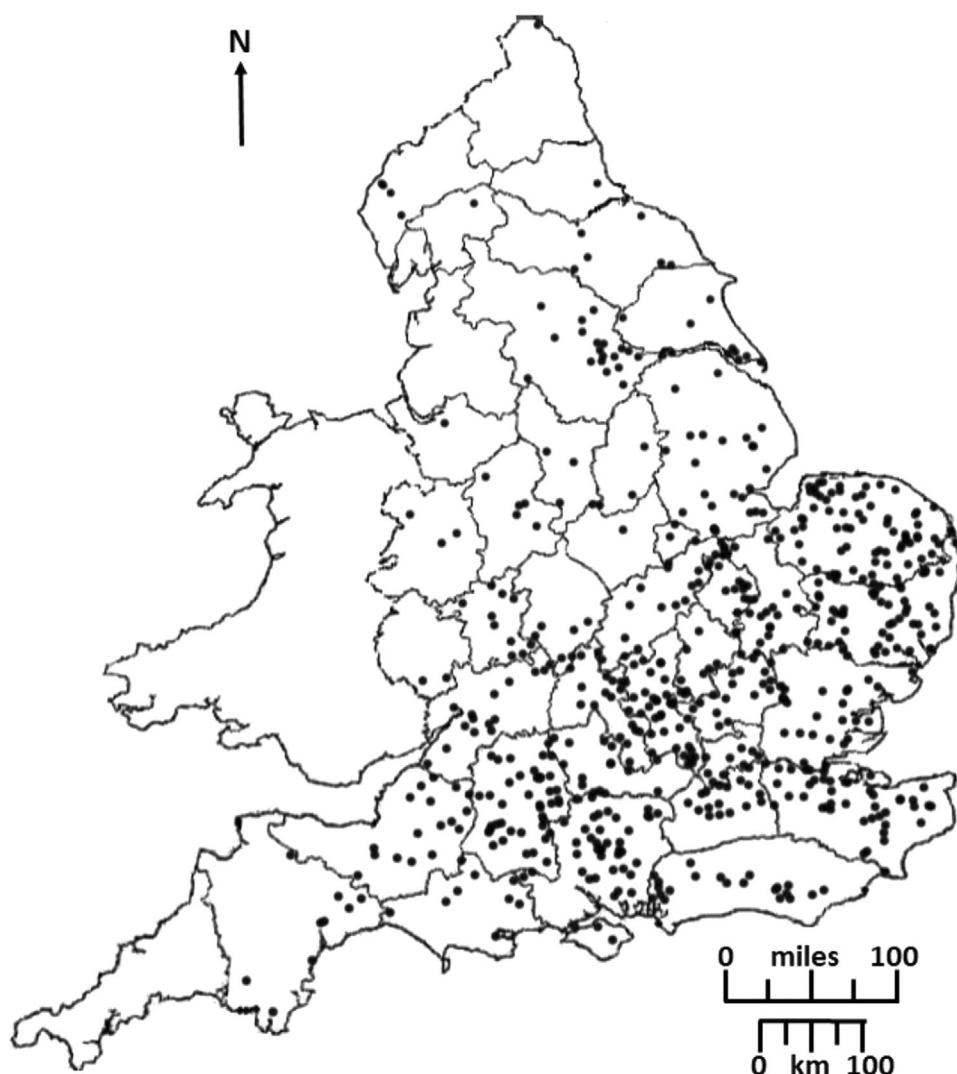


Figure 1. *Geographic distribution of manorial accounts used in the study*

Source: Manorial accounts database; see online app. S3.

1276 or 1277, while in 1277–8 it was devastating Yorkshire. By Michaelmas 1278, there were 184 sheep at Cockermouth, compared with 451 in Michaelmas 1274 (unfortunately, no accounts survive for the intermediate years). According to the 1277–8 account from the Holderness demesnes, 8,855 out of the total 9,076 sheep were sold in panic for an excessively low price, because of ‘disease’ (*propter infirmitatem*). Similarly, at Harewood (Yorkshire), all 265 ovids were sold before shearing.¹⁰ From Yorkshire it moved along the coast, attacking coastal manors in

¹⁰ TNA, SC 6/824/9–10 (Cockermouth, Cumbria); SC 6/1078/17 (Holderness demesnes); SC6/1077/27 (Harewood, Yorkshire).

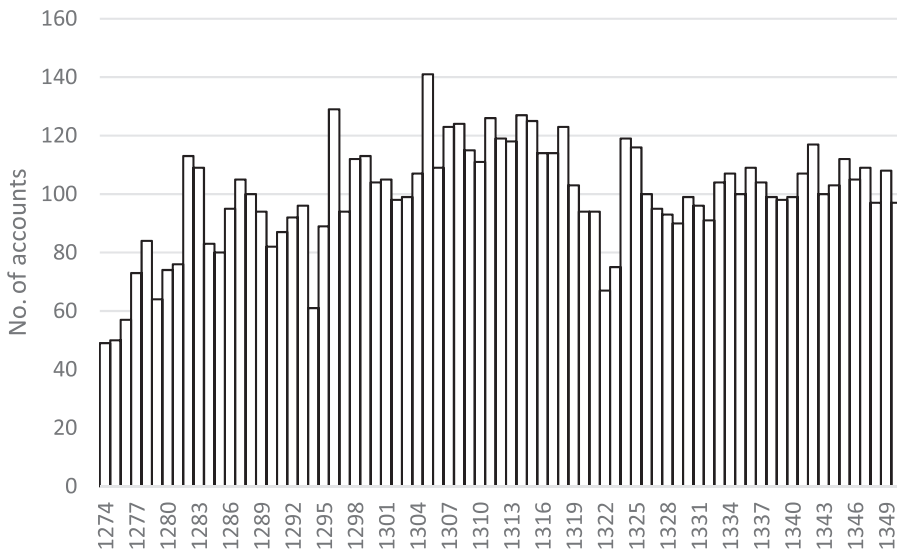


Figure 2. *Chronological distribution of manorial accounts used in the study*

Source: Manorial accounts database; see online app. S3.

Lincolnshire and Norfolk in the same year. By 1278–9 the disease had spread over all of England, but it was during 1279–80 that it was particularly pervasive and devastating, claiming the largest share of its victims. Those flocks spared until that point were hit in 1280–1, by which point the first, and by far the deadliest, wave of sheep mortality in England was over—but not in Ireland and Wales, where the disease was ravaging local flocks.¹¹ There are no references to sheep mortality in Scottish sources around these years, but given that the disease broke out in northern England (possibly Northumberland), it would be surprising if it did not make its vicious journey north of the border.¹²

As both narrative sources and manorial accounts indicate, the disease in question was scab. Thus, the *Annals of Waverley* (Surrey) and the *Annals of Dunstable* (Bedfordshire) speak about ‘scab’ (*scabies*), which ‘ravaged among all the sheep of England’.¹³ Other contemporary chronicles that mention the disease, albeit without specifying its name or nature, include the *Lanercost Chronicle* (under the heading of 1275), the *Barlings Chronicle* (under the heading of 1276), and the *Louth Park Chronicle* (under the heading of 1277).¹⁴ Although many accounts merely note that the mortality was caused by ‘disease’ (*infirmetas*) or ‘great disease’ (*magna infirmetas*), some accounts specifically mention ‘scab’ (*scabies*, *scabia*).¹⁵

¹¹ As indicated in the manorial accounts from Ballysax (county Kildare) (TNA, SC 6/1237/1) and hinted in the *Annals of Inisfallen* sub 1281 (Mac Airt, *Annals of Inisfallen*, p. 375). For the Welsh evidence of scab, see Remfy, ed., *Annales Cambriae*, p. 258.

¹² The chronicles of John Fordun, Andrew Wintoun, and Walter Bower, as well as the *Liber Pluscardensis*, all covering that period, do not mention scab outbreak in Scotland.

¹³ Luard, ed., ‘*Annales monasterii de Waverleia*’, p. 388; idem, ‘*Annales prioratus de Dunstaplia*’, pp. 305–6.

¹⁴ *Chronicle of Lanercost*, p. 97.

¹⁵ For instance, TNA, SC 6/929/19 (Attleborough, Norfolk), SC 6/938/2 (Lopham, Norfolk), SC 6/761/11 (Langley Marish, Buckinghamshire), and SC 6/1007/10 (Walton, Suffolk).

Table 1. *Mortality rates of English demesne flocks, during the first wave of scab epizootic (1276/7–1280/1)*

	Total animals	Deaths only (%)	Panic sales (%)	Panic slaughter (%)	Deaths + panic sales + panic slaughter (%)
<i>1. With Holderness demesnes</i>					
All animals	47,655	35.3	19.7	0.8	55.7
Mature animals, all	29,123	31.6	23.6	1.2	56.5
Yearlings, all	8,038	40.4	4.5	0.1	45.0
Lambs, all	10,495	41.5	20.5	0.0	61.9
Wethers, all ^a	12,988	33.6	23.3	1.5	58.4
Ewes, all	15,958	29.6	24.1	1.1	54.7
Rams, all	177	61.0	3.4	0.0	64.4
<i>2. Without Holderness demesnes</i>					
	Total animals	Deaths only (%)	Panic sales (%)	Panic slaughter (%)	Deaths + panic sales + panic slaughter (%)
All animals	38,579	43.0	5.7	1.0	49.7
Mature animals, all	23,624	38.2	7.5	1.5	47.2
Yearlings, all	6,577	49.4	5.5	0.1	55.0
Lambs, all	8,379	51.8	0.7	0.0	52.5
Wethers, all	11,071	39.4	10.0	1.8	51.3
Ewes, all	12,376	36.7	5.2	1.4	43.3
Rams, all	177	61.0	3.4	0.0	64.4

Note: a Wethers are castrated rams.

Source: Manorial accounts database; see online app. S3.

Scab is a highly acute and transmissible form of parasitic dermatitis, caused by the faeces and bites of non-burrowing sheep mites (*Psoroptes ovis*). The two-week life-cycle evolves from the egg, through hexapod larvae, octopod protonymphs, and tritonymphs, into adult mites. After mating and fertilizing, female mites will live for around 40 days, laying one or two eggs a day and never mating again.¹⁶ In appropriately cold temperatures ($\sim 10^{\circ}\text{C}$), the mites can be viable off the host for 17 days (in wool sacks, woollen clothes, barns, and soil), during which period eggs can hatch. Off-host longevity is shorter in warmer temperatures.¹⁷

Between 1275 and 1280, England suffered colossal sheep losses. As the evidence from manorial accounts indicates, demesne flocks declined by at least 50 per cent—a higher figure than the previous estimates.¹⁸ Table 1 breaks down the losses into three categories, as recorded by manorial clerks: deaths (about 43 per cent), ‘panic sales’ (about 6 per cent), and ‘panic slaughters’ (about 1 per cent).¹⁹ Unfortunately, not every account states that those mass deaths were caused by scab, and quite a few clerks sufficed themselves by noting ‘deaths through murrain’ (*in morina*). Given the unusually high mortality rates, however, and the prevalence of scab all over the country, there can be little doubt that most deaths were indeed caused

¹⁶ Bates, ‘Sheep scab’.

¹⁷ Coop, Barger, and Jackson, ‘Macrocyclic lactones’; Meintjes, Fourie, and Horak, ‘On-host ecology’.

¹⁸ Previously, 48% had been suggested. See Slavin, ‘Flogging a dead cow’, p. 118.

¹⁹ In those instances when scabious ovids were butchered or sold, clerks often indicated that the animals were got rid of ‘because of the fear/doubt of murrain’ (*pro timore/dubio morine*); see *ibid.*, p. 125. I also identified the references of ‘*en masse* sales’ (‘in grosso’), with entire or almost-entire flocks being sold, as an indication of panic sales.

by this disease. It is also possible that panic sales and slaughters were, in fact, preventive measures, when demesne managers attempted to prevent the spread of the disease further. However, these attempts were anything but successful, as there is no evidence that those manors practising panic sales and/or slaughters had lower mortality rates.

Obviously, mortality rates varied from place to place. Some flocks got off lightly: for instance, Agney (Kent) lost only 15 per cent of its sheep, while the comparable figures at Patney (Wiltshire) stood at only 8 per cent, and it is not certain if these flocks died of scab at all.²⁰ These, however, were clearly lucky exceptions and in the vast majority of cases the fatality levels were considerably higher. Mortality seems to have been particularly devastating on large sheep farms in the north, with some flocks being nearly or entirely wiped out. For instance, Kirkstall Abbey seems to have lost its entire flock, numbering perhaps 6,500 heads.²¹ As we have seen, the Holderness flock belonging to Isabella de Forz, countess of Devon, was nearly emptied of its 9,076 sheep in the course of 1277–8.²² It should be borne in mind that the countess lost her flock through panic sales, as the account clearly indicates. Although it is clear that these panic sales were designed to get rid of diseased sheep, and most (if not all) sheep were likely to die, there is no way to establish the exact proportion of these dying sheep that were sold in panic by the countess's manorial managers. Also, the latter were luckier than most manorial officials, who managed to sell only a small proportion of diseased animals: as table 1 establishes, if we were to exclude Holderness from the sample, then panic sales accounted for only 6 per cent of all losses. Conversely, with this same exclusion, the proportion of sheep lost through deaths rises from about 35 to about 43 per cent. Panic slaughter was an even less commonplace phenomenon, contributing no more than just 1 per cent to all ovine losses. All the same, if we conjoin the three types of 'losses' (deaths, panic sales and slaughter), we end up, most likely, with higher mortality rates than those indicated by death numbers: perhaps as high as 56 per cent, if we assume that most panic sales (including the *en masse* sales of the Holderness flock) implied that sold animals were diseased and doomed to perish. After all, it is hard to imagine the Holderness managers wishing to ruin the countess' income by selling healthy animals. It is unclear who would have bought scabious animals, given that both skins and meat of scabious sheep are rendered useless. Remarkably, a similar situation prevailed during the bovine pestilence outbreak of 1319–20, whereby some demesnes managed to get rid of seemingly sick animals, via panic sales and, in some instances, slaughter.²³

Furthermore, mortality figures varied across different sex- and age-cohorts. For the purpose of this exercise, the Holderness flock has been excluded from the sample, as here most ovine losses are related to sales, rather than recorded deaths. As table 1 indicates, the epizootic was particularly harsh among rams (61 per cent, or 64 per cent, if we also take into account panic sales and slaughter). The high mortality rates in rams may be explained by the fact that scab mites commonly infest the scrotal area of rams.²⁴ Another group-at-risk consisted of lambs and

²⁰ Canterbury Cathedral Archives (CCA), DCc/Agney/4 and HantsRO, DC/J1/3.

²¹ Clark, 'Foundation', p. 189.

²² TNA, SC 6/1078/17.

²³ Slavín, 'Bovine pestilence', pp. 1242–3.

²⁴ Bates, *External parasites*, p. 199.

yearling rams (with mortality rates around 50 per cent, or slightly higher, if we account for sales and slaughter). This conforms to modern observations of scab outbreaks, which tend to be particularly devastating in lambs born to ewes with scab during pregnancy, or yearlings, whose physical growth overlaps with scab outbreaks.²⁵ Wethers (castrated rams) exhibited higher mortality rates than ewes (the respective figures of 39 and 37 per cent, deriving from deaths only, are inflated to the respective 43 and 51 per cent, when including the losses through panic sales and slaughter), most likely because wethers grew longer and heavier fleeces than sexually active sheep, and this facilitated the dissemination of scab, either through direct contact with live mites, or via shearing combs and cutters. Again, these are conservative estimates, which do not take into account the colossal losses of the Holderness flock (and similar behemoths, such as Kirkstall Abbey sheep farm, for which we do not have accounts), which could, potentially, inflate the mortality rates even further.

Those mortality rates seem particularly devastating when compared to sheep mortality in 'normal' years. On average, in the period *c.* 1270–1350, average mortality rates were in the region of 10 per cent across flocks, with 6 per cent for wethers, 8 per cent for rams and ewes, 13 per cent for yearlings, and 16 per cent for lambs: figures largely comparable with contemporary mortality rates.²⁶ This implies a five-fold excess mortality, with the figures for rams being particularly high. These figures were lower compared to the excess mortality rates experienced by bovine stocks during the Great Bovine Pestilence of 1319–20, when the average mortality rates stood at 62 per cent, compared with just 4 per cent in normal years (rendering the 15.5-fold excess mortality).²⁷ All the same, the 1275–80 outbreak figures seem to be considerably higher than those reported in present day scab outbreaks. Thus, during the 2003–4 and 2007–8 outbreak, only about 6–8 per cent of English flocks were affected—in contrast with the 1275–80 outbreak, when virtually all manorial flocks suffered excess mortality.²⁸ The 2003–4 /2007–8 data are based on questionnaires sent to sheep farmers and, unfortunately, do not establish mortality rates within infected flocks. However, given the widespread and prescribed use of tar and quicksilver medicaments, it is clear that the recovery rates in affected flocks nowadays are considerably higher and, conversely, mortality rates are considerably lower.

To make things even worse, the recovery process was incredibly slow and full of setbacks. First, the outbreak was particularly harsh among lambs and rams, thus wiping out any possible surge in ovine fertility for at least several years. In the case of rams, scab can be particularly devastating, because of scrotum infestation, causing a decline in fertility.²⁹ Second, and more importantly, the first outbreak was followed by a number of recurrent mortality waves, well into the late 1330s. Although local outbreaks occurred virtually every year, waves of epizootic proportions, affecting

²⁵ NADIS (National Animal Disease Information Service), 'Sheep scab', <http://www.nadis.org.uk/bulletins/sheep-scab.aspx> (last accessed 1 Nov. 2019).

²⁶ DEFRA (Department for Environment, Food & Rural Affairs), 'Statistics about the structure of the agricultural industry', <https://www.gov.uk/government/collections/structure-of-the-agricultural-industry#data-sets> (last accessed 1 Nov. 2019).

²⁷ Slavin, 'Bovine pestilence'.

²⁸ Bisdorff, Milnes, and Wall, 'Prevalence and regional distribution'; Rose, Learmount, Taylor, and Wall, 'Mapping risk foci'.

²⁹ Bates, 'External parasites', p. 199.

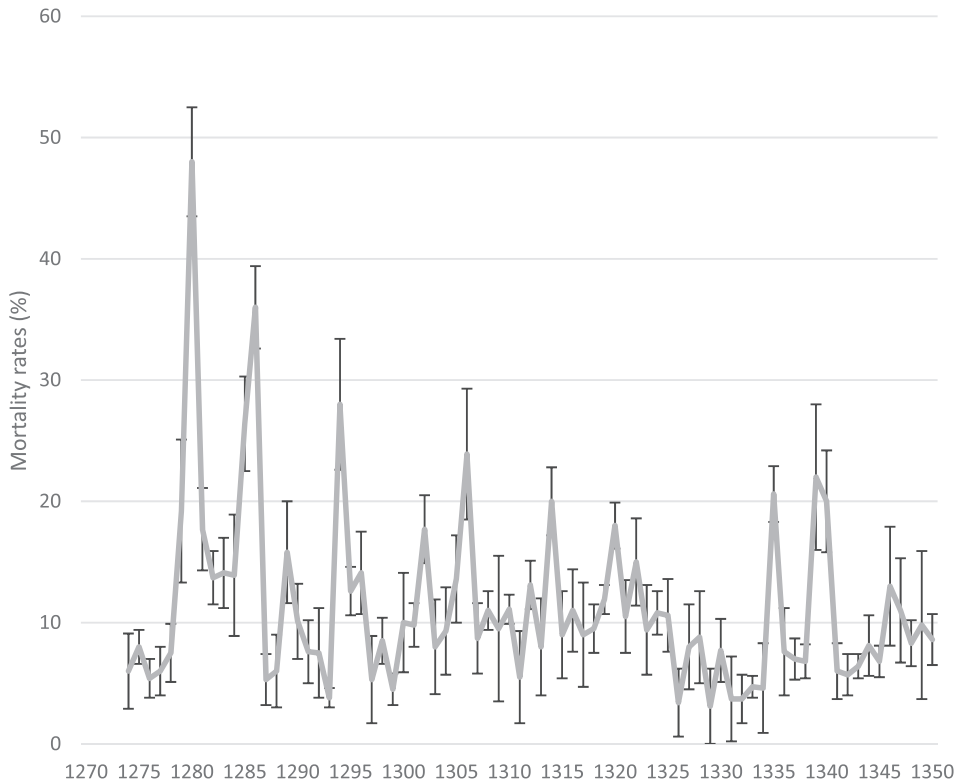


Figure 3. *Estimated annual mortality rates of English demesne flock, 1273/4–1349/50, with plotted standard errors*

Source: Manorial accounts database; see online app. S3.

the entire country, were reported in 1284–6, 1293–4, 1313–14, with more minor outbreaks recorded in 1305–6, 1315–16, 1319–20, 1321–2, 1334–5 and 1338–40 (figure 3). In the course of the 1285–6 outbreak, the mortality rates stood at about 38 per cent; during the 1293–4 outbreak, the figure was about 32 per cent, while in the course of 1313–14 alone, about 20 per cent of English sheep perished. Despite these short-term setbacks, however, the replenishment rates peaked from 1323 onwards, to the point that by 1332, the demesne flocks reached their 1274 levels, while a remarkable growth during the 1340s implied that by the time of the Black Death the national size of demesne flocks may have exceeded that of the pre-scab period by some 50 per cent.

In order to estimate the overall pattern of growth and decline in the English sheep population over this period, we need to take into account the differences between the demesne flocks and tenant flocks. The evidence from the demesne should by no means be taken as illustrative of the situation as a whole. It is unlikely that the demesne flocks constituted more than 20 per cent of the national flock, the remainder being reared by tenants. This derives from the estimate that the seigniorial sector accounted for some 20 per cent of the rural component of national

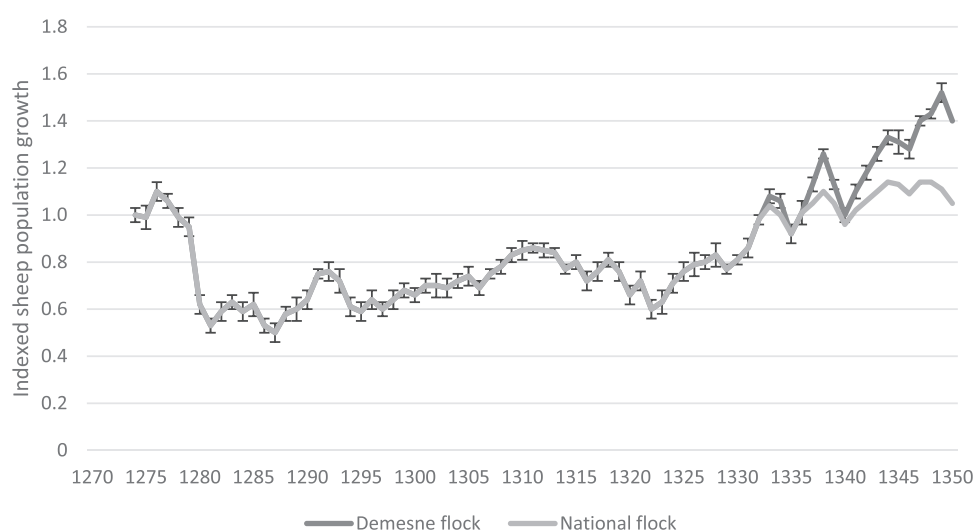


Figure 4. *Estimated indexed levels of English 'national flock', 1273/4–1349/50 (1275/6–1349/50 = 1.0), with plotted standard errors*

Notes: Until c. 1333, I have assumed the growth within the demesne and tenancy sector was, more or less, similar. Hence, the red curve accounts for both the demesne and tenancy sectors until c. 1333 (see the 'Extrapolation of "national" sheep population trends' section of app. I for explanation).

Source: Manorial accounts database; see online app. S3.

income around 1300 (see appendix I for further particulars).³⁰ As we have seen, the evidence from the tenancy sector is frustratingly thin, consisting of only eight series of tithe accounts recording lamb and wool payments in a fairly long run (albeit with many gaps), in addition to seven parishes in the Peak District of Derbyshire recording such tithe payments in 1336 and the late 1340s (see appendices I–II and online appendix S2).³¹ The record is further obscured by the fact that only two of the eight series (Sedgeford in Norfolk and East Meon Church in Hampshire) begin before the crisis began in the 1270s. Nevertheless, these surviving tithe accounts seem to contradict the rosy scenario on the demesne from the 1330s onwards.

While the pace of restocking varied from place to place, depending on local conditions and arrangements, there is no evidence of any remarkable expansion of tenants' sheep in the 1330s and 1340s—in contrast with the demesne flocks (figure 4; see appendices I–II and online appendix S2). For instance, at Sedgeford, despite the steep fall from 22 to 3 tithed lambs in 1273–4 and 1278–9, respectively, the number of tithed lambs rose to 27 in the period 1285–1300, climbing to 32 in 1301–14 and expanding further to 43 in 1317–28, only to fall to 20 in 1340–50. At East Meon Church, the situation was even more grim: the numbers declined from 195 in 1273–4 to the average of 131 in the 1280s, temporarily climbing to 175 in the 1290s, collapsing again to 139 in the 1300s, resurging to 166 in the 1310s, only to fall again to 149 in the 1320s, and then further to 117 in the 1330s, before rising to 150 in the 1340s. The sense of decline rather than expansion is

³⁰ Campbell, *Seigniorial agriculture*, pp. 56–9.

³¹ For details, see n. 8.

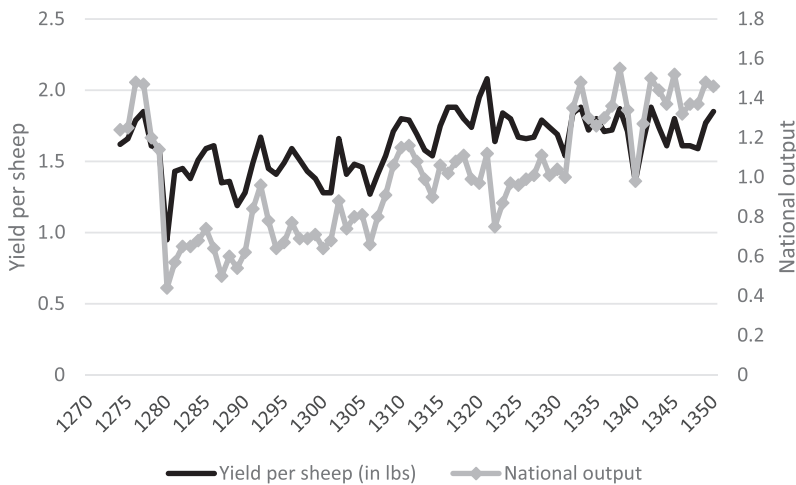


Figure 5. *Estimated English wool yields and index of wool output, 1273/4–1349/50*

Notes: Annual wool yields are estimated to be 1.62 lbs per animal fleece, on the basis of assigning 20% to the demesne sector, where the weight of an average fleece is estimated to have been 1.4 lbs per animal (deriving from the manorial accounts dataset), and 80% to the tenancy sector, where the weight of an average fleece is assumed to have been 1.68 lbs per animal (the yield ratio between the demesne and tenancy is assumed to have been 1.00:1.20). The conversion into national wool output levels (indexed on 1275/6–1349/50) is obtained by multiplying national per-animal yields by estimated numbers of sheep (see section V and tab. 2). In constructing the national output levels, I have assumed that the annual population growth rates within the demesne and tenancy sectors were similar until c. 1333 (see the ‘Extrapolation of “national” sheep population trends’ section of app. I for explanation).

Source: Manorial accounts database; see online app. S3.

felt even more markedly at Moundsmere (Hampshire), for which surviving tithe accounts go back to only 1296–7. Here, the average number of tithed lambs fell from 23 in 1297–1300 to 16 in 1301–10, 15 in 1311–20, 11 in 1321–30, 10 in 1331–40 and then dropped to 8 in the 1340s. The remaining series have thinner coverage, but the general impression there is that of a similarly declining trend (see appendices I–II and online appendix S2). It appears that the growth of tenant sheep population, in comparison to the demesne, was about 10 per cent slower in the 1330s and 20 per cent slower in the 1340s. It is possible that the slower expansion within the tenancy sector reflects the peasants’ response to low wool prices that characterized the period 1333–49 (see figure 5). After all, why would they invest their resources into a low-yielding sector?

It would therefore be fair to say that although the size of the ‘national flock’ on the eve of the Black Death seems to have been larger than in 1275, it certainly did not grow by 50 per cent between the two benchmarks, as the demesne evidence suggests, but a more modest figure—perhaps in the order of 10–15 per cent, given the prominent share of the tenancy sector (figure 4). The wider implications of these estimates in the context of ongoing historiographic debates will be discussed later in this article.

II

It should be stressed that the murrain was not the only setback to hit sheep farming; we also have to account for abysmally low wool yields during the crisis years. Just

as with crop yields, wool yields were highly volatile, varying from year to year, depending on both exogenous (weather, vegetation growth, and animal health) and endogenous (management) factors.³² As manorial accounts in the dataset indicate, an average sheep produced about 1.4 lbs of wool on the demesne in 'normal' years in the period 1275–1350: a figure closely agreeing with the estimate put forth by Britnell.³³ The evidence regarding tenant wool yields is virtually non-existent and the only set of accounts specifying the yields of tenant wool comes from the manor of Segdeford (Norfolk).³⁴ As the Sedgeford accounts indicate, the tenant wool yields were about 25 per cent higher than those of the demesne, standing at 1.47 lbs per fleece in the period 1300–50—in comparison with the average yields of 1.24 lbs per demesne fleece (it appears that wool productivity of Norfolk sheep stood below the 'national' average of 1.4 lbs per sheep). It is unclear if the Sedgeford yields reflect the situation elsewhere in England. As recent research has shown, however, it appears that tenant output within the arable sector was higher than the demesne one—perhaps by as much as 20–25 per cent.³⁵ The idea that the peasant productivity rates may have outmatched the demesne ones within both the arable and pastoral sectors is thus strengthened by the Sedgeford evidence. If the Sedgeford peasant yields of wool were representative for the whole period and peasants' flocks accounted for 80 per cent of sheep nationally, then average 'national' wool yields might have been as high as 1.62 lbs per mature animal (if we take the ratio of 1.00:1.25 between the demesne and tenancy as a norm).

During the first wave of the murrain, and especially in 1279–80 (the most devastating and pervasive year), the average demesne wool yields from the surviving animals within the demesne sector fell from 1.4 to about 0.95 lbs per animal (figure 5). Manorial accounts were careful to distinguish between 'solid wool' (*lana grossa*) and 'broken wool' (*lana fracta*), that is, wool scraps or scabious wool. As the accounts indicate, during the 1279–80 outbreak, the proportion of *lana fracta* within the total output of mature sheep wool was approximately 20 per cent—in contrast with the average 3.8 per cent in 'normal' years (see appendix II).³⁶ In some extreme cases, the share of 'broken wool' actually exceeded that of 'solid wool'.³⁷ The proportion of *lana fracta* was, unsurprisingly, higher than usual in other crisis years: thus, during the outbreaks of 1285–6, 1293–4, it accounted for 14 and 10 per cent, respectively. Given that scab did not discriminate between the demesne and tenant flocks, we can expect a similar fall within the tenant sector. By the time of shearing in June 1280, about 85 per cent of animals infected in that year were dead, and thus very few live animals were around to be shorn. This fact, together with the abysmally low wool yields per animal, implied colossal losses of wool (certainly higher than the 50–56 per cent estimated for sheep losses).

³² For a study on late medieval wool yields, see Stephenson, 'Wool yields'; for the impact of sheep management on animal well-being, see Stone, 'Productivity', pp. 18–20.

³³ Britnell, *Britain and Ireland*, p. 416. The average of 1.4 lbs per animal is based on 7,871 accounts from 601 demesnes for the period 1274–1350; the standard deviation figure is 0.17.

³⁴ NRO, DCN 60/33/5–13, Lest IB/16, DCN 60/33/14–17, DCN 62/2, Lestr/IB/17–20, and DCN 60/33/28.

³⁵ Sapoznik, 'Productivity'; Myrdal and Sapoznik, 'Technology, labour, and productivity'.

³⁶ The calculation of the *lana grossa/lana fracta* proportions derives from the accounts of 13 Hampshire-Wiltshire demesnes of Winchester Cathedral Priory; HALS, DC/J1/2–18. The annual particulars are given in app. II.

³⁷ For instance, at Silkstead (Hampshire), mature sheep yielded, collectively, 42 lbs of solid wool and 46.7 lbs of broken wool; HALS, DC/J1/3.

In the course of the period under investigation, the relative fluctuations in wool yields seem to have been determined primarily by environmental and biological factors. Hard winters were likely to make sheep develop short and coarse fibres, while cold winters or excessively dry springs would depress grass growth, and so deprive sheep of sufficient nutrition and thus reduce wool growth.³⁸ By contrast, the combination of moderate winters and pluvial springs would secure access to winter grazing, produce abundant pasturage, and endow sheep with long and fine wool. Thus, the years 1287–90, 1300, and 1306 were excessively dry, while 1283 and 1340 were also characterized by excessively hard winters. In all these instances, wool yields were low, standing at more than 15 per cent below average. Conversely the torrential rain of 1316, as well as the pluvial years of 1338, 1342, and 1350, produced high yields.³⁹ In some years, this correlation is less straightforward and wool yields seem to have been influenced by the physical well-being of sheep rather than weather, or the combination of both. This was the situation during the murrain outbreaks of 1293–4 and 1305–6.

Naturally, the combination of the steep fall in population and low wool yields resulted in a serious reduction in the total production capacity of the English wool industry. As figure 5 estimates, during 1279–80 the overall levels of wool output stood at about 58 per cent below average (when compared to the benchmark year 1273–4). The subsequent recovery, mirroring that of the sheep population in general, was slow and full of setbacks, related to both fluctuations in wool yields and recurrent outbreaks of murrain. For instance, by 1292 the sheer levels of wool production seem to have reached nearly 80 per cent of the 1274 level; but because of the 1293–4 outbreak, the figure declined to about 53 per cent of the 1274 level. Similarly, by 1310 the total wool output had nearly reached its pre-murrain levels, only to fall back to about 73 per cent of the 1274 figure. It was not until 1332 that the sheer levels of wool production returned to their pre-scab levels, and with the exception of the short-term crisis of 1340, caused both by a sudden outbreak and low wool yields, they consistently stood above the pre-1274 levels. It appears that the demesne wool industry experienced a true boom on the eve of the Black Death, when, thanks to the impressive expansion of the demesne flocks, the levels of wool output may have stood at between 40 and 60 per cent higher than in 1274. Naturally, the ‘national’ levels of wool production were not nearly as high as those within the demesne sector: as we have seen, there is no evidence that tenants could afford the same luxury of expanding their flocks and, thus, increase the levels of wool production. Nevertheless, there can be little doubt that the ‘national’ levels of wool production stood firmly above their pre-1274 levels.

III

What impact did the crisis have on the prices of wool and live animals? As figure 6 suggests, the prices started going up in 1274–5 and peaked in 1277–8, with one stone of wool selling for 6s. (up from 3.9s in 1273–4), staying at 5.7s. in 1278–9, but

³⁸ Stephenson, ‘Wool yields’, pp. 381–5.

³⁹ The data on weather have been collated from Titow, ‘Evidence of weather’ (manorial accounts); Britton, *Meteorological chronology* (chronicles); Wilson, Miles, Loader, Melvin, Cunningham, Cooper, and Briffa, ‘March–July precipitation reconstruction’.

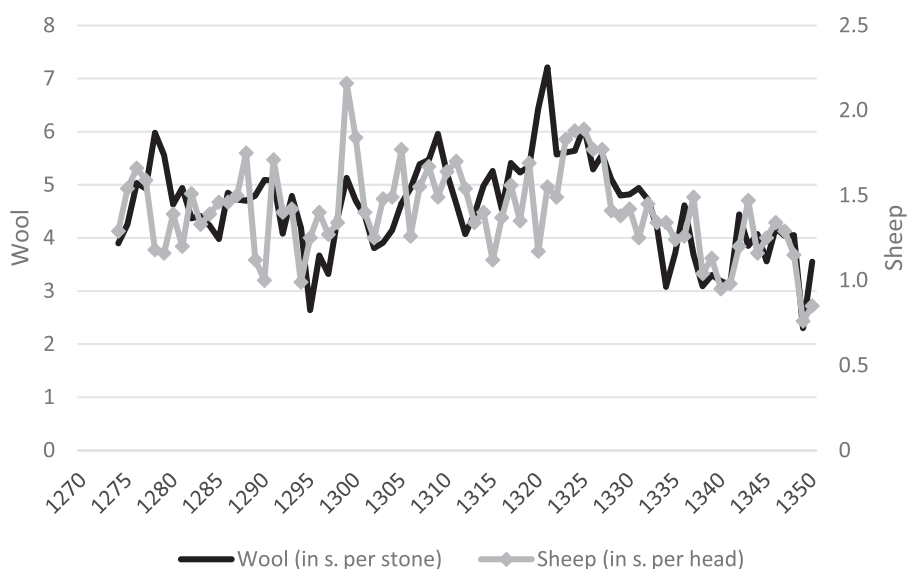


Figure 6. Annual prices of wool and mature sheep (wethers, rams, and ewes averaged), 1275/6–1349/50 (in shillings per stone of wool and animal head)

Source: Manorial accounts database; see online app. S3.

collapsing to 4.6s. in 1279–80, that is, during the fiercest year of the epizootic. This is indeed surprising, given that the dramatic reduction in wool supply should have, at least in theory, led to an increase in price, with demand held constant. In his study of wool prices in late medieval England, T. H. Lloyd asserted that the 1279–80 collapse in wool prices was related to the 1279–80 recoinage, which brought down commodity prices.⁴⁰ This interpretation can be challenged by the fact that the recoinage had no effect on other commodities, grains in particular. Grain prices were determined by the annual availability of cereals, which, in turn, were determined by annual harvest yields. Likewise, annual wool prices were undoubtedly determined by the availability of good quality wool, which, in turn, was determined by annual wool yields.

Indeed, the pre-1279–80 rise in prices was a widespread ‘panic’, caused by the rumours of the spread of scab and sheep mortality in the north and along the eastern coast (all the way from Northumberland to Norfolk), between 1275 and 1279. The southern flocks were, as we have seen, temporarily spared and the increasing demand for good quality wool may have commanded high prices. Once scab hit the southern counties, the prices collapsed at once, reflecting not only the depressed yields, but also the poor quality of wool shorn from ailing or soon-to-die sheep.

The proportion of broken wool within the total output of mature sheep wool rose from 4 to 20 per cent, but even some proportion of solid wool was undoubtedly of worse quality than usual. Indeed, some accounts hint that while bad quality wool was selling for abysmally low prices, good quality wool was valued excessively

⁴⁰ Following David Farmer; Lloyd, *Movement of wool prices*, p. 16.

highly. For instance, at Sevenhampton (Wiltshire), one stone of wool hoarded from the previous year's shearing (and thus scab-free) was sold for the overwhelming sum of 7.9s.⁴¹ Similarly, at Halvergate (Norfolk), the previous year's wool was about 2–2.5 times more expensive than that from 1279–80.⁴² Conversely, one stone was valued at between 2.6s. and 2.9s. at Gamlingay (Cambridgeshire), Quickbury (Essex), and Weston (Hertfordshire).⁴³ At Lopham (Norfolk), a local clerk indicated in his annual account that all the wool sold that year was scabious.⁴⁴ However, even if wool sold was of good quality, some buyers may have been hesitant in purchasing it: it is possible that because of the chronic scarcity of good quality wool, some producers may have wrapped bad quality wool, trying to sell an entire sack off as good wool. Although I was unable to find any evidence from the scab years, such dishonest practice was not unheard of in late medieval England.⁴⁵ When these factors are considered together, we may begin grasping the somewhat unexpected behaviour of English wool prices during the scab outbreak, with the average figure of 4.6s. per stone reflecting, in effect, the average price between expensive, good quality wool and cheap, low quality wool.

It appears that the ensuing wool price fluctuations were triggered by both endogenous and exogenous factors. The sudden price collapse in 1294–5 (from the average 4.7s. for 1285–94 to 2.6s.) was caused not just by Edward I's adverse wool policy, which included the imposition of the *maltôte* custom and seizure of wool supplies from alien merchants and priories (as suggested by Lloyd), but also by a recurrent outbreak of scab in 1293–4, when the sheep population declined by almost 20 per cent and the quality of wool was poorer than usual.⁴⁶ Similarly, between 1304–5 and 1308–9 prices rose from 4.2s. to 6s. per stone. This rise can be connected to both the increased demand for English wool, as noted by Lloyd, and to the slow recovery of sheep population and wool supply after the 1305–6 outbreak.⁴⁷ Likewise, the new peak at 7.2s. per stone in 1320–1 may have something to do with the 1319–20 outbreak, which claimed about 13 per cent of the demesne stock. Conversely, the prolonged period of low wool prices between 1333–4 and 1349–50, with one stone averaging 3.1s., can be ascribed to the unprecedented boom in sheep farming (especially within the demesne sector), related to the expansion of sheep population and good animal health. This interpretation may be at odds with that of Lloyd, who linked it to the 'general deflation' of that period.⁴⁸ After all, wool and grain yields, and hence prices, did not always move in parallel: thus, the poor grain yields of 1339 and 1346 drove up grain prices in the following year, while the wool prices do not exhibit the same surge. One may argue that it was the prolonged period of low wool prices that discouraged peasants from expanding their sheep flocks, in contrast with their lords.

⁴¹ TNA, SC 6/1057/7; printed in Farr, ed., *Accounts and surveys*, p. 110.

⁴² 86 fleeces produced in the summer of 1279 were sold for 73.3s., while 89 fleeces produced in the following summer were vended for 29.6s. Unfortunately, the account does not indicate the weight of the fleeces; TNA, SC 6/936/7.

⁴³ Merton College Muniments (MCM) 5342; TNA, SC 6/839/26, SC 6/843/19, and SC 6/873/9.

⁴⁴ TNA, SC 6/938/2. Unfortunately, the Lopham account specifies neither the quantity of wool shorn, nor the quantity of wool sold.

⁴⁵ Miller and Hatcher, *Medieval England*, pp. 294–5.

⁴⁶ Lloyd, *Movement of wool prices*, p. 16.

⁴⁷ *Ibid.*, p. 17.

⁴⁸ *Ibid.*, p. 18.

Indeed, there seems to have been a good degree of synchronicity in annual behaviour between the wool and sheep prices (with a correlation coefficient standing at 0.49), with the exception of the first murrain outbreak and 1319/20–1322/3 (figure 6). That there was no rise in live animal prices between 1274–5 and 1278–9—that is, during the spread of scab in the north and along the eastern coast—could be explained by the fact that wool was a much more sought-after commodity than sheep, and its demand extended among both domestic and foreign merchants.

IV

The depression of the English wool industry had some serious repercussions for the international wool trade, as is reflected in annual statistics of English wool exports. English wool, both fine in quality and comparatively inexpensive, was the single most cherished export commodity, a ‘white gold’, generating substantial income to large-scale producers. Given the widespread demand for and consumption of English wool all over Europe (and parts of the Middle East), and the involvement of complex networks of European wool merchants (first and foremost Italian, but also French—especially Cahorsin—as well as Flemish, Hanseatic, and domestic) in the English wool trade, it is hardly surprising that the biological shock led to a major international crisis. The steep decline of the ovine population by some 50 to 56 per cent, within just a few years, meant that the local producers were, in many instances, unable to supply their clients with wool. Often, the transactions between wool producers and wool merchants were in the form of advance contracts, whereby merchants would supply producers with advance payments of a fixed sum for a certain amount of wool to be delivered by the maturity date, usually within a year or two (or, in some instances, several years) after the agreement of contract.⁴⁹

Our information regarding the annual volumes of exports of English wool comes from two principal sources: enrolled wool customs accounts, recording the annual totals of taxed wool exports, and particular accounts, containing details of wool exports from individual ports (figure 7).⁵⁰ Both types of documents begin with the introduction of a permanent customs duty on wool exports (at 6s. 8d. per sack) in spring 1275. Unfortunately, the enrolled wool accounts do not start until 1279–80, while the only two surviving pre-1279/80 particulars are the 1275–6 accounts for Hull (27 June 1275–27 April 1276) and Chichester (July 1275–June 1276).⁵¹ The latter is badly faded on its right-hand side, and consequently, only about 90 per cent of its wool entries are legible. Nevertheless, those two accounts provide a glimpse into the impact of the first outbreak of scab on wool trade and hints about the levels of pre-1279/80 exports. In 1275–6, Hull exported a total of 4,397 sacks of wool, compared with 2,084 sacks exported in 1279–80. Similarly, the Chichester figures were *at least* 897.6 sacks (and probably higher, given that only about 90 per cent of the entries are legible) in 1275–6, while the 1279–80 figure stood at 496 sacks. To a large degree, the fall in the Hull and Chichester volumes mirrors the decline in the total sheep population of England.

⁴⁹ Bell et al., *English wool market*, pp. 11–67.

⁵⁰ The enrolled wool customs accounts are tabulated in Carus-Wilson and Coleman, *England's export trade*.

⁵¹ TNA, E 122/55/1 and E 122/135/1.

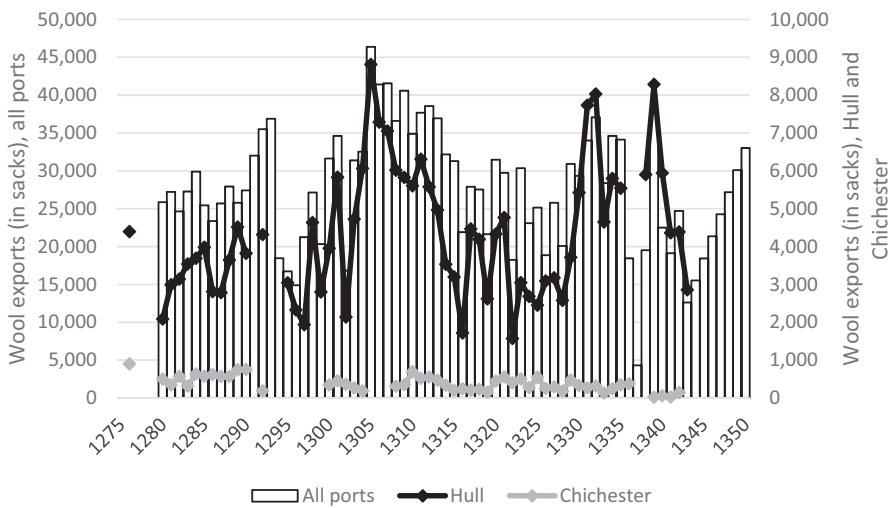


Figure 7. *Annual wool exports (in sacks), totals for England (15 ports), Hull, and Chichester 1275/6–1349/50*

Sources: Carus-Wilson and Coleman, *England's export trade*; TNA, E 122/55/1 and E 122/135/1.

As figure 7 indicates, in the course of 1279–80, England exported a total of 25,870 sacks of wool from 11 ports (Melcombe Regis, Southampton, Sandwich, Chichester, London, Ipswich, Great Yarmouth, King's Lynn, Boston, Hull, and Newcastle). If we were to speculate that the Hull and Chichester figures are representative of the situation elsewhere in England, and the volumes of exports from other ports fell similarly by about 50–55 per cent, then we may assume that on the eve of the murrain, England may have been exporting approximately 50,000–55,000 sacks of wool a year. Based on this estimate, it appears that the volumes of exported wool may have slightly exceeded those consumed domestically, accounting for about 52–55 per cent of all wool produced in a given year.

The subsequent export trends in the 1280s and 1290s reflect the demographic trends in sheep flocks. The temporary rise came to a halt in 1284–5 and 1285–6, when the total export figures stood at 25,454 and 23,373 sacks respectively, down from 29,908 sacks in 1283–4. This may be accounted for by the second wave of the scab outbreak, which ravaged the flocks during those years. The figures started rising once more, reaching their peak in 1292–3 with 35,505 exported sacks, only to fall to 18,458 a year later, when scab returned once more. The figures fell further to 16,728 in 1294–5, and then again to 14,874 in 1295–6. Apart from the murrain and wool shortage, we have to keep in mind the outbreak of the Anglo-French War over Gascony (1294–1303), which commanded rising transaction costs and discouraged foreign merchants from travelling to and from England, as well as the confiscation of alien goods, which included wool stocks.⁵²

That the recurrent waves of murrain alone were capable of depressing the wool trade can be demonstrated by repeated episodes of short-term decline in the levels

⁵² Munro, 'Industrial crisis', pp. 135–6; the survey of the confiscated wool is printed in Bell, Brooks, and Dryburgh, eds., *Advance contracts*, pp. 176–219.

of wool exports during the recurrent waves of sheep mortality in 1305–6, 1313–14, 1315–16, 1321–2, and 1334–5, when England was not involved in continental warfare and did not, with the exception of 1322, impose any new subsidy on alien merchants. Thus, in 1316–17 and 1317–18, wool merchants exported 27,887 and 27,527 sacks, respectively, up from 21,895 in 1315–16. These fluctuations reflect the trends in sheep population, which was going up after short-term setbacks in 1313–14 and 1315–16. In 1322–3, 1328–9, and 1332–4, the export figures were high, standing at 30,000 sacks or more, despite the royal imposition of alien export duties. Again, this went hand in hand with the steady growth of sheep population after the 1321–2 outbreak. It was not until the late 1330s that institutional factors once more became a dominant force in determining the annual fluctuations in the levels of wool exports. The abysmally low figure of 4,310 sacks exported in 1336–7 was connected to the draconian statute of Edward III issued that year. The statute forbade all English wool exports and foreign cloth imports, and, conversely, promoted the immigration and settlement of foreign cloth artisans in England.⁵³ The low figures of the early 1340s may well be connected with the ongoing hazards of warfare in France and the Low Countries, in conjunction with the commencement of the Hundred Years' War (1337–1453). In particular, ongoing fighting and raiding in Zeeland, Hainault, Artois, Brittany, and Gascony (in addition to French naval raids on Hampshire and Sussex towns) undoubtedly increased the transaction costs of the wool trade. Ironically, this was precisely the era of a remarkable boom in English sheep farming.

V

The recurrent outbreaks of sheep mortality, low wool yields, and the resulting decline in wool output caused much hardship for sheep farmers. Despite this fact, there is sufficient evidence that wool producers, and most notably major monastic houses, were still being pushed to enter into risky business contracts with wool merchants. This fact is evidenced in advance contracts for the sale of wool, signed between the buyers and producers, and in the sheer quantities of wool purchased in the same contracts.⁵⁴ Figure 8 establishes the amounts of wool contracted by wool merchants (chiefly Italian) and entered into royal memoranda rolls and plea rolls. As the figure indicates, during the first scab outbreak, the sheer amounts of contracted wool entered into the rolls were well above average, with the respective figures for 1278–9 and 1279–80 standing at 453 and 541 sacks a year, for future delivery. This stood in sharp contrast with the average figure of 134 sacks and the median figure of 64 sacks a year, over the entire period of 1259–1325. In other words, during the deadliest outbreak of scab, wool business was not just being conducted as usual: it was conducted with unprecedented intensity.

The contracts were written in such a way that merchants took all precautionary measures and imposed heavy risks and penalties on wool producers. First, the contracts distinguished between the three qualities of wool (good, middling, and locks), and specified the share of each type within each transaction. Second,

⁵³ Munro, 'Industrial crisis', p. 134.

⁵⁴ The contracts have been printed in Bell et al., eds., *Advance contracts*.

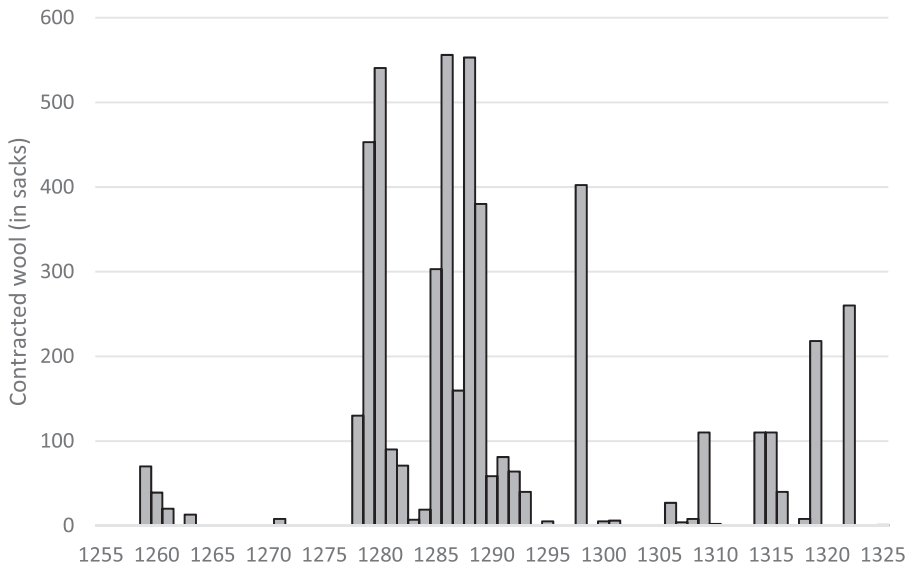


Figure 8. *Annual amounts of wool (in sacks) contracted by wool merchants for future delivery and enrolled as recognizances into royal memoranda rolls and exchequer rolls, 1259–1325*

Source: Bell et al., eds., *Advance contracts*.

about one-quarter of the post-1276 contracts stipulated that wool was to be scab-free.⁵⁵ In addition to that, some contracts also required wool to be free of rot.⁵⁶ Third, the advance contracts implied hidden interest rates (varying between 10 and 40 per cent) that would only increase with the delay of repayment.⁵⁷ Finally, and most importantly, the contracts stipulate very clearly that producers authorized the Exchequer to compensate their clients by paying the debt from their lands and goods, in the event of their inability to deliver the agreed quantities of wool.⁵⁸ Failure to fulfil these contractual terms would result in litigation through the Exchequer court, where Italian merchants enjoyed considerable privileges, in particular, in conjunction with debt recovery.⁵⁹

Wool producers were taking considerable risks, then, by signing advance contracts. Indeed, the recurrent waves of scab and the ensuing depression within the wool sector, extending into the early fourteenth century, meant that in many instances producers failed to deliver contracted volumes of wool. Such situations are exemplified in the records of commercial dealings between Rievaulx Abbey and the Frescobaldi, Cerchi, and Mozzi of Florence, and the Ricciardi of Lucca (figure 9). Rievaulx Abbey, boasting perhaps as many as 14,000 sheep and yielding at least 60 sacks a year around 1340, continued to be involved in Italian wool trade

⁵⁵ TNA, E 159/55, rot, 9; printed in Bell et al., eds., *Advance contracts*, p. 47 (no. 61).

⁵⁶ Bell et al., eds., *Advance contracts*, nos. 42, 61, 85, 87, 94, 100–1, 114, 120, 126, 138, 143, 145–6, 157, 171 (references to scab); nos. 93, 96–7, 108, 117–19, 165 (references to scab and rot).

⁵⁷ Bell et al., *English wool market*, pp. 126–32, 142.

⁵⁸ *Ibid.*, p. 27.

⁵⁹ *Ibid.*, p. 13.

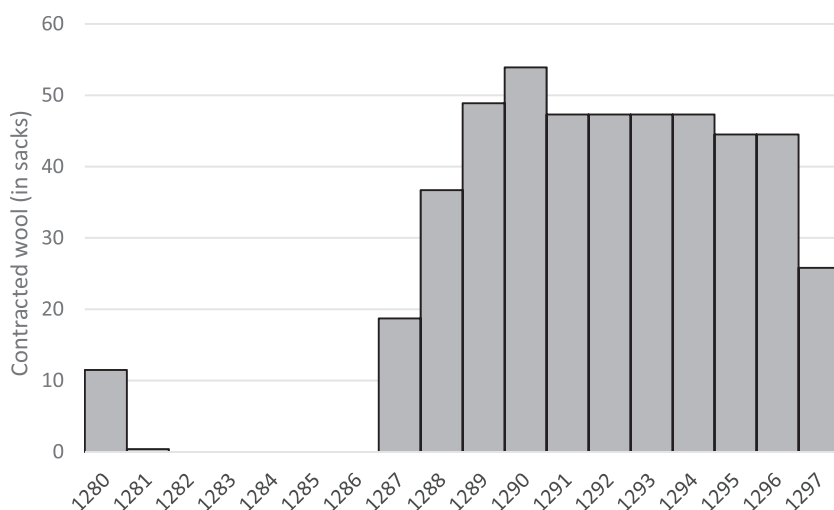


Figure 9. Annual volumes of contracted wool (in sacks) at Rievaulx Abbey, 1279/80–1296/7

Source: Jamroziak, 'Rievaulx Abbey', p. 209.

notwithstanding the recurrent outbreaks, which undoubtedly reduced its flocks and wool production capacities.⁶⁰ That the Rievaulx flocks were hit badly by the disease is evident in the remarkably low volumes of wool contracted in 1279–80 and 1280–1, and in the fact that between 1281–2 and 1285–6 no advance contracts were signed. Business resumed in the following year, and between 1286–7 and 1296–7, the abbey agreed on *at least* seven deals amounting to 462 sacks of good wool, in addition to borrowing at least £1,992 from Italian wool merchants.⁶¹ This implied an annual delivery of 50 sacks of wool (requiring about 11,600 sheep)—well above the actual production capacity of Rievaulx in the aftermath of the scab outbreaks.⁶²

The negative experiences of Rievaulx were by no means unique. The situation is echoed in business contracts involving other major wool producers, including Meaux Abbey (Yorkshire), Fountains Abbey (Yorkshire), Combermere Abbey (Cheshire), and Pipewell Abbey (Northamptonshire).⁶³ Given the gap between the volume of contracted and produced wool, producers had to make up for the missing quantities through purchases of so-called *collecta* wool (to be distinguished from *propria* wool, produced at producers' own farms).⁶⁴ For instance, according to a 1287 contract between Rievaulx Abbey and Lucchese merchants, 10 sacks out of the total 26 came from *collecta*.⁶⁵ At Bolton Priory (North Yorkshire), *collecta*

⁶⁰ Evans, ed., *Pegolotti*, p. 260.

⁶¹ Jamroziak, 'Rievaulx Abbey', p. 211.

⁶² *Ibid.*, p. 213.

⁶³ Bell et al., eds., *Advance contracts*, nos. 19, 21, 26, 28, 37, 42, 43, 73, 93, 95, 103, 109, 136; Waites, *Monasteries and landscapes*, p. 244; Bell et al., eds., *Advance contracts*, no. 21; Bell et al., *Advance contracts*, nos. 93, 136; Trow-Smith, *British livestock*, p. 139; Jennings, *Yorkshire monasteries*, pp. 99–100; Bell et al., *English wool market*, pp. 29, 93–100; *Calendar of the Close Rolls*, 1272–9, p. 146; *Calendar of the Patent Rolls*, 1272–81, pp. 103, 170, 247.

⁶⁴ On *collecta* wool, consult Bell et al., *English wool market*, pp. 51–4.

⁶⁵ Jamroziak, 'Rievaulx Abbey', p. 211.

accounted for about 80 per cent of all wool sold between 1287–8 and 1303–4.⁶⁶ While the latter may be an extreme example, it shows that some producers were facing remarkable difficulties in securing the sheer volumes stipulated in sale contracts, including the *collecta*, given the widespread shortage of wool all over the country. It is unclear if *collecta* would have been acquired from the tenancy sector, or if it was substituted with a cash equivalent of missing wool.

The inability to produce the contracted amounts of wool and the need to secure *collecta* implied the increasing indebtedness and, consequently, economic crisis of major wool producers, which resulted in bankruptcy and—in some extreme cases—in dispersal of communities, as indeed happened at Kirkstall and Rievaulx abbeys (1281 and 1291 respectively).⁶⁷ Many communities had to get by in heavily indebted states well into the early fourteenth century. Despite the omnipresent signs of crisis, wool-producing centres carried on their business dealings with Italian merchants. The heavy losses incurred on their demesnes and difficulties meeting their existing contractual obligations implied their need to secure new contracts as a means to access the capital they needed to replenish their sheep flocks, produce wool, and avoid potential bankruptcy and dispersal. It should be borne in mind that, quite paradoxically, sheep prices did not soar, despite the widespread murrain: on the contrary, the average price of an adult sheep dropped from 1.6s in 1275–7 to 1.2s. in 1278–81, before climbing back to 1.5s. in 1282–7 (figure 6). The low price of sheep could well be another incentive for producers to enter into advance contracts. Moreover, as recognizances of wool debts indicate, the advance contracts could be renegotiated, if their original terms could not be met. Obviously, the single biggest challenge was to deliver the agreed volumes of wool on time, because of the recurrent waves of scab and financial difficulties that wool producers were facing. In some cases, merchants were forced to accept a renegotiation of a contract and agree on a revised date of delivery. In some other instances, they renegotiated contracts of their own accord, showing consideration towards struggling producers who faced numerous difficulties.⁶⁸

VI

This brings us to the last point: the impact of the crisis on textile production. The situation is reflected particularly well in annual figures of broadcloth exports and imports by alien merchants, as recorded in annual custom accounts. Unfortunately, these accounts do not start until the issue of the Carta Mercatoria in 1303; there is a gap between 1312 and 1322 (on account of the Ordinances of 1311 which curtailed the Crown's right to collect customs);⁶⁹ and to complicate matters further, no cloth exports and imports by denizens (domestic merchants) are recorded until 1347, a year when they were first taxed. Nevertheless, these figures, as incomplete as they are, are indicative of the fact that there was a huge deficit of balance between the remarkably low figures of exports and strikingly high figures of imports, which carried on until the 1320s (figures 10 and 11).

⁶⁶ Calculated from Kershaw and Smith, eds., *Bolton Priory compotus*.

⁶⁷ Jamroziak, 'Rievaulx Abbey', p. 213. Other houses included Fountains (Yorkshire) in 1291, Bruern (Oxfordshire) in 1293, and Pipewell (Northamptonshire) in 1296. See Bell et al., *English wool market*, p. 70.

⁶⁸ Bell et al., *English wool market*, pp. 41–6.

⁶⁹ Ormrod, 'Crown and the English economy', p. 168.

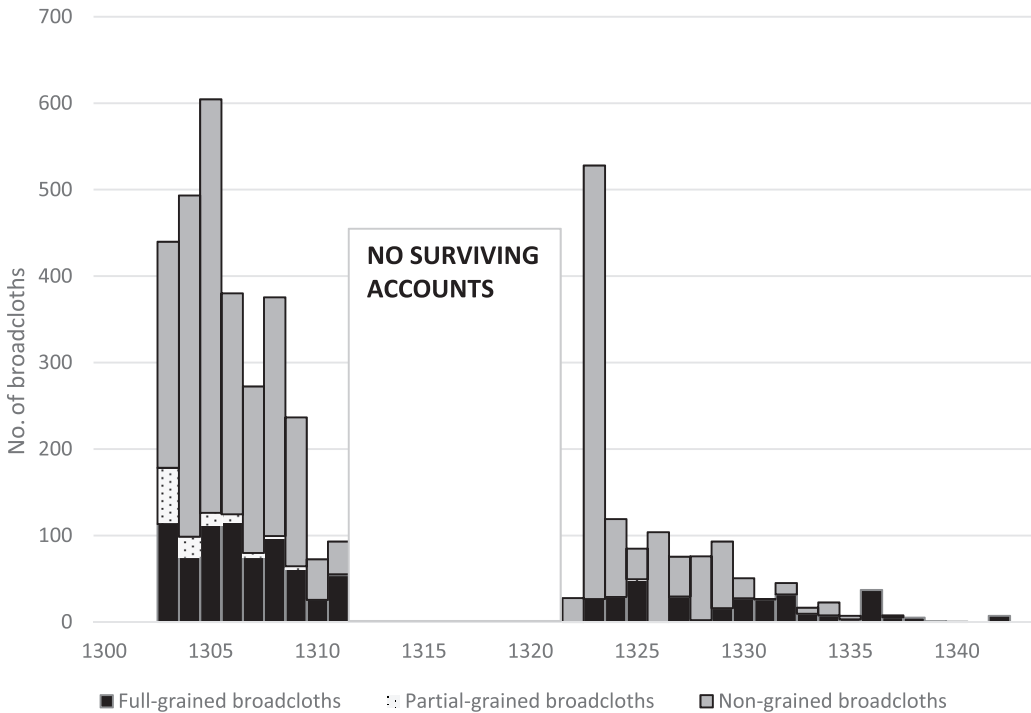


Figure 10. *Annual English exports of broadcloths by aliens, 1303–43*

Source: Munro, 'Industrial crisis', p. 135.

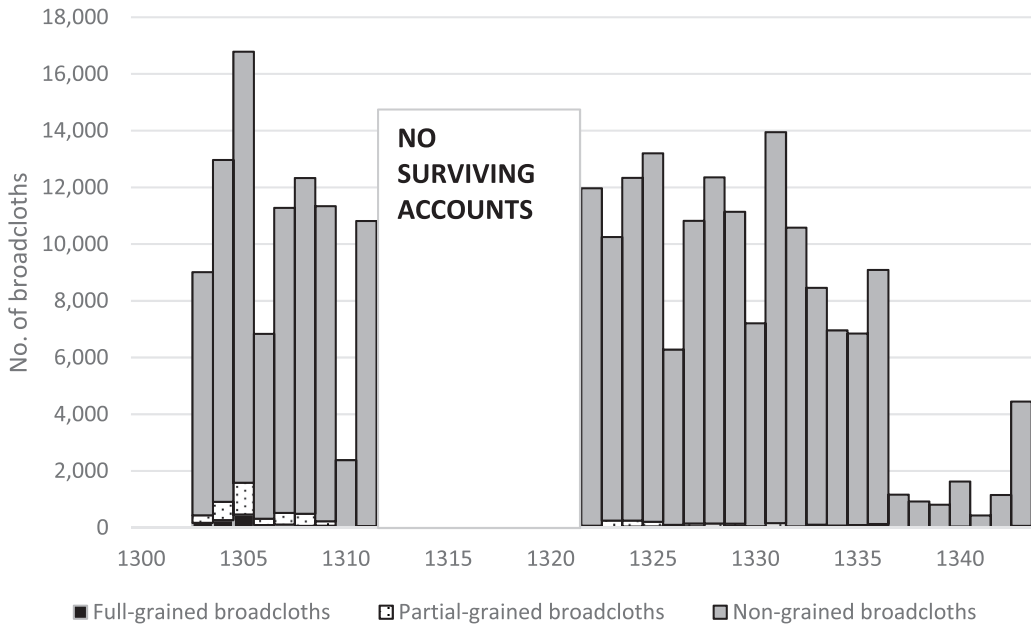


Figure 11. *Annual English imports of broadcloths by aliens, 1303–43*

Source: Munro, 'Industrial crisis', p. 135.

As we have seen at the beginning of this study, several scholars have advocated the view that between the 1270s and 1320s, there was a pronounced decline in the urban textile industry. This view is indeed corroborated by substantial evidence which indicates the decline in numbers of textile workers in London, Winchester, Northampton, Leicester, Oxford, and other towns, in the course of that period.⁷⁰ In their quest for causes, scholars have tended to focus on humans and looms, rather than sheep and wool. Although warfare, taxation, transaction costs, and foreign competition undoubtedly *intensified* the crisis, it was Nature that *initiated* it. The sharp decline in wool production also meant a decline in textile production, particularly in the domestic sector—especially with wool leaving the country for the Continent (albeit on a more limited scale). As a result, wool supply could not have possibly matched the levels of domestic demand. It was under these dire circumstances of a chronic under-supply within the domestic sector that the urban textile industry was doomed to decline, with many artisans going out of business or being forced into poverty. This illustrates the phenomenon that John Munro has aptly called the ‘industrial crisis of English textile towns’.⁷¹

Why did local wool producers prefer to deal with foreign wool merchants and let English wool leave the country, rather than sell their produce to local urban textile craftsmen and, thus, leave a larger share of their produce in England? Again, this may be related to the mutual benefit of wool producers, who badly needed ready capital to buy new animals and pay for their debts, and foreign merchants, who were able to extend large-scale loans via advance wool contracts, and thus conduct their business as usual. Although there were still some prominent wealthy denizens involved in business dealings with wool producers and supplying urban artisans with raw material, they could not compete with the financial capabilities of Italian or Cahorsin merchants. Hence, it would be much more appealing to focus on foreign rather than domestic wool markets, thus hindering domestic textile production and cloth exports. To put it differently: the urban textile industry crisis was *initiated* by the chronic shortage of raw wool and *aggravated* by the fact that the little wool that was produced ended up with foreign merchants, rather than domestic weavers.

It was not until *c.* 1310 that the volumes of wool available for domestic consumption would return to match the hypothetical levels of demand—partially because of flock restocking and partially because of the decline in human population by about 15–20 per cent during the Great Famine of 1315–17.⁷² However, it appears that it was in the 1330s and 1340s that the levels of wool available for domestic supply and consumption may have reached unprecedentedly high levels. By that point the scab crisis was long over and sheep farming and wool production were buoyant once again. It was also, quite paradoxically, the period when the volumes of wool exports fell to unprecedentedly low levels, in conjunction with ongoing warfare and royal protectionist measures. It is, of course, possible that custom accounts under-record the real volumes of exports that would either be shipped secretly from one of the English, Scottish, or English-controlled Irish ports. However, even if this were the case, then the unaccountable volumes of English

⁷⁰ Munro, ‘Industrial crisis’, pp. 120–1.

⁷¹ *Ibid.*

⁷² Slavin, *Experiencing famine*, ch. 7.

wool could not have possibly matched their pre-1336 levels: as the surviving port accounts from Berwick indicate, the annual figures stood at about 700–1,200 sacks (most of which were produced in Scotland, rather than England).⁷³

In other words, the drastic fall in the volumes of wool exports after 1336 implied that there was a huge surplus available to be consumed domestically. In theory, it could be stored; it could be diverted to other uses, including non-cloth weaving, carpeting, and insulation; or, alternatively, it could be woven and consumed at a higher and faster rate than usual. In any event, if the domestic consumption levels went up, driven by the abundance of consumable wool, then it may explain a gradual revival of the urban textile industry around the same time. This would have cut the demand for imported broadcloths, which, in turn, may explain the sudden fall in their volumes in the late 1330s (with the ongoing warfare and royal protectionism being the other factors). The new textile industry was catering not only for domestic consumption, but also for international markets. To withstand the increasing transaction costs and foreign competition, English textile producers adapted to the new reality by shifting, in a piecemeal manner, from cheap and low-quality worsteds to finer-grade and more luxurious cloths. This was largely possible thanks to the enormous advantage of the denizens, who were taxed much less than alien merchants.⁷⁴ It was the predominance of finer-grade cloths that characterized English textile exports from the second half of the fourteenth century, from which point England dominated the international textile trade for some two centuries.⁷⁵ The dynamics and fortunes of late medieval and early modern English textile production and trade have been duly explored in the seminal work of John Munro.⁷⁶ For one, they belong to a much brighter period in the history of English wool industry in the post-Black Death era.

VII

The sheep panzootics, caused by recurrent outbreaks from 1275 onwards, were a major biological disaster with far-reaching economic consequences. Within the space of some four years, England lost about half its sheep. As we have seen, replenishing the flocks was a long, costly, and painful process. Also, the process was hindered by recurrent waves of scab, on both national and local levels. Hence, it was not until the 1330s that the pre-1275 levels were attained. While the demesne sector continued to expand its flocks in the 1330s and 1340s, the peasants were unable to match the pace of the demesne expansion. Apart from decimating local flocks and depriving sheep herders of their most important form of capital, the crisis had severe implications for the wool trade and for textile production. By 1280, the volume of English wool exports seems to have halved, when compared to their 1275 levels.

To make things even worse, the end of the first wave of the epizootic in 1280 did not mean the end of the crisis: there were several recurrent waves of the disease in the following decades. This was a serious blow to local sheep farmers and wool

⁷³ Donnelly, 'Open economy', p. 9.

⁷⁴ Munro, 'Industrial crisis', p. 140.

⁷⁵ Munro, 'Origins'.

⁷⁶ Munro, 'Industrial transformations'; idem, 'Towns and textiles'.

producers and, as such, it should have discouraged wool merchants, at least for the time being, from engaging in such a risky business. Nevertheless, it appears that Italian and Cahorsin wool merchants carried on their business as usual. This reflects the need of wool producers for ready capital to buy new animals and pay off their debts, and the ability of foreign merchants to extend large-scale loans via advance wool contracts. The exports of English wool in the context of the chronic shortage (and increased transaction costs related to warfare and taxation) inflicted a serious blow on the domestic textile industry, which experienced a sharp decline from the 1280s onwards. The 'industrial crisis of English textile towns' continued until the 1340s, when the expansion of sheep flocks and fall in export volumes created a vast surplus of wool available for domestic consumption, reviving the urban textile industry.

The wool and textile crisis of *c.* 1275–1330 is a classic example of a complex economic crisis that was *initiated* by natural forces (scab outbreaks), and *aggravated* by institutional factors (exports of already scarce wool, foreign competition, the possible relocation of textile industry to the countryside, ongoing warfare, royal intervention, and increased transaction costs). The interaction between exogenous and endogenous factors, vital for understanding the complexity of socio-economic crises, has been highlighted in my work on the Great European Famine of 1315–17.⁷⁷ The wool industry crisis of *c.* 1275–1330 resembles, to a certain extent, the dairy industry crisis of the 1320s, caused by the Great Bovine Pestilence of 1319–20. Although, unlike the cattle disease, scab outbreaks occurred in several recurrent waves, the implications were long-term and far-reaching in both instances.⁷⁸ The bovine mortality crisis meant a long-lasting depression chiefly within the dairy sector; the scab crisis implied a long-term depression within the wool sector. One should also account for the decline in sheep meat and milk sectors, but this lies outside the scope of the present study. Above all, however, both the sheep and cattle crises indicate that animal health was a detrimental factor in economic fortunes in late medieval England, and indeed in the pre-industrial world. This, in turn, is linked to a much bigger question about the impact of exogenous or natural forces on the economy and society. In recent years, there has been an increasing awareness of the role of Nature as 'historical protagonist'—a view expressed time and again by Campbell in his more recent publications, and in particular in his 2016 *Great transition*.⁷⁹ While Nature was surely not the only historical trigger, it should, by all means, be treated on a par with endogenous/institutional and demographic factors.

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⁷⁷ Slavin, 'Market failure'.

⁷⁸ Newfield, 'Cattle panzootic'; Slavin, 'Bovine pestilence'; idem, 'Flogging a dead cow'.

⁷⁹ Campbell, *Great transition*.

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Appendix I: Extrapolation of 'national' sheep population trends, 1275–1350

The fact that the survival of manorial and tithe accounts (and their distribution in the sample) is uneven implies a methodological challenge for reconstructing the annual demographic trends. I have attempted to address the problem in the following manner. To extrapolate the 'national' figures, I had to treat the demesne and tenancy sectors separately.

For the demesne sector, I have calculated the ratio between the current year's sheep numbers and the previous year's sheep numbers, on the basis of only those demesnes whose accounts survive for both years. For instance, there are 109 accounts surviving for 1282–3 and 113 accounts for 1281–2. Out of these numbers, only 86 accounts survive *for the same manors, for both years*. The total head count of sheep on those 86 demesnes at the end of the accounting year 1282–3 (Michaelmas 1283) was 33,857, compared with 32,012 at the end of the previous accounting year (Michaelmas 1282). This implies that the sheep population on those 86 demesnes grew by some 6 per cent (or put it differently, the ratio between 1283 and 1282 was 1.06). I have therefore used the factor of 1.06 as an approximate guideline to indicate the annual growth for 1283, within the 'national' demesne sector.

Reconstructing the tenancy sector is even a less likely task, which is undoubtedly liable to many methodological pitfalls and criticisms. The volume of the surviving accounts recording lamb tithes is too small to subjugate it to any robust statistical analysis. All the same, the surviving tithe accounts for the pre-1320 period indicate that the pace of flock replenishment within the tenancy sector mirrors that of the demesne sector. Therefore, I have estimated, perhaps in a naive manner, that the growth rates within both sectors was, more or less, on a par. The situation seems to have been different in the 1330s and 1340s, when the peasant sector started to lag behind the demesne one. The slower growth of peasant sheep numbers may imply that the overly optimistic picture of growth painted by the manorial accounts is misleading, when considering the 'national' situation, accounting

for both the demesne and tenancy. On the basis of the surviving tithe accounts, it appears that the growth of tenant sheep population, in comparison with the demesne one, was about 10 per cent slower in the 1330s and 20 per cent slower in the 1340s.

When factoring both the manorial accounts and tithe receipts into the annual 'national' sheep population figures, I have assigned the former (the demesne sector) the weight of 20 per cent, and the latter (the tenancy sector) the weight of 80 per cent. For instance, if the annual growth rate between 1338 and 1339 was 1.13 (13 per cent) within the demesne sector and (crudely estimating) 1.03 (3 per cent) within the tenancy sector, the estimated national growth rate was 1.05 (5 per cent).

Appendix II: Relative proportion of broken wool (*lana fracta*) and solid wool (*lana grossa*), produced on 13 Hampshire-Wiltshire demesnes of Winchester Cathedral Priory, 1272/3–1347/8

	<i>Lana fracta</i> (%)	<i>Lana grossa</i> (%)
1272–3	5.4	94.6
1273–4	2.7	97.3
1275–6	3.6	96.4
1279–80 (epizootic year)	19.0	81.0
1280–1	8.0	92.0
1281–2	7.7	92.3
1282–3	6.9	93.1
1285–6 (epizootic year)	14.1	85.9
1293–4 (epizootic year)	10.2	89.8
1298–9	4.0	96.0
1304–5	1.2	98.8
1306–7	4.2	95.8
1307–8	2.2	97.8
1308–9	2.8	97.2
1309–10	4.1	95.9
1310–11	6.6	93.4
1311–12	2.8	97.2
1312–13	3.6	96.4
1314–15	4.9	95.1
1315–16	4.7	95.3
1317–18	3.8	96.2
1318–19	2.0	98.0
1323–4	3.3	96.7
1324–5	4.1	95.9
1328–9	1.7	98.3
1329–30	5.7	94.3
1330–1	3.9	96.1
1331–2	0.3	99.7
1334–5	5.1	94.9
1337–8	3.1	96.9
1338–9	1.7	98.3
1343–4	3.2	96.8
1346–7	2.5	97.5
1347–8	2.1	97.9
Average, non-epizootic years	3.8	96.2

Source: HALS, DC/J1/2–18.

Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

S1. Annual numbers of sheep (in heads) on 601 English demesnes, 1274–1350

S2. Annual numbers of lambs paid in tithes by seven English parishes, 1274–1350

S3. Manorial accounts and tithe receipts databases