

Sectoral Advance in English Agriculture, 1850-80

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"I wish to bring the whole discussion to bear on the present condition of the dairy farms of the Vale district of Gloucestershire, which have generally, I believe, been as stationary in their produce as the hill farms have been progressive."—J. C. Morton to the Kingscote Farmers' Club, c. 1863.

"The high price of mutton and wool for several years has given such a stimulus to light land farming, that the strong wheat lands have receded in public estimation, and are at present in most need of improvement."—*Presidential address to the Royal Agricultural Society, 1867.*

THE more precise economic history of nineteenth-century agriculture which is gradually appearing has understandably so far dealt mainly with national aggregates of inputs and output.¹ We have advanced less far with understanding the machinery whereby the one was processed into the other. Recently, however, Dr R. W. Sturgess in this REVIEW² has attempted to distinguish divergent trends within nineteenth-century farming between light soil and clayland agriculture. We wish to dissent from his optimistic view of the progress of the clayland sector between 1850 and 1880.³

Appropriate units of study, in our view, need to be of sufficiently broad scope to rescue discussion from a chaos of minutiae. The order is such a tall one where so many farming systems, in a constant state of change over time, shade into one another that it is more than reasonable first to be sure what the units refer to. Leaving aside fine pedological definitions, the 'clays' do not represent a type of farming defined as a single enterprise-mix. Nor are they a discrete region in the conventional geographical sense of a single block of land. Rather, we are dealing with the responses to changes in prices and technology of at least three linked ecosystems—clayland dairying, clayland

¹ See especially J. R. Bellerby, *Agriculture and Industry: Relative Income*, 1956; E. M. Ojala, *Agriculture and Economic Progress*, 1952; M. J. R. Healy and E. L. Jones, 'Wheat Yields in England, 1815-59', *Jnl Roy. Statistical Soc.*, ser. A, cxxv, 1962, pp. 574-9.

² 'The Agricultural Revolution on the English Clays', A.H.R., xiv, 1966, pp. 104-21.

³ It is only fair to note that the bulk of Dr Sturgess's paper deals with the technical problems of increasing production on the clays during the first half of the nineteenth century. We are by no means at odds with him over this. Where we dissent is that the technical developments of the mid-century swiftly and conclusively improved matters. C. S. Orwin and E. H. Whetnam, *History of British Agriculture 1846-1914*, 1964, p. 5, also appear to believe that tile drains were to do for the clays what the turnip had done for light land.

fattening, and clay wheat-and-bean husbandry, the last named distinctly more convertible to grass in the Midlands than in the south and east. Ecosystems are sections of the earth's surface occupied by well-defined systems of interacting living organisms and physical environment. Their deeper basis in the natural world makes them more suitable for long-term historical study than more transient, price-formed types of farming, where there may be subtle, short-term changes of emphasis on one product or another, and it seems perfectly legitimate to trace their economic history. Indeed, Victorian analyses were so much in terms of groupings like 'claylands' that, given our sources, it would be like throwing out the baby with the bathwater entirely to disregard contemporary nomenclature. In this paper we shall therefore be partly concerned with assessing the comparative production record of two sets of ecosystems: the clay or heavy land as against the free-draining or light land set. This latter comprised the mixed farming of the chalk, limestone, sandlands, and friable loams. Since, however, Dr Sturgess has made some bold pronouncements about the clayland category, it is with that former group that we shall be mainly concerned.

For all the definitional difficulties, the dichotomy between light land and clayland does seem central to understanding the secular redistribution of farming systems and agricultural prosperity throughout the period of so-called 'agricultural revolution' from the seventeenth to the nineteenth centuries. Through these years the lighter lands were brought into cultivation under unfamiliar rotations, whereas the heavy land which had once been one of the 'granaries' of the country began to feel competitive disadvantage. The division helps towards explaining the asymmetrical progress of powerful new husbandry régimes (in the light land sector) and the special incidence of agrarian distress among the farmers of the heavy land sector whenever there was a severe fall in the price of their chief crop, wheat. The dynamism of the light land sector has been described elsewhere.¹ By the middle of the nineteenth century the system was actually accused of overproducing fodder and bedding and the insistence of tradition-bound landowners that straw should not be sold off upland farms was thought a great nuisance.²

This was in bitter contrast with the difficulties of the clays, accounts of which are also starting to filter from the primary sources into our secondary texts.³ It is not in issue that the claylands remained a laggard sector from

¹ E. L. Jones, 'Agriculture and Economic Growth in England, 1660-1750: Agricultural Change', *Jnl Econ. Hist.*, xxv, 1965, pp. 1-18.

² Clement Cadle, *On the Management of a Breeding Herd of Cattle, on an Arable Farm . . .*, 1863, pp. 3-4.

³ E.g. in David Grigg, *The Agricultural Revolution in South Lincolnshire*, 1966.

1815 until mid-century. Under arable their disabilities stemmed from the clinging moisture-retentiveness of the soil, which compressed the working season from either end, made traction costs very high, and rendered it virtually out of the question to grow fodder crops (especially turnips) for feeding stock through the winter, or at least to put on stock to feed them off. Consequently, in a time notable for falling prices for the main clayland cash product, wheat, farm incomes on heavy land were squeezed between feeble receipts and high, seemingly irreducible costs. Yet at least corn-growing regularly brought in some ready cash, though seldom enough to float clayland farmers out of the morass, and into mixed farming. Their landlords were imprisoned in the same cage, and usually unwilling to step in or unable to help for long. All this was noisily remarked in each and every public expression of agricultural distress.

Clayland farmers were thus treading in a vicious circle, epitomized in the good old saying, "No food, no stock; no stock, no dung; no dung, no corn."¹ Their situation contrasted with the 'virtuous circle' on the light lands—more feed; more stock; more dung; more fodder crops and more grain in the next round; still more stock and so forth. The light lands had reaped these benefits ever since leguminous, grass, and root crops began to pump extra fodder into them from the middle of the seventeenth century. This was the mutually dependent, upward spiral which Adam Smith analysed in *The Wealth of Nations*² in the eighteenth century, and which J. J. Mechi in the mid-nineteenth century was to dub the "expanding circle."³ For this gradually progressive system the light lands had the advantage: they were free-draining so that traction costs were low, while their working season was relatively long. The key question is, were the heavy lands ever enabled to catch up?

Commentators during the second quarter of the nineteenth century ardently hoped that pipe drainage would begin to turn the same productive wheel on the clays by permitting turnips to be grown on their bare fallows and fed off. "If, by any process, the clay soils of England can be rendered sufficiently dry and friable to admit of the union upon them of stock husbandry with tillage," wrote one of them, "another agricultural revolution will be effected."⁴ Hopes that such a 'revolution' might take place, especially

¹ C. S. Read, 'Report on the Farming in Buckinghamshire', *Journal of the Royal Agricultural Society of England* [henceforth *J.R.A.S.E.*], xvi, 1855, p. 320. See also his 'Farming of Oxfordshire', *J.R.A.S.E.*, xv, 1854, p. 256, for the built-in defects of clayland farming.

² Adam Smith, *The Wealth of Nations*, ed. Edwin Cannan, 1937 (1st edn, 1776), bk 1, ch. xi, pp. 219-28.

³ J. A. S. Watson and M. E. Hobbs, *Great Farmers*, 1951, p. 90.

⁴ J. Trimmer, *On the Improvement of Land as an Investment for Capital . . .*, 1847, p. 11.

if it involved growing turnips on the clays, were misjudged. Had they not been, the light land sector would still have held the lead, for as Ruegg commented of the Dorset chalklands, the subsoil of the light lands was an interest-free drainage system, and "the time and capital required in draining stiff soils have been released in this locality and applied in other improvements."¹ Small wonder that in the third quarter-century, "every farmer who has capital enough to manage a clay farm in a capital way goes travelling about in search of a 'sheep and turnip' farm."²

Dr Sturgess's recent suggestion is, however, that there was a 'revolution' on the English clays during the third quarter of the nineteenth century which enabled them to meet the 'Great Depression' with confidence. The substance of the change was the widespread adoption of improved drainage techniques and the increased use of oilcake, artificial fertilizers, and grain for feeding to stock in the 1850's and '60's. He urges that these technical developments broke the clayland bottleneck of insufficient fodder, partly by enabling vetches and mangolds to be grown and partly by enabling grassland formerly reserved for mowing to be summer grazed. This led, he claims, to reports of a significant increase in the physical output of livestock and livestock products from clayland farms between 1850 and 1880.

We dispute that the extent of the changes was especially significant and feel that such advance in clayland agriculture as was made at this period requires economic, not merely technical, explanation. Admittedly, to evaluate the record of any one farm sector at the brink of the period of pre-digested agricultural statistics is tricky. We are thrown back on the historian's customary assemblage of partial sets of figures and assessments of literary evidence. There is a strong risk that the difference of interpretation, fed by instance and counter-instance, will reach an impasse. The anecdotal evidence in the farming journals of the period is large; available concepts of farming systems grade into one another and are seldom closely defined; national price and cost trends fluctuated constantly; and the varieties of local responses to them were enormous. It may well be that the materials at present available will permit us only to distinguish in broad outline between the contributions of different sectors.³ Yet some reply to Dr Sturgess's case is important, since to

See also Philip Pusey who likewise optimistically used the term 'revolution' in 'Some Introductory Remarks on the Present State of Agriculture as a Science in England', *J.R.A.S.E.*, 1, 1840, p. 6.

¹ L. H. Ruegg, 'Farming of Dorsetshire', *J.R.A.S.E.*, xv, 1854, p. 425.

² [C. W. Hoskyns], 'The Progress of English Agriculture . . .', *The Farmer's Magazine* [henceforth *F.M.*], 3rd ser., ix, 1856, p. 348.

³ Probably the ideal approach would be through a massive reconstitution of estate and farm account data and through the much rarer records of agricultural merchants.

accept it would mean completely revising conceptions of the distribution of productivity increase and agricultural prosperity during the so-called 'Golden Age'.

Caird's Tour of 1850-1¹ established categorically that clayland farmers as a class were still deficient in capital and enterprise, and that relative to those on freer-working soils their businesses were unproductive and unprofitable. If we argue that the gap was narrowed during the next quarter-century, it is tantamount to saying that the clayland sector became in investment and output the leading growth sector of English agriculture. We hope to be able to demonstrate the contrary hypothesis—that the clays made comparatively little net advance in production in the 1850-80 period and that this progress was less a 'revolution' than a natural adaptation to market trends.

I

Productive investment patterns in the light land and clayland sectors were quite distinct. By its very nature, an expansion of output could be secured within the 'virtuous circle' of the former camp by piecemeal additions to occupiers' working capital from current earnings. Any injection of investment could produce fruitful linked effects. In distinct contrast, on the clays a big fixed investment in field drainage had to precede other inputs. The requisite initial burst of investment was plainly beyond the means of clayland occupiers at mid-century. It was Peel's intention to provide some of it as a sweetener to the pill of Repeal, in the form of state loans for drainage and other land improvements—the Public Money Drainage Act of 1846.

Although landlords accepted responsibility for drainage in principle, rather few discharged it in practice. The sum total of land drained during the period, relative to responsible estimates of the need, was small. The foremost expert, Bailey Denton, estimated that by 1880 only 16 per cent of land requiring drainage had been properly dealt with, a figure which the more optimistic Caird was willing to advance by only a few per cent.² This must be set against wide agreement that half of all cultivated land in England was 'heavy' and possibly one quarter was 'cold clay'.³ There thus remained a huge gap of untreated clayland. An official enquiry of 1870 discovered that in 11 out of 42 English counties drainage activity had been negligible and in

¹ James Caird, *English Agriculture in 1850-51*, 1852.

² *R.C. Agriculture, 1880-82: Minutes of Evidence*: vol. 1, pp. 164-5. Denton estimated that only 3 million acres of some 18,455,000 acres requiring drainage had been efficiently drained.—Caird in the *Report of the Select Committee of the House of Lords on the Improvement of Land*, 1873, pp. 343-4.

³ Sturgess, *loc. cit.*, p. 104.

only six was it completed or not required.¹ The inertia was confirmed by the Richmond Commission, before which Shaw-Lefevre, for one, insisted that a very large part of the country had suffered severely for want of drainage, while other witnesses reported that where drainage had been carried out it had many times failed.²

Why, when men at mid-century so obviously set store by drainage as the complete answer to both landlords' and tenants' difficulties, was so little done? Presumably landlords were soon aware how poorly drainage usually paid. Those with slender non-agricultural resources or no special hobby interests in estate administration must have stood aside. Their scepticism was clearly not unreasonable. *The Report of the Committee of the House of Lords on the Improvement of Land* in 1873 admitted the "speculative element" in drainage, the return depending upon "the attention, the skill and the good fortune of the investor."³ Even where tenants agreed a 7 per cent increase in rent to cover interest and repayment of the sinking fund a landlord customarily expected to wait 25 years to recover his outlay.⁴

Much of the work actually carried out fell short of expectations. Where the tenants were left to carry out the task, the planning, perhaps involving several farms, was often ill done.⁵ Where operations had been supervised by representatives of the Inclosure Commissioners, who were inclined to be fussy and expensive overseers, mistakes had still sometimes been made. Druce noted in his Eastern District that much land had been drained too deeply for surface water to run off fast enough and that many outfalls were choked with weeds and brambles.⁶

Poor returns on drainage resulted even more often from the inadequacy of subsequent investment. In 1851 Donald had warned that, "there are numerous other improvements after drainage which ought to be gradually going forward until complete. . . It may require years to enable a tenant to supersede the kind of management to which he is accustomed; and he may not, and probably will not, be able to commence the process of improvement

¹ *Agricultural Returns for Great Britain*, 1870, pp. 16-17.

² *R.C. Agriculture, 1880-82: Minutes of Evidence*: vol. III, p. 235.

³ Select Committee on the Improvement of Land, *op. cit.*, xv. For substantial evidence of unrewarding or only marginally profitable landlord investment in drainage, see F. M. L. Thompson, *English Landed Society in the Nineteenth Century*, 1963, pp. 245-54.

⁴ Select Committee on the Improvement of Land, *op. cit.*, pp. iii-iv. Some landlords borrowed for drainage at 6½ per cent and charged tenants only 5 per cent.—J. Caird, 'British Agriculture', *J.R.A.S.E.*, 1878, 2nd ser., XIV, p. 43.

⁵ E.g. Caird, 'English Agriculture', *op. cit.*, pp. 75, 217.

⁶ *R.C. Agriculture, 1880-82, Reports of the Assistant Commissioners*, Mr Druce's Report, p. 101.

until he receives due encouragement."¹ Tenants had to learn to keep new drainage systems flowing freely; they had to afford to buy lean stock to consume the fodder they were now expecting to grow, and to apply properly the additional manure thus obtained. Perhaps landowners gave insufficient encouragement by way of technical advice, housing for livestock, or liberal tenant-right, but it is equally true that many may reasonably have doubted the ability of clayland tenants to supply the necessary extra working capital to expand their enterprises or to reorganize their farming on progressive lines. We shall attempt below to demonstrate that their doubt was substantially justified.

Mechi, whose strong inclination was to minimize clayland disabilities, may have been right in insisting that stiff clays could not be improved effectively for less than £25 per acre, which included a £12 outlay by the tenant in chalk and manure, and which overall might represent a £2-£3 per acre addition to rent.² In 1873 Keary said of the West Midland grass farms that many were worth little more after drainage than before, largely because the improvement had not been followed by a system of manuring which would cost a further £4-£5 per acre.³ Drainage, plus generous tenant-right for cake and manures on the Duke of Bedford's Tavistock estate resulted in no substantial improvement in the tenants' finances and Little suspected that many "certainly showed no surplus" for their efforts over the 'Golden Age'.⁴ Numerous farmers too clearly lacked adequate reserves of capital or the ability to accumulate it (except briefly during the Crimean War) where wheat, bean, and bare fallow systems persisted. Small clayland livestock farms did little better. In 1845 it was estimated that £10 per acre was the necessary occupier's capital for an effective improvement of stiff clays,⁵ but the average was still below this point during the price inflation of the early '70's. The Richmond Commission was in little doubt that occupiers' capital was inadequate in terms of the price levels prevailing even before the depression began. In 1870 the Earl of Lichfield was asserting strongly that the want of adequate tenant capital was the major inhibition to a stepping-up of landlords' investment.⁶ Where landowners made unremunerative outlays in drainage it was usually the result of over-optimistic calculations of the extent

¹ James Donald, *Land Drainage*, 1851, p. 82.

² J. J. Mechi, *How to Farm Profitably*, n.d., p. 15.

³ Select Committee on the Improvement of Land, *op. cit.*, pp. 158, 176, 177.

⁴ *R.C. Agriculture, 1880-82, Reports of the Assistant Commissioners*, Mr Little's Report, p. 16.

⁵ Select Committee on the Charging of Entailed Estates for Drainage, 1845, *Minutes of Evidence*, p. 29.

⁶ *F.M.*, July 1870, p. 33.

to which tenants would respond. A failing of the government drainage scheme was that its promise to landowners was based largely on the increased rents which tenants 'ought' to pay and the increased livestock they 'ought' to keep once the improvement had taken place.

A further element was the unrealized belief that drainage could introduce the turnip husbandry to clayland farms. On the stiff plastic clays neither large root breaks nor the extensive overwintering of stock in the fields became possible. Nor was draining a panacea for wet seasons. 'Capitalists' attracted by rents of ten shillings or less per acre on the Wealden clays soon abandoned root growing and their new homesteads when seasons became less favourable.¹ Bare fallows remained stubbornly the answer for foul land and prolific weed growth, and significantly in the early '70's even the 'Leviathan' heavy land farmer, Middleditch, was driven back to them after an extravagant investment in thorough drainage and the improvements to back it.² About the same time Mechi's profits shrank away, although he does seem to have shown that improvements could pay given lavish enough expenditure in the early phases.³ No doubt many landowners perfectly well believed this, but knew that few tenants on cheaply rented farms would be able to bear sudden rent increases of 30 per cent or more. Not surprisingly, when the drainage on a North Devon estate failed after twenty years with rents advanced from five shillings to eight shillings per acre the original debt was still undischarged.⁴

By the eighteen-sixties advanced agriculturists had forsaken the guiding light of drainage for the steam plough. The rise of this novelty was as swift as its impact was slender. Figures are fragmentary: in 1863 approximately 600 sets of steam ploughing tackle were thought to be in use; in 1866 between 800 and 1,000 sets were regularly cultivating under 200,000 acres. In 1867 it was estimated that at least 900 Fowler rigs alone were at work in England.⁵ But the very high capital cost limited steam ploughing to landowners and privileged farmers—who could reorganize their holdings to accommodate it, although clayland fields were often simply too small. Clarke was obliged to observe that such farmers as went in for the steam plough were sometimes

¹ H. Evershed, 'Report on the Farming of Kent, Sussex, and Surrey', *Journal of the Bath and West of England Soc.*, 3rd ser., III, 1871, p. 29.

² 'Report on Messrs. Prout and Middleditch's Continuous Corn Growing', *J.R.A.S.E.*, 1875, 2nd ser., XI, p. 57.

³ Orwin and Whetham, *op. cit.*, pp. 126-9.

⁴ *R.C. Agriculture, 1880-82*, Mr Little's Report, *op. cit.*, p. 16.

⁵ C. C. Spence, *God Speed the Plow—the coming of Steam Cultivation to Great Britain*, 1959, p. 105. Contemporary published figures of the output of agricultural implement makers do not distinguish the sizeable export component.

"sinking men . . . making desperate ventures upon a costly machine that was to retrieve the condition of their farms. Hoping that it would do everything, not only cheapening labour and increasing efficiency but stöcking and manuring land as well,"¹ a comment which throws a sidelight on the real shortage of working capital. By the early 'seventies improving landowners were hardly to be encouraged by comments like one from Suffolk that clayland farmers were still "waiting till something wonderful turned up."² Scanty improvement on the clays and the low profits accruing to them were reflected in the utter failure of the worst of them to rise in value between 1857 and 1875, whereas the average price per acre for all farms (based on five-year moving averages) rose from £39 in 1857-61 to £54 in 1873-7.³ The Penrith Farmers' Club debated the future of these poorest clays and decided that if it could make them pay even as grassland at 15 shillings per acre it would shortly expect landowners to present the club with a piece of plate "for having discovered for them the secret."⁴

In the clayland sector as a whole the fact that drainage costs rose faster than either rents or farm incomes dissuaded massive investment.⁵ The exceptions were the more fertile and easier worked medium clays and loams of districts such as Holderness, the Vale of Pewsey, the Isle of Thanet, and the Cheshire Plain. Where soils were 'mixed' only part of any given farm required draining and this was more feasible financially. It also helped to extend root breaks and stock keeping which were already present in the structure of farm enterprises. In such cases rents were already high enough to attract landlords' capital and tenants were more likely to match landowners' provision of tile drains with the labour of their employees.

Generally, however, the heavy lands failed to attract big capital, and their handful of entrepreneurs on the scale of Mechi, Middleditch, or Prout were few enough, as Richard Jefferies once remarked, to "set every agricultural tongue wagging within a radius of twenty miles."⁶ Most crucially, too little had been drained and some of that ineptly. The third quarter of the nineteenth century naturally saw no miraculous complement of increased 'con-

¹ J. A. Clarke, 'Report on Steam Cultivation', *J.R.A.S.E.*, 2nd ser., III, 1867, p. 198.

² *Agricultural Gazette*, 11 June 1873, p. 55.

³ Caird, 'British Agriculture', 1878, *loc. cit.*, p. 315; J. T. Ward, 'Farm Sale Prices over a Hundred Years', Centenary Supplement to the *Estates Gazette*, 3 May 1958, p. 49.

⁴ *F.M.*, Jan. 1864, pp. 33-8.

⁵ Drainage costs rose from £4-£5 (c. 1843) to £7-£10 per acre in 1873.—Select Committee on the Improvement of Land, *op. cit.*, p. xvi. According to the income tax assessments, there may have been a fall in real rent on the poor clays between 1851-2 and 1878-9. See J. H. Clapham, *An Economic History of Modern Britain*, II, pp. 278-9; Caird, 1878, *loc. cit.*, p. 315.

⁶ Richard Jefferies, *Hodge and His Masters*, Uniform edn, 1949, p. 35.

ventional inputs' (oilcakes or fertilizer) since the clayland tenantry were notoriously impoverished when it began. Where green crop acreages were low, intensive winter feeding was not possible unless large quantities of cake and grain were brought on to the farm. But green crop values, though rising to a degree, remained essentially low on the clays. Mangolds made some headway, but in the late 1870's extensive root cropping was still as rare on most true clays as bare fallowing was frequent.¹ The general deficiency was not made up by artificial feeding.

Morton concluded his survey of dairy farming in 1878 with the opinion "that on ordinary dairy farms . . . the cows graze in the cow pastures during summer, and as a general rule get nothing else, except perhaps a help with cabbages and clover or vetches brought to them when the grass is short. In winter they get mangolds and hay and perhaps some grains . . . or where they are treated better they may receive decorticated cotton cake and meal, in addition. . ."² Other sources suggest that liberal feeding was indeed exceptional; for example, Carrington provides much indirect evidence that the bulk of corn and cake fed was on mixed rather than pure grassland farms. Sheep were perhaps better cared for than cattle; but on low-lying grass farms where these were overwintered, they often received no supplementary feed until lambing, whereas on light land arable farms abundant root and green crops were fed throughout the winter and ewes received rape, chaff, and cotton cake on the autumn stubbles.³ On mixed arable farms high feeding was spurred by the aim of securing plenty of dung. Pasture farmers felt no such compulsion. In 1872 Thompson considered that grassland management was highly unsatisfactory, with little manuring practised. The standards of grass farming achieved in some parts of Leicestershire, Northamptonshire, Gloucestershire, and Somerset were adjudged "quite exceptional."⁴

There is less evidence about the input of artificial fertilizers. But it was apparently very low on the clays. In North Wiltshire at least they were little used.⁵ Contemporary farm accounts indicate that only on highly cultivated mixed farms were artificials bought regularly or in quantity. Superphosphate

¹ For examples, see J. A. Clarke, 'Practical Agriculture', *J.R.A.S.E.*, 2nd ser., xiv, 1878, pp. 582-620.

² J. C. Morton, 'Dairy Farming', *J.R.A.S.E.*, 2nd ser., xiv, 1878, p. 673.

³ W. T. Carrington, 'Pastoral Husbandry', *J.R.A.S.E.*, 2nd ser., xiv, 1878, pp. 701-18.

⁴ H. S. Thompson, 'On the Management of Grassland', *Journal of the Bath and West of England Soc.*, 3rd ser., iv, 1872, p. 121. 'First class grassland' was defined as capable of producing 20 stone of meat per acre per year without additional feed. Second class grassland was expected to produce the same quantity with the help of additional feeding stuffs. Thompson indicates clearly that grassland on strong clays fell into neither category (p. 124). An Essex farmer doubted whether any acre of meadow in his county "would fatten a bullock."—*F.M.*, Jan. 1876, pp. 70-1.

⁵ *F.M.*, April 1860, p. 292.

and bone meal, which probably comprised the bulk of artificials applied, were most useful for roots—which of course were least grown on the clays. Nitrogenous fertilizers seldom proved valuable on acidic clays unless these had been well limed and chalked. In Surrey at least, chalking and liming had largely died out by 1870 because labour costs were thought prohibitive, while elsewhere chalking was carried out extensively only in areas within easy carting distance of chalk deposits.¹ Nitrate of soda, continuously applied, led to the formation of 'sodium clay' on heavy soils, producing stickiness and lack of tilth. For these reasons the few energetic intensive farmers on the clays preferred cake and feeding grains to produce organic manures rather than applying artificials.

If these inputs remained low on the clays it follows that we need anticipate no dramatic rise in output. It would be wrong to pretend that there was no rise in output where drainage had allowed green crops and roots on to the fallows and where serious efforts had been made to increase livestock production by higher feeding. Writing in 1867, E. P. Squarey duly noted some increase in clayland livestock output, but was forced to admit that in the strong wheat lands neither method nor yield were any improvement on sixty years previously.² Such evidence as is available suggests that eye-catching progress was exceptional. Even where drainage had been effected the subsequent consolidation was often poor. And drainage, which all agreed was a *sine qua non*, had hardly begun to improve clayland agriculture.

II

Even in the 1870's both arable and pastoral claylands were much less intensively farmed than light or mixed soils. Table I compares land use and stocking densities on the heavy clays of East Essex with the medium loams of the Tendring area in the north-east of the county in 1874.

TABLE I³

	Percentage of total cultivated area under				Per 100 acres	
	Corn crops	Roots	Bare fallow	Permanent grass	Sheep	Cattle
East Essex Clays (23,100 acres)	53.7	2.4	9.7	20.2	32.1	5.1
Tendring loams (25,800 acres)	59.4	12.8	1.8	10.9	49.5	5.1

¹ Evershed, *loc. cit.*, p. 4; Clarke, 'Practical Agriculture', *loc. cit.*, p. 625.

² 'On the Farming of the Southern Counties', *Journal of Agriculture*, 3rd ser., III, 1867, p. 57.

³ Parish Agricultural Returns, P.R.C., MAF/68/354.

The clays score low on roots and high on bare fallow, while the total stocking density is higher on the loams notwithstanding that agricultural statistics collected in the summer would favour the specialized summer grazing in the marshes and saltings of the clays against the winter fattening of the loams. Table II compares for 1879 the pastoral clays of the Melksham Union in 'cheese' Wiltshire with the light land arable farming of the Amesbury Union in the chalk country.

TABLE II¹

	<i>Percentage of total cultivated area under</i>		<i>Per 100 acres</i>	
	<i>Permanent pasture</i>	<i>Green crops</i>	<i>Cattle</i>	<i>Sheep</i>
Melksham Union	86.73	2.57	30.25	8.92
Amesbury Union	31.06	18.59	18.0	132.01

Despite a high proportion of pasture, livestock numbers on the Melksham clays, expressed as sheep equivalents, were lower than on the chalk—181 compared with 202 per 100 acres. Some indication of the relative output of cattle from the various farming regions is provided by the breakdown of sales at the London market, 1868–70, given in Table III.

TABLE III²

NUMBERS OF CATTLE SOLD IN THE METROPOLITAN MARKET 1868–70 (BY DISTRICT)

	<i>Jan.–Mar.</i>	<i>April–June</i>	<i>July–Sept.</i>	<i>Oct.–Dec.</i>	<i>Totals</i>
Essex, Cambs., Norfolk, Suffolk	51,130	61,721	3,200	—	116,051
Leics., Lincs., Northants.	4,400	370	74,750	68,070	147,590

These show the falling-off of grassland cattle from the more pastoral East Midlands in the later winter months in favour of the predominantly arable districts of East Anglia. The scale of winter feeding in arable districts is not indicated in the Agricultural Returns, since they were taken in midsummer when arable livestock numbers were at their lowest. On at least some Norfolk

¹ *R.C. Agriculture, 1880–82, Reports of the Assistant Commissioners*, vol. 1, p. 416. The sheep equivalents used are those suggested in C. S. Orwin and S. J. Upfold, 'Farming Equipment and Finance', *J.R.A.S.E.*, LXXXII, 1921, p. 135.

² Monthly Cattle Trade Reports, *F.M.*, 1868–70.

farms cattle numbers in December were four times those in June. In 1877, 86,000 store beasts were brought into the county by rail alone.¹

Few directly comparable estimates of output survive, but even these indicate a pattern. A comparison of Caird's wheat yield estimates for 1850-1 with Clarke's for 1878 suggest, without being conclusive, that the most spectacular advances were made in the predominantly light land counties. Surrey and Hertfordshire yields rose by more than 20 per cent, and in Dorset by almost 40 per cent.² No substantial rise in wheat yields seems to have occurred on the heavy lands of Lincolnshire between 1850 and 1880.³ Morton was quite clear that any advance in Gloucestershire had come on the light arable lands: "it is these whose rents have increased—*they* have given the labourer his wages, and *they* have fed the population. I believe if any one will inquire into the circumstances of the dairy farms of the Vale, they will find no more cheese or butter made per acre now, than was made 40 years ago." Figures from 13 dairy farms in Tortworth and Wickwar parishes collected by his father in 1830 indicated stocking at 23 cows per 100 acres, and he found no more in the 'sixties.⁴ Cheese yields in the Vale of Gloucester in fact remained a stable 3½ cwt per cow over the period 1850-78.⁵ Even in progressive Cheshire the gains are not really established: Caird in 1850 stated that on moderate land cheese yields averaged 3-3½ cwt and on good land up to 4½ cwt, while Morton in 1878 thought 3¾-4 cwt possible only on good farms.⁶

Conversely, the evidence points to a continuing expansion of output on the lighter soils. The process of reclamation still went ahead. In Sussex gorse-covered land was pared and burnt at £2-£3 per acre.⁷ Much chalk downland had been converted to tillage in Dorset during and after the 1850's: "Not many people care to let an old down piece stand, if good for anything, as by proper management it may be made to produce more feed."⁸ Similar

¹ Clarke, 'Practical Agriculture', *loc. cit.*, p. 465. While the categories are somewhat inappropriate, the implication is certainly that the total physical output (i.e. including cereals) of the mixed farming counties was considerably higher than in the more pastoral clayland regions.

² *Ibid.*, pp. 461-2; Caird, 'English Agriculture', *op. cit.*, p. 474.

³ Grigg, *op. cit.*, pp. 189, 192.

⁴ J. C. Morton, 'A Lifetime on the Cotswolds', *Gardeners' Chronicle and Agricultural Gazette*, offprint, c. 1863, p. 7.

⁵ Caird, 'British Agriculture', *op. cit.*, p. 44; Morton, 'Dairy Farming', *loc. cit.*, p. 412.

⁶ Caird, *op. cit.*, p. 218; Morton, *loc. cit.*, p. 411. R. Trow-Smith concluded that no real improvement in average milk yields per cow took place between the late eighteenth and late nineteenth centuries.—*A History of British Livestock Farming, 1700-1900*, 1959, p. 306.

⁷ Evershed, *loc. cit.*, p. 16.

⁸ Joseph Darby, 'The Farming of Dorset', *Journal of the Bath and West of England Soc.*, 3rd ser., IV, 1872, p. 7; see also pp. 6, 14, 34.

if less spectacular activity was reported from Wiltshire, Hampshire, and Berkshire.¹ Reclamation associated with enclosure was carried out over 614,000 acres of the country between 1845 and 1869.²

Husbandry systems on the light lands were intensified and diversified by heavier and more varied fodder cropping assisted by big inputs of artificials and feedingstuffs. This may have been most marked in the hinterland of the east coast ports of entry for bones and oilcake, but it was impressive as far west as Dorset. By 1870 high feeding and heavy artificial manuring had become general on large farms in the centre of that county. By then sheep were being fattened on oilcake rather than sold off lean, while in one district it was estimated that sheep numbers had doubled since 1850. Cattle numbers had risen 50 per cent since the mid-1850's.³ Similar progress was achieved in Berkshire between 1850 and 1860: "Comparatively barren chalk hills, that within the last ten years would hardly produce a turnip larger than an apple, have become, by the application of judicious fertilizers, highly cultivated stock- and corn-producing districts."⁴ On light land farms such increases in output were not secured at the expense of grain producers, quite the contrary. Changes in the same direction, increasing livestock output, were slighter on the clays and more obviously cancelled by losses on the arable side.

III

The price trends of the third quarter of the nineteenth century prompted a greater emphasis on livestock products. Although we believe that this was mainly secured by a changing balance within established mixed farming systems, there were certainly switches into purely grassland farming on the clays. They were nevertheless hardly 'revolutionary' and such as they were, they need explanation not simply in technical terms, on account of drainage plus oilcake and artificials, but in the context of price and cost movements. Gently following the swing of these cannot in this case be said to constitute 'revolution', however one defines that overworked noun.

The demand factor at work was the rise in prices for livestock products relative to cereals. (Table IV.)

The supply factor was the rise in labour costs which up to the Labourers' Revolt was especially marked in the high wage northern and midland counties. (Table V.)

¹ R. Molland, 'Agriculture c. 1793-c. 1870', *V.C.H. Wilts*, iv, 1959, pp. 65-6; *F.M.*, 1870, p. 73; J. B. Spearing, 'On the Agriculture of Berkshire', *J.R.A.S.E.*, xx, 1860, p. 16; A. C. Smith, *Guide to the British and Roman Antiquities . . . round Abury*, 1884, p. iii.

² Orwin and Whetham, *op. cit.*, p. 190.

³ Darby, *loc. cit.*, pp. 5, 8-9, 14, 32-3, 35.

⁴ Spearing, *loc. cit.*, p. 16.

TABLE IV¹

RELATIVE PRICE MOVEMENTS: ARABLE AND LIVESTOCK PRODUCTS 1851-80
(1865-74=100)

	1851-5	1856-60	1861-5	1866-70	1871-5	1876-80	<i>Movement</i> 1871-80 <i>cf.</i> 1851-60
Wheat	103	98	87	100	100	87	- 7%
Barley	82	98	86	101	103	95	+10%
Oats	90	87	87	101	104	96	+ 7%
Beef	77	85	87	94	110	103	+31%
Mutton	80	88	93	93	108	105	+27%
Cheese	75	86	84	102	97	85	+13%
Milk	65	84	82	89	91	111	+36%

TABLE V²

REGIONAL WAGE MOVEMENTS 1850-72
(Average weekly wage of all regions 1850-51=100)

	1850-1	1869-70	1872
Northern counties	130	165	188
Midland counties	104	138	161
Eastern counties	84	114	138
South and South-western counties	83	111	131

These trends favoured livestock production and accounted (together with a climate more amenable to grass growing) for a more positive switch to pastoralism on the northern and western clays than elsewhere. Mainly it was the heaviest land, least profitable under wheat, which moved wholly into grass. This switch in enterprises was often the expedient which followed serious losses of money on cereal production. When it occurred in the drier south and east, it was a movement towards much less intensive farming,

¹ Based on E. H. Whetham, 'Livestock Prices in Britain', A.H.R., XI, 1963, p. 29, Table I; *Report on Wholesale and Retail Prices*, 1903, pp. 70-1, 136-7, 153. The value of wheat output per acre probably fell considerably after 1866 when below-average harvests were not fully compensated by higher prices.—J. P. D. Dunbabin, 'Communications', *Past and Present*, 27, 1964, p. 109.

² Based on wage data in Caird, 'English Agriculture', *op. cit.*, p. 512; W. Hasbach, *A History of the English Agricultural Labourer*, 1920, p. 284.

resorted to after the abrupt rise in labour costs from 1872 and the steeper fall in wheat prices from the mid-1870's.¹ There, it was difficult to grow good grass quickly. Impoverished farmers in any case found it financially difficult to stock grassland; their landowners in the 1870's were no more inclined to promote the change and to back it with adequate livestock housing than they had been to foster drainage twenty years or so before.² Hence, for example, Druce described conditions in Essex as deplorable in 1880, "with some lands altogether derelict and more full of weeds and natural rough grass upon which a few cattle were picking bare living."³ Tumble-down pasture became common on the poorer clays in the later 'seventies.⁴ It was not surprising that many arable farmers regarded a major switch to grassland farming as a retrogressive step in which "the whole procedure of a farm would have to be remodelled and they would have to go back to the primitive days."⁵

However, some positive switch to grass there was, with a rise of sorts in the clayland output of livestock products as a result. What has not been discussed so far are the opportunity costs. Even if it had been paying badly, the conversion of clayland arable to grass meant foregoing the wheat crop. More seriously, the expansion of country dairies on existing clayland grass which followed the cattle plague of 1865-6 in the London cow-houses meant to a large extent foregoing the sale of cheese and butter, and the use of their by-products, in favour of liquid milk. This renders any assertion about a net gain in physical production on the clays at best equivocal.

IV

It remains to reassert that the investment record of the clayland sector during the 1850-80 period was poor. Drainage was the key: too little was done, and since clayland farmers had had no particular opportunity to accumulate capital it was rarely accompanied by the essential concomitants—oilcake and artificial fertilizer. Mixed farming spread only patchily on to the

¹ These difficulties are fully discussed in R. Hunter Pringle, *R.C. Agriculture, 1894-97*, pp. 128-33, and W. T. Carrington, 'The Advantages of Converting Cold Arable Clay into Permanent Pasture', *J.R.A.S.E.*, 2nd ser., xv, 1879. See also *F.M.*, Jan. 1876, pp. 70-1; July 1877, p. 24.

² The costs of conversion could be high and most farmers (and some landowners) considered them to be the landlords' responsibility. Cost estimates varied between £3 and £12 10s. per acre with a general average of £6-£8, spread over three or more years.

³ *R.C. Agriculture, 1880-82, Minutes of Evidence*, vol. III, p. 435.

⁴ Orwin and Whetham, *op. cit.*, p. 246.

⁵ *F.M.*, Feb. 1873, p. 110. Indicatively, in 1863 tenants virtually ignored the Duke of Northumberland's offer to carry the costs of laying heavy arable down to grass.—F. M. L. Thompson, *op. cit.*, p. 255.

clays,¹ but instead was consolidated and most intensified in the light land sector. Hardly surprisingly, the output record of the clayland sector, especially when the opportunity costs are counted, was uninspiring.

There was thus no 'revolution' in technique, merely a series of rather unsatisfactory adaptations to the swings in the market towards livestock production. This did not, as Dr Sturges claims, prepare the clays for the 'Great Depression'. Pringle, Haggard, and Hall saw many of them ranches "prairie fashion" during that period and beyond,² and rents fell farthest after 1880 on the clay soils.³ It was always the mixed farming of the lighter lands which gave the high yields of livestock products. Arthur Young had written of the wet clays in 1770, "such soils must, like others, be cultivated by somebody, but I would advise every friend of mine to have nothing to do with them."⁴ C. S. Read echoed this a century later. His advice to a farmer about to take an out-of-condition heavy land farm was, "Don't!"⁵ Indeed, ever since the middle of the seventeenth century English agriculture had been afflicted by a laggard clayland sector; modern analysis shows that it is with us yet.⁶ The view that the years 1850-80 saw a radical amendment of the position seems to us entirely untenable.

¹ In the physically more favourable districts and also near big towns which supplied ample dung and formed an immediate market.

² Pringle, *op. cit.*, pp. 41, 45-51, 82-3; H. Rider Haggard, *Rural England*, 1902, vol. 1, pp. 99, 129, 409, 470; vol. II, pp. 59, 394, 511-12; A. D. Hall, *A Pilgrimage of British Farming*, 1913, pp. 412-13, 421. A useful summary of evidence, the majority indicating a general trend towards less capital intensive farming, may be found in *R.C. Agriculture, 1896, Alphabetical Digest of Minutes of Evidence*, pp. 42, 45, 69-76, 98-100.

³ In Suffolk, for example, rent reductions by 1881 averaged 15 per cent on light lands and 20-40 per cent on heavy lands.—J. Thirsk and J. Imray, *Suffolk Farming in the 19th Century*, Suffolk Records Society, 1, 1957, p. 30.

⁴ *The Farmers' Guide in Hiring and Stocking Farms*, II, p. 4.

⁵ Reported by W. T. Carrington, *loc. cit.*, p. 493.

⁶ M. H. R. Soper, 'Heavy Land Farming', *Agriculture*, LXVII, 1960, pp. 174-8.