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On the Road Again with Arthur Young
English, Irish and French Agriculture
During the Industrial Revolution

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In the summer of 1767, "some private business carrying (him) to the South of Wales," Arthur Young embarked on what came to be known as his Six Weeks Tour through the Southern Counties of England and Wales (1768) (Young 1771a, Vol. I, p. iii). By way of amusement--so he tells us--Young noted down particulars of farming practice along the way. This was the beginning of what became a grand design to survey the agriculture of the three Kingdoms. A Six Months Tour through the North of England (1771a) and The Farmer's Tour through the East of England (1771b)--each four volumes--quickly followed and rapidly went through several editions. In 1776, 1777, and 1778, Young took three trips to Ireland and in 1780 published the Tour in Ireland. More short tours of British districts followed in the 1780's (Young 1786, 1787, 1789), but Young's interests turned to Europe. He traveled to France three times between 1787 and 1789 with excursions into Catalonia and Italy. The result was the enormously influential Travels...of France (1794).

Young's tours are unique in travel literature because his objective was original. In the late eighteenth century, it was widely believed that national prosperity depended on a productive agriculture. Yet important as agrarian issues were universally believed to be, they were discussed in a factual vacuum. Even the most basic matters like the size of the agricultural sector were unknown in this pre-statistical age. Young aimed to remedy this deficiency by collecting the details of farming in different districts and using those findings to address major questions of agrarian policy. He was aware of the originality of the task:

"Describing the husbandry of the kingdom, by registering minutes on the spot, was a new undertaking, having never been executed either in this or any other country of Europe." He anticipated great benefits as he explained in the Eastern Tour:

I am now come to a part of my undertaking, which I esteem of greater national importance than any other; it is the particulars of farms. From the average of a great number we may certainly be able to calculate with much truth the general state of the whole kingdom; respecting the application, product and value, of the soil; the livestock it carries, and the people it maintains... [T]his method of coming at the real state of the nation, respecting its agriculture, is the only one tolerably sure, and that is not open to an infinity of objections and errors. A book containing these particulars of all the farms in the kingdom, I should esteem the pocket book of a British minister; it would be as useful to study, as it would be tedious to read.

While Young began the Six Weeks Tour without a firm plan for collecting information, by the tour's end he had evolved a questionnaire that he used--in longer and shorter versions--on all his subsequent trips. He kept a register, which he dutifully added to each evening; the published work follows these day-by-day entries closely. Moreover, he also tried hard to build generalizations on this information. Hence, his efforts to compute national income accounts, to compare the productivity and profitability of farming systems, to explain variations in rents and wage rates, and to measure the effects of farm size on productivity.

Young was a man of decided opinion on agrarian issues, and his views gained credibility from these positivistic inquiries. Many historians have done him the honour of erecting their interpretations on the foundation of his opinions, but few

have done him the honour of reanalyzing the information he worked so hard to collect. In view of the paucity of farming data, this neglect is surprising. However, the many criticisms made of him and his methods, during his own lifetime and since, are probably part of the answer. He was routinely accused of being a poor farmer himself, and thus hardly in a position to judge the success of others. His "conversational," often after-dinner, methods of research were attacked, and some of his hobby-horses ridiculed. He was accused of highlighting what was "best" and thus giving a distorted picture of the overall state of agriculture. We will touch on these points again.¹ Yet these objections are surely not the whole explanation for the neglect of the data. A decisive reason, in a precomputer age, is the sheer drudgery of making sense of the bewildering amount of information in the various tours.

Young himself wrestled with that problem, and he was concerned that he had not extracted all the knowledge his data contained. "I want several penetrating political arithmeticians at my elbow," he stated, "to point out the combinations between different, and seemingly distinct circumstances, too many of which will, I fear, escape me." (Young 1771a, Vol. III, p. 378) In this paper we make a start at that task by using Young's data to reexamine his judgments on the agricultures of Ireland, England, and France.

Many indicators could be used to gauge productivity--yield

¹Meanwhile see Mingay (1975, pp. 3-4).

per acre, output per worker, real rent, total output relative to total input. In this paper we concentrate on yields for three reasons. First, it is the only measure that Young collected on all his tours.² Second, yields measure the biological efficiency of corn cultivation, if not overall economic efficiency.³ Third, yields are critical in resolving several long standing disputes. In England, the critics of enclosure argued that it led to the conversion of arable to pasture, thereby reducing corn production. The defenders of enclosure countered that it boosted yields so output was maintained in spite of any reduction in tilled acreage. For Ireland, the level and rate of growth of yields between 1770 and 1846 is central for deciding whether food production kept pace with population. For France, the issue of when--or whether--an agricultural revolution occurred has revolved around the history of yields. For these reasons, historians have used grain yields as a measure of agricultural

²Young also collected considerable information on land values, and it is conceivable that they might shed light on total factor productivity. However, Young (1794, II, pp. 120-3) doubted that the numbers measured the economic rent of land.

³Griliches (1968, Vol. I, p. 242) maintained that in the twentieth century yields have depended on factors like seed variety, fertilization, and soil moisture. Mechanization and intensity of cultivation have been unimportant in raising yields. Chorley (1981) explained the growth of yields in eighteenth and nineteenth century Europe in terms of cropping changes that raised soil nitrogen. Parker and Klein (1966) explained the growth in nineteenth century American yields in terms of chemical inventions and (in contrast to Griliches) new mechanical equipment.

productivity in the past.⁴ We do likewise. Our focus is comparative; however, we also take the chance to look forward from Young into the nineteenth century. Building on Young's data, rather than his opinions, we reassess European agriculture during the industrial revolution.

We begin with Young in England. There "improvement" was his theme, and he firmly believed that enclosure was its prerequisite. Yet the data in his tours show enclosure had little effect on yields. Moreover, comparing Young's yields with earlier and later ones suggests that by this criterion his age was notably stagnant in the history of productivity growth in English farming.

Next we follow Young to Ireland. He concluded that Irish farming was much less productive than English. In this, he was the first of a long line of commentators and historians who have portrayed rural Ireland in the century before 1846 as unproductive, overpopulated, and inevitably headed for the Great Famine. Yet Young's data suggest a radically different interpretation, for they show Irish farming in the 1770's to have been scarcely less productive in terms of yields than English farming.

Finally, we travel with Young to France. There is irony there too, since Young's yield figures per se make much of France

⁴For instance, Bennett (1937), Bourke (1969), Campbell (1983), Chorley (1981), Clout (1980), Fussell (1929), Holderness (1978), Morineau (1968, 1970, 1974), Newell (1973), Overton (1979), Slicher van Bath (1963), Titow (1972), Turner (1982), Yelling (1977).

look relatively advanced, despite his repeated, not to say tedious, castigations of farming practice across the Channel. We show why some of Young's data here are likely to be misleading and make a case for using his yield-seed ratios instead. Nonetheless, the conclusion is inescapable that northeastern France, if not the rest of the country, compares much more favourably with England and Ireland than Young allowed.

Finally, we speculate on the gap between Young's statistical evidence and the conclusions apparently founded on it. Why was Young misled? Why have the contradictions not been spotted by historians before? Why were Young's findings both popular and false?

1. English farming

It is as a proponent of the enclosure of open fields that Arthur Young is best remembered today. In a famous passage written late in his life, Young contrasted "the Goths and Vandals of open fields" with "the civilization of enclosures." (Young, 1813, pp. 35-6.) The theme that enclosure led to productivity growth runs throughout his writings. His favourite evidence for this claim was the rise in rent that followed enclosure.⁵

The great rise in rent which has taken place in nineteen cases out of twenty should alone be accepted

⁵In the modern literature, McCloskey (1972) has advocated the use of rents to measure efficiency gains at enclosure. Allen (1982) analyzes the farm reports collected by Young in his English tours and finds that rents rose at enclosure because income was transferred from farmers to landlords, not because productivity went up. See also Yelling (1977, pp. 210-3.)

as a sufficient proof of this point [i.e. the higher productivity of enclosed farming], for what can be the inducement to the farmer to give double or treble his former rent unless with a view to the profit of his business. And how is he to increase his profit without increasing the value of his produce? (Young 1808, pp. 37-8, as quoted by Yelling 1977, p. 210.)

The obvious retort to this is that a reduction in employment would raise a farmer's profits, thereby allowing a higher rent to be paid "without increasing the value of his product." Indeed, a big enough fall in labour costs--say from converting arable to pasture--could allow rents to rise even as the value of agricultural output fell. Technical advance to be sure, but not "improvement" that increased England's food supply. A concern with grain production or productivity in its own right requires a comparison of yields--not rents--in open and enclosed villages.

Young never made the comparison, yet his tours include the yield information needed to do it. The summary tables in the Northern and Eastern Tours are incomplete, so new summaries have been abstracted from all of the village reports in the volumes. The information is available for 231 villages scattered from Northumberland to Hampshire and Somerset to East Anglia.⁶ Average yields by counties are shown in Appendix Table 1. To compare open and enclosed farming, it was necessary to determine which villages were open and which enclosed, and that has been done for most of the 231. Table 1 compares average yields for

⁶The general character of these data is described in Allen (1982). While that paper concentrated on the analysis of the data relating to farms, this paper analyzes a broader sample of villages.

the principal field crops.⁷ In every case the table shows a higher average yield for enclosed than for open villages. However the differences are never statistically significant and the percentage differences in the means are quite small. (Curiously, the small number of "partly open" villages had the lowest yields.)

Before accepting the conclusion that enclosure had only a small effect on yields, we must satisfy ourselves as to the reliability of Young's data. Though he was the best known agricultural writer of his generation, Young's reputation as an expert has never gone unquestioned. To a condescending contemporary, he was "particularly interesting to those who studied agriculture for amusement and recreation" (Gazely, 1973, p. 196) to agricultural historian Eric Kerridge, "a mountibank, charlatan, and a scribbler" (quoted in Mingay, 1975: 3). But Young's most trenchant contemporary critic was William Marshall, also an agricultural writer. In the latter's Review and Abstract, Young's methods of amassing and assessing information are repeatedly ridiculed. To Marshall, Young surveyed like "an enquiring tourist," relying

not so much (on) the results of the deliberate examinations of the author, on the spot; as the remarks of others, in conversation--many of them, no doubt, the bare assertions of guarded, or perchance designing men; others, the mere opinions of the prejudiced; the incoherencies of the unintelligent; or, possibly, the extempore answers of those who could scarcely have put

⁷Throughout national yield averages have been computed as unweighted arithmetic means of the county data. The absence of county acreage data left no other option.

the enquirer into the right road to the next market town. (Marshall, 1808-1817, vol. III, pp. 65-6. See also Vol. III, pp. 358, 491-2, and Vol. IV, pp. 456-460.)

There are two approaches to assessing a charge like this.

The first is to examine the survey procedure. The reliability of any survey depends on the competence of the enumerator and the knowledge of those queried. Was Young as slipshod a reporter and his informants as ignorant as Marshall claimed?

Young's description of his method does not bear out Marshall's accusations. Young worked hard to distinguish informed observation from vacuous speculation. He was well aware of the need to cross question his informants to obtain accurate information.

For many miles, I had nothing but provincial weights and measures, totally unknown in the south: These were all reduced to the common standard;--the intelligence I received in the most common points was conceived in such uncommon terms, and in such barbarous measures, that had I not gained numerous explanations, my work would have been a volume of contradictions. A practical knowledge of agriculture, is as requisite to such an undertaking as plenty of patience. After abundance of explanations, I frequently had such intelligence as would have passed current with those who were unexperienced in husbandry, but which forced me to a most uncommon attention to discover wherein was the mistake. My business was likewise so very unusual, that some art was requisite to gain intelligence from many farmers, &c. who were startled at the first attack. I found that even a profusion of expense was often necessary to gain the ends I had in view: I was forced to make more than one honest farmer half drunk, before I could get sober, unprejudiced intelligence. Nor were such my only difficulties; I met with some farmers who gave me accounts too improbable to credit; whether from ignorance, or an attention to deceive, I know not; but I always repeated my enquiries upon those occasions, until I gained the truth. (Young, 1771a, Vol. I, pp. x11-x111)

These remarks hardly suggest a casual approach to collecting data; they read more like a manual for an agricultural survey in a third world country today.

If Young was reliable as a questioner, what of the people he interviewed? We know a good deal about them. The modest success of the Six Weeks Tour prompted Young and his publisher to try something more ambitious. And so Young, then relatively unknown and still in his late twenties, accordingly placed notices in the northern press, announcing that the author of the Six Weeks Tour would visit the area and

beg[ing] leave to request such of the nobility, gentry, landlords, farmers, and others, as possess, or are acquainted with, any particular improvements, experiments, customs, implements, etc. in (those) counties,...,to inform him of such circumstances, with exact directions to the places where such improvements, etc. are carried on. (Young, 1771a, Vol. I, p. iv.)

This appeal elicited no response, but Young proceeded north anyway. Gaps in the early part of his register are "not to be laid to (his) account; but to those who could have given me better intelligence, but neglected or slighted the undertaking." However, Young's luck changed in York, where many of the gentry were congregated for race-week. He was invited to many estates. The gentry themselves provided much information, but they were especially valuable in having their bailiffs arrange interviews with their tenant farmers. Under the circumstances, the farmers were more cooperative than those Young approached on his own early in the tour. The completeness of his information rises dramatically after York.

The Northern Tour was an immediate success and quickly went into a second edition. Young's reputation rose sharply so that he was hospitably received by the landed classes throughout his next trip. As a result, he was able to continue the interview techniques he had developed in the North, so the Eastern Tour contains essentially comparable material.

If Young had relied only on the accounts that improving landlords gave him of their own methods, then his tours would be useless in judging average productivity. But he was always aware of the difference between best practice and average practice and specifically inquired after the latter. The lion's share of his attention was devoted to "general husbandry," the ordinary farmers whom he refers to throughout as "they." "They plough four times for wheat;" "they usually rear by turning cow and calf to grass together;" "they sow seven bushels and gain eight quarters in return." (Young, 1771b, Vol. I, pp. 3, 82, 165.) His questioning of common farmers ensured he received much information on typical methods and results. Therefore, Young's informants, as a whole, appear a reliable basis for assessing English productivity. Marshall's "no doubt" sounds like sour grapes from a man piqued at the hospitality extended to his rival.

A second way to judge the reliability of Young's information is to compare it with other, contemporaneous material. Between Young's tours and the middle of the nineteenth century, there were five enquiries that provide wide ranging information on

English grain yields. They were: the official inquiries of 1795, 1800, and 1801, the county reports conducted under the direction of the Board of Agriculture between 1790 and about 1810, and the findings of James Caird (1852, p. 474) in his tour of British farming districts. The first set of data have been most usefully collated by Turner. We extracted the second from William Marshall's summary of the Board of Agriculture surveys and, where necessary, from the original county reports. Caird produced a summary table for wheat only, but county data on barley and oats are scattered throughout his book.

These sources present several difficulties of interpretation. The official inquiries collected returns for some specific years (including some of extremely good and bad harvests) as well as estimates of "average" yields. Since that is what concerns us, we confine our discussion to the 1795 return for an "average" year and the return for 1800 (said to be about average). Most commentaries on British grain yields have relied on McCulloch's (1837, Vol. I, p. 482) putative extraction of the figures from the Board of Agriculture reports.⁸ However, it has been impossible to duplicate his table--Where, for instance, did he find all those potato yields?--so we have constructed new averages, relying mainly on Marshall's Review and Abstract and consulting the original reports in ambiguous cases. Our national averages do not differ dramatically from McCulloch's, but ours conform a bit more to the other sources. All together, we have

⁸Most influentially Fussell (1929, p. 109, n. 35).

five estimates for English grain yields between c. 1770 and c. 1850.

How do Young's yields compare to the later ones? If we begin with the "average 1790's" figure, the 1800 return, and the Board of Agriculture average, Young is clearly not far out of line. In fact, the discordant return is always the "average 1790's," which is consistently lower than the others. Turner (1982, pp. 502-3, 494) was disturbed that this average was less than the 1800 return. He noted that some returning officers believed that farmers had understated their yields. Our results reinforce that concern and suggest the "average 1790's" figure is the least reliable. Not too much should be made of this, however, since the standard errors applying to all these means are several bushels per acre, so the statistical hypothesis that the means for each crop are equal across the four samples cannot be rejected. The high standard errors are a measure of the weakness of all the data and a reminder that not too much should be read into differences of a few bushels.

Table 2 is a useful corrective to persistent fears that Young's yields were too high (e.g. Bennett 1937). Discarding the "average 1790's" return throughout as an underestimate, we see for wheat that Young's return is 5% greater than the Board of Agriculture average and 10% above the 1800 average. For barley, Young's average is lower than the Board of Agriculture average and almost identical to the 1800 return. For oats, again, Young is a bit higher than the 1800 or Board of Agriculture means, but

the excess is less than for wheat. Given the large standard errors of all of these numbers, the most reasonable conclusion is that English grain yields did not change much between the time of Young's tours and the Board of Agriculture reports.

Table 2 also shows that Caird's c. 1850 yields are consistently higher than the earlier yields for all crops. The implication that yields increased in the first half of the nineteenth century is confirmed by the Healy-Jones series of wheat yields between 1815 and 1859. (Jones 1974, pp. 184-190.) By its construction, this series overstates yields actually reaped, but it is reliable in establishing the upward trend.

Young's yields also invite comparison with earlier returns. Monastic accounts record yields for many demesnes in southern England from the thirteenth to the fifteenth century. These records suggest that wheat and oats yielded, in round numbers, about 10 bushels per acre, while barley yielded up to fifty percent more.⁹ Table 2 shows that crop yields had about doubled in England sometime between the middle ages and the late eighteenth century.

⁹Thus, for instance, Titow's (1972, pp. 121-135) summary of the yields of forty manors of the Bishop of Winchester between 1209 and 1349 showed wheat yielding 10.7 bushels per acre, barley 16.8 bushels, and oats 11.7 bushels. (Titow's figures have been divided by .9 to compensate for the tithe. (Titow 1972, p. 8.) Farmer (1977) reports yield-seed ratios for the same manors in the fifteenth century, and those ratios are scarcely different from the ones Titow reports. Brandon (1972, p. 417) reports similar numbers for some Sussex manors. See Slicher van Bath (1963) summarizes yield-seed ratios for all English records in print when he wrote. Again those ratios are fully consistent with the argument of this paper. The only discordant finding is the high yields in some East Norfolk manors recently discussed by Campbell (1983).

teenth century. Since the difference between open and enclosed yields in Table 1 is small compared to the total advance, it is clear that enclosure made little contribution to this aspect of the English agricultural revolution.

When did the increase in yields occur? Fussell (1929, p. 111) combed contemporary farming books to discover what informed observers believed were typical crop yields. For the early eighteenth century the consensus was twenty bushels per acre for wheat. Turner (1982) and Overton (1984) have recently challenged this conclusion as too high, but it has received strong support from a recent analysis of probate inventories. (Allen 1986.) This investigation established that most of the growth of wheat yields in the south midlands was accomplished by open field farmers in the seventeenth century. The Goths and Vandals were certainly busy in those years! However, by the early eighteenth century, productivity growth, as measured by grain yields, seems to have ceased, to resume only in the first half of the nineteenth century.

The information that Turner (1982) has recently abstracted from the 1801 crop returns also allows open and enclosed yields to be compared. He found that the yield of wheat in enclosed villages was 26.4% higher than in open villages. The differential was 21.4% for barley and 25.5% for oats. These increments are considerably larger than those implied by Young's data. Which source is more reliable? It is not obvious that the 1801 yields should be preferred to Young's. 1801 was an exceptional

year. As disturbing, it is not clear whether all the reports refer to 1801 or to an "average" year. There is an unknown selection bias in that the yields were not called for but were voluntarily returned as supplemental information under "General Remarks." In any event, the reporting was done by parish clergy. What were their motives and biases? Were they as assiduous as Young? Moreover, the 1801 comparisons do not square with other data summarized by Turner. He compared "average 1790's" yields in open and enclosed villages in Northamptonshire and found only modest differences for wheat and barley, the main crops.

Whatever the ultimate resolution of that matter, two things are clear. Based on the evidence of his tours, Young was incorrect in his view that enclosure radically raised efficiency. Moreover, he was also wrong in believing that he lived in an age of improvement, at least as far as grain yields are concerned. For his yield data imply that the late eighteenth century was an age of stasis.

2. Ireland

"In the management of arable ground," declared Young in 1780, "the Irish are five centuries behind the best cultivated the English counties." Young's claim was echoed repeatedly in the decades before the Great Famine, both by outside observers and by those seeking to impress English notions of "improvement" on Irish farmers and landowners. Histories of the period which

seek to "predict" or "explain" the Great Famine also repeat the spirit of Young's condemnation. These accounts tend to highlight the abject poverty of the cottier-labourer--a poverty often put down to sloth and compounded by agrarian violence--and the notion that an inefficient system of land tenure led to low and stagnant productivity. Government Blue Books--especially the evidence presented to the Devon (1842-5) and Poor Inquiry Commissioners (1835-6)--and the accounts of travellers such as Kohl and de Beaumont provide plenty of support for such arguments.¹⁰

Yet there has always been scope for another assessment of Irish farming. Accounts of improved livestock breeds and farm equipment abound in statistical and topographical surveys of the day. Moreover, some simple political arithmetic comparing the rise in population and exports suggests that production increased. After all, between the Union and the Famine Ireland's population rose from five to 8.5 million, while exports grew from small beginnings to providing the sustenance of one-tenth of Britain's population (Thomas 1985). These shipments amounted to about one third of Irish output. Irish farmers must have done a great deal to prevent the Law of Diminishing ^{Marginal} Returns from asserting itself.

This conclusion gains credibility from recent attempts to measure the growth in total factor productivity in Irish and

¹⁰Compare O'Brien (1921, pp. 27-128) and Green (1956, pp. 89-128).

English agriculture. In Ireland in the half century before the Famine, capital accumulation and technical change were adding a half to one percent annually to productivity. (O Grada, forthcoming, chapter 2; see also Solar 1983.) Recently, Crafts (1985 p. 160) found that capital accumulation and technical change increased the productivity of English farming 0.42 percent annually in 1760-1800 and 1.27 percent in 1820-1840. By the English yardstick, the Irish were doing quite well.

This result is suggestive but not definitive. Another, important way to judge the performance of Irish agriculture is to assemble contemporary evidence on grain yields and use the to measure productivity growth before the Famine and to compare Irish with English levels of efficiency.¹¹ For England our sources provide yield estimates for c. 1770, c. 1800, and c. 1850. Irish sources are available for the same periods. Arthur Young provides a window on the 1770's in his Tour of Ireland. The early nineteenth century is dealt with by two sources: several of the county surveys produced for the Dublin Society between 1801 and 1824 (and inspired by the English Board of Agriculture reports) provide yield data, as does Wakefield in his Ireland: Statistical and Political (1812). The official Agricultural Statistics begin in 1847 and report yields at midcentury. Presumably yields for grains in the late 1840's (but of course not potatoes) are similar to levels immediately prior

¹¹For an earlier assessment of Irish grain yields before 1845, see Bourke (1969, pp. 26-39). However, Bourke largely eschews comparisons across countries and over time.

to the Famine.¹²

We must question the reliability of these data, just as we did for England. Similar doubts surround Young's Irish reports as surround his English reports. Despite the claim that "he spent the best part of three years in Ireland" (Mingay, 1975, p. 6), the Irish Tour is based mainly on data collected during a whistle-stop tour in the summer of 1776. In many respects the Tour is inevitably superficial. In his haste to cover lots of ground, Young spent most of his time with the gentlemen who entertained him. The reaction of Robert Fraser, who surveyed Wexford for the Dublin Society in 1807 and was particularly upset by Young's appraisal of that county, is perhaps apposite:

It is, indeed, of little moment to notice anything, that is said by a man, who, professing he had a great desire to visit these baronies, of which he had heard so much, passed through them in part of a day, and left them the next morning at an early hour. (Fraser, 1807, p. 56).

Young's itinerary immediately recalls Marshall's charge that he merely recorded idle, after dinner conversation. By the time Young visited Ireland he was a national figure,¹³ and his

¹²Another source is the parish yield data in the Ordnance Survey memoirs for the 1830's. Available for Ulster counties only, these data are often ambiguous in terms of the measurement units used. However, omitting unclear cases yields a 34-parish average of 37.0 bushels for oats and a 31-parish average of 26.6 bushels for wheat. We are grateful to Liam Kennedy of Queen's University, Belfast, for sharing his O.S.M. data with us.

¹³A condensed single volume version of the first and second tours had been produced by John Wynn Baker for the Dublin Society in 1771. This abridgement of the Six Weeks, and Six Months Tour of Arthur Young, Esq. was aimed at "the common farmer of Ireland," and three thousand copies were printed.

informants came from far up the social scale. He sought and received letters of introduction from, inter alia, Edmund Burke and Lord Shelbourne. In Dublin he was immediately taken charge of by Col. Burton, the Viceroy's aide-de-camp, and thereafter steered from the home of one grandee to the next. (Gazley, 1973 pp. 96-100.) The hospitality of the Irish gentry and nobility at this time was legendary. (Cullen, 1981, pp. 172-192.) Young was hosted by Lord Chief Baron Foster, Lord Courtown, Archbishop Robinson, the Earl of Ross, Sir James Caldwell, Sir Lucius O'Brien, the Earl of Shannon, Mr. Herbert of Muckcross, the Earl of Clanwilliam, and many others. Only rarely was he forced back on his own resources for accommodation. When "Mr. Lowther to whom (he) had a letter, not being at home (he) was forced to take refuge in a cabin, called an inn at Rathoath" (Young, 1925, p. 32). "Preserve me Fates from such another!" he remarked. (Also Young, 1892, Vol. I, p. 85).

Had this been Young's first tour, the result might have been meaningless as an indicator of the average level of productivity. But by 1776 Young was experienced and was clear in his own mind on the information he sought. Most of his hosts seem to have had an interest in farming. He was an industrious reporter of facts about Irish agriculture and was careful to distinguish between improvers and the general run of farmers. The format of the reporting closely follows that of the English tours. He was at pains to record average crop yields, and his numbers for the most part do not reflect the experience of individual "improv-

ers." Young's findings certainly deserve a careful look.¹⁴

The same is true of the Dublin Society reports and Wakefield's Ireland. These sources probably suffer from the same limitations as the corresponding English sources. The yields derived from the Dublin Society reports are again no more than ~~the~~ estimates. The quality of the reports varies, although those which record yields tend to be more carefully written in other respects. The best---those by Dutton, Dubourdieu, Fraser, Sampson, and Tighe---are excellent examples of the genre. Wakefield's somewhat idiosyncratic survey took far more work than Young's. It overlaps with the Dublin Society's in time. However, more of Wakefield's numbers may reflect "best practice" farming than the other sources we use. Still, they should not be discarded out of hand.

Appendix Table 2 shows the average yields for each county computed from Young, the Dublin Society, Wakefield, and the average of the official returns for 1847-53. As with the English data, there is considerable variation which shows the quality to be imperfect. Table 3 shows the national averages along with Bourke's "best estimates" for the early 1840's.

(Bourke 1969, p. 27.)

¹⁴It is worth noting that French writers have generally been impressed with Young's Irish inquiry. When C. Millon produced in 1800 a work "qui fasse connaitre d'une maniere satisfaisante l'Irlande," it was a translation of Part II of Young's Irish Tour. Young's reputation was a "sure guarantee" of success; "nothing escaped his inquiries." See (1931, 1976 ed, p. 27n) suggests rightly in our view that Young's knowledge of Irish agriculture was "plus precise et plus exacte."

The table contradicts Young's claim that the Irish were five hundred years behind the English. Comparing Tables 2 and 3 show that Irish wheat and oats yields in the 1770's were slightly lower than English yields, while Irish barley yields were indeed higher. The differences are small compared to the gap between eighteenth century and medieval England. The results derived from the Dublin Society reports and Wakefield are in agreement (although Wakefield tends to be higher) and imply yields comparable to England's at the beginning of the nineteenth century. Finally, though Irish yield growth seems to have faltered in the immediate pre-famine period, it still seems that between Young's time and mid-century productivity growth in both countries was roughly comparable.¹⁵

The history of crop yields thus shows Irish farming to have been much more productive than Young and many other observers concluded. Why did they come to other conclusions? The immediate answer is that, some enthusiasts aside, the Irish did not use the new crops (in particular clover and turnips) that were diffusing through England. Young and others took their neglect as the indicator of agricultural backwardness.

But the relative neglect of clover and turnips was probably sensible under Irish conditions. After all, the potato was doing for Irish agriculture what the turnip did for English--and

¹⁵Even Bourke's (1969, p. 27) more conservative assessment reflecting a belief that the reduction in acreage during the Famine boosted yields--still implies progress between Young's time and 1845.

more. Besides its role as fodder crop and soil cleanser, it provided a healthy diet for the poor. In this sense, the potato, far from characterizing a separate, antediluvian system of farming, was part of Ireland's agricultural revolution. As for artificial grasses, their slow diffusion in Ireland was almost certainly related to climate and soil. Let Fraser and Dubordieu, Dublin society writers on counties Wicklow and Down explain:

In this county, like many other parts of the island, they trust so much to the natural disposition of the soil to produce grass, that they are at no pains to improve it. The inclosed pasture is chiefly natural grass, arising on worn out arable fields, on which according to their expression, they have left it to God Almighty to sow the seeds; some meadows there are, which have never been ploughed. (Fraser, 1801, p. 178.)

While we are celebrating the fertility of our isle, let us not ungratefully pass by the white clover (*trifolius repens*), the never failing attendant on good farming, and which, in despite of the very worst management, often clothes, in winter, our fields with green, or in summer enamels them with its favourite flowers. (Dubordieu, 1801, p. 137.)

In the circumstances, why should Irish farmers have wasted their time and money sowing clover?

3. Young on France

What of Young on France? His Travels...of France remains his best-known work, though it is probably remembered more nowadays for its account of the Revolution than its research of agriculture. Nevertheless, the Travels, like the Tours, is mainly a book about farming. While Young is sometimes reproached for superficiality (Bourde 1967: III, 1653-4), historians

(e.g. Clout 1980, Morineau 1970, Bourde 1953, Sexauer 1976) quote him repeatedly as an authority on French agriculture.¹⁶ According to Lord Ernle (1927, p. 206), discussion in France "always centred round his name...France has made an adopted child of Arthur Young."

A comparison of the English, Irish, and French tours suggests that, at least as far as yields are concerned, Young had much more trouble in finding the kind of information he wanted in France. His difficulties were a result of the change in the nature of his informants. His first travel book, the Six Weeks Tour, was written "as an amusement on the road." When he hit his stride in the Northern and Eastern tours, Young relied on interviews with farmers for his material. His connections with the gentry were critical in arranging those interviews, and the list of acknowledgements in the Eastern Tour reads like a Who's Who of the farmers and landowners of the region. (Young 1771b, Vol I, pp. xxvii-xlvii.) In Ireland, Young's informants came from farther up the social scale: instead of relying on progressive capitalist tenants, who were relatively thin on the ground, he was feted, entertained, and informed mainly by the nobility and the very rich, who nevertheless provided him with the data he need.

In France, however--and we think this is important--he relied mainly on his own resources, travelling alone or with

¹⁶See also See's (1931) balanced appraisal in his introduction to the first complete translation of the Travels, Voyages en France, Vol. I, 1976 edition, pp. 15-35.

friends, and generally staying in wretched inns. (Gazley, 1973, pp. 177, 203-4, 206, 208, 214, 221, 234, 239.) His agricultural researches reflected the change. Thus we see him reporting yields as a result of "the measure I took with my eye" or walks along fields, with no consideration for how typical the summers of his trip were. (Young 1794, Vol. II, pp. 45, 56, 76.) In England and Ireland, the problem of weights and measures was relatively minor or dealt for him by his hosts. By contrast, Young spent five pages of his chapter on "Produce - Rent - Price" in his Travels on the "infinite perplexity" of French measures, before warning the reader that "after all my labour, it would be a want of candour were I to offer the result...as correct." (Young 1794, pp. 43-6.) In addition, though Young's command of French was passable, the panoply of dialects and regional languages then spoken in the hexagon can only have added to his confusion. (Cf. Weber 1977.)

Nevertheless he tried his best to estimate corn yields on his first two trips. It was a constant struggle.

At La Fere re-enter Picardy, but do not here meet with the arpent of the province. The measure eighty verge of twenty-two feet, 38,720 [square] feet. Variations of measure now occur at almost every town. At St. Quintin they reckon by the septier of land being eighty verge of twenty-four feet, 46,080 [square] feet...

We quoted earlier from the Preface to the Northern Tour where Young explained how "a practical knowledge of agriculture is as requisite to such an undertaking as plenty of patience." Now we can see him putting his practical knowledge to work in trying to test the "intelligence" he received about French

weights and measures.

At La Belle Angloise the rent is three septiers of wheat per septier of land... On a farm of eight hundred septiers thirty-five horses are kept; on another, of four hundred septiers there are twenty. This evidently makes the measure about an arpent, as well as the price noted above, and agrees also with the produce; hence the St. Quintin measure continues here of 46,080 [square] feet,--but the septier of wheat cannot be the quantity of seed for a septier of land... (Young, p. 55.)

His difficulties increased as he entered French Flanders.

In the way from Cambray to Valenciennes, enter this celebrated province, which, among the French themselves, has the reputation of being the best cultivated in the kingdom. The difficulties, however, of gaining intelligence increased every step, for not one farmer in twenty speaks French; and all the way to Valenciennes, the confusion of measures, both of land and corn, makes the utmost circumspection necessary. The manco of land is sown with the manco of seed wheat, which weights 80 lb. being one-third of a Paris septier; the present price is 7 liv. 10s.--and of a sack 22 liv. 10 s. If they sow as we do, which, from their earliness, and the appearance of the young plant, I believe they do, this makes the manco two-thirds of an acre, which agrees very well with the measure I took by my eye of a piece, which I was informed contained six mancos of land, the rent I was informed, was five to seven mancos of the corn produced, or the value per manco of land, six will be 480 lb. of wheat, or two sacks 45 liv.; add two sacks of oats at 5-1/2 liv. it is 56 liv. for three years, or 18 liv. rent per manco, which agrees well enough with the quality of the soil, and other circumstances of the country... (Young, pp. 55-6.)

These excerpts show an active mind at work. We quote them at length to dispel any lingering claims that Young was credulous or superficial in collecting his data.

He made three trips through France, and on his third--and longest--trip, he changed his reporting in an important way. While still noting yields per acre, he also frequently reported

that easier number, the yield-seed ratio. This change may have reflected frustration at the units of measure. "At Avignon, we meet with the same difficulty in discovering the measure of land accurately as at Montilimart. I must therefore take the seed for my guide here also." (Young 1794, Vol. II, p. 92.) Too much cannot be made of this, however, since he did work out bushels per acre at Montilimart and continued to do so despite the difficulties. It is more likely that his use of yield-seed ratios was a concession to the usual idiom for discussing productivity. Thus, "at Marseilles, the celebrated Abbe Raynal assured me, that he had been informed by many agriculturalists, who well know France, that the whole kingdom does not produce more than 4-1/2 for one of the seed, on an average." (Young 1794, Vol. II, p. 93.) To get an overall view of productivity, he had to rely on this sort of testimony much more on his third trip than he had to on his first two. The first trips were mainly in northeastern France where the land was uniformly fertile, so that he could reasonably expect that the yields he sampled were representative of the whole region. His last trip, especially, was in less fertile districts. Moreover, he travelled the main roads that followed river valleys where the land was more productive than the districts as a whole. So, while he could directly ascertain yields there, he had to rely on the testimony of others for yields in the hinterlands. And those assessments were given in terms of yield-seed ratios.

In sum, Young gives us two estimates of yields for France--

yields per acre and yield-seed ratios. (He retrospectively added yield-seed ratios for districts like northeastern France where he did not collect them on his first tours.) Table 4 shows the yields per acre of wheat implied by the two methods.

In Table 4 we have followed Young's division of the country into soil districts.¹⁷ The first column in Table 4 shows Young's own averages of his yield per acre figures, while the second column reports our averages of his data for the same regions. In these averages we have tried to exclude returns for exceptional good years or rich soils. Our results are broadly similar to Young's. The third column shows the yields implied by multiplying Young's yield-seed ratios by seed rates for the same places reported in the 1837 agricultural inquiry.¹⁸ For the loam district of northeastern France the three estimates are within ten percent of each other and thus concur closely. For the other districts, and especially the mountain, stony, and chalk dis-

¹⁷The loam district includes Picardy, Flanders, Artois, the Isle de France, and parts of Normandy, Alsace, and Auvergne. The heath district includes Brittany, Anjou, and Gascoign. The Mountain district includes Roussillon, Languedoc, Auvergne, Dauphine, and Provence. The stony district includes, Lorraine, Alsace, Franche Comte, and Burgundy. The chalk district includes Sologne, Saintonge, Angoumois, Poitou, Touraine, Sologne, Champagne. Young also distinguished a gravel district and a district of "various loams," but he collected little information about them. Clout (1977, p. 549) has produced a useful map of Young's soil districts with his route superimposed.

¹⁸The seed rates were read off Clout's (1980, p.112) map of the departments where Young recorded yields. Mainly on his third trip, Young (1794, Vol. II, p. 118) reported seed rates for some places in France. The average level of seeding as recorded by Young is consistent with the 1837 inquiry but seed rates do not corresponded very closely place by place.

tricts, the directly measured yields are much higher than the yields implied by the yield-seed ratios. As previously suggested, however, this discrepancy probably reflects the difference between productivity in the valleys, where Young was doing his measuring, and productivity elsewhere. He was explicit about this in the case of the Mountain district. He noted "the great roads lead mostly along vales" and added

another circumstance, in countries where irrigation is well understood, is that the waters of great tracks of mountains being directed over small ones of vallies, to their prodigious improvement, must of necessity add a value to them, which would grossly deceive us, if the slightest general idea was formed from it. (Young, 1794, Vol. II, p. 89.)

He did not forget this admonition when he drew his general conclusions.

The average [rent] thus stated is that of land improved and cultivated, and chiefly vales, in this mountainous district...The product of wheat and rye, proportioned to the seed, rises from four for one, to ten for one, but the latter is in watered vales; such advantages excepted, about four or five for one. (Young 1794, Vol. II, p. 95.)

There is no doubt that the places where Young minuted his yields per acre were in vales and their yield-seed ratios were of the order of ten to one. The difference between that ratio and the overall ratio of five to one accounts for the difference between the directly measured yields and those implied by the yield-seed ratios in Table 4. Quite likely the same fact accounts for the differences in the other districts. Thus, in summarizing the heath district, Young (1794, Vol. II, p. 88) noted "that the cultivated and improved lands, or those naturally rich and good,

have been here in contemplation."¹⁹

How do these numbers compare to other information we have about grain productivity? We can compare Young's yields with those returned annually beginning in 1815 in the Récoltes des cereales et pommes de terre, 1815-1876. The Récoltes returns are on a departmental basis. Table 4 shows the average yield in 1815-6 for the departments Young reported on a generation earlier.²⁰ The Récoltes yields for the mountain, stony, and chalk districts are not too different from those implied by Young's yield-seed ratios, but, of course, much lower than his direct estimates of yields. For the loam district, however, the discrepancy with Young's estimates is impressive. Either Young's numbers are too high, or the Récoltes averages are too low, or the productivity of farming in northeastern France was depressed by war damage and dislocation. (Grantham 1978.)

The last column in Table 4, which reports the Récoltes averages for 1850-1 for the departments Young surveyed, raises some important questions about the timing of the agricultural revolution in France. In these comparisons we use the yields implied by Young's yield-seed ratios as being more broadly representative than his directly measured yields. There was a substantial rise in yields in the chalk and stony districts

¹⁹Specklin (1976, Vol. 3, p. 265) noted that Young "n'a vu le pays que le long des routes traversées, et entre elles, principalement dans l'Ouest, il y avait de grands espaces qu'il n'a connus que par oui-dite ou pas du tout."

²⁰In Appendix Table 3, Young's yields and the Récoltes returns are presented for the departments that Young surveyed.

between either 1787-9 or 1815-6 and 1850-1. This finding is consistent with Newell's (1973) chronology and inconsistent with Morineau's (1968, 1970, 1974). However, productivity growth was negligible in the mountain district at the same time. There may have been productivity growth in the heath district, depending on whether Young's implied yields or the Recoltes yields are preferred.

The productivity history of these districts should be seen in comparison with the histories of Ireland and England. Evidently yields in the mountain, stony, and chalk districts were much less than in those countries. The heath district is environmentally similar to much of Ireland. A comparison of yields in the heath district with the Irish yields reported in Table 3 shows Ireland very much more productive. (Indeed, Ireland emerges very well from comparison with France for Irish farmers reaped yields at least as high as French farmers in the more favoured loam district.) All the French districts aside from the loam district had low yields by the standard of international comparison. One can interpret the rise in yields in the heath, stony, and chalk districts in the first half of the nineteenth century as catching up to productivity levels already achieved elsewhere in Europe, but the catching up was far from complete.

The loam district provides the biggest mystery in Table 4. If one accepts the Recoltes yields, there was productivity growth between 1815-16 and 1850-1, but if one accepts Young's yields

there was stasis. The issue is sharpened by comparing yields in the loam district to those in England, which was environmentally similar and much of which was farmed for a long time under a similar open field system. The 1815-6 Récoltes average is significantly below the English wheat yields shown in Table 2, but Young's yields are quite similar. French yields in 1850-1, however, were lower than those reported by Caird. Setting aside the 1815-6 Récoltes figure for the moment, the worst one can fault French farming for is not keeping up with the advance in yields recorded in England in the first half of the nineteenth century. (Cf. O'Brien and Keyder 1978, pp. 125-6.)

And the Récoltes yields probably should be set aside. Gill (1964, p. 158) dismissed the returns as useless. Grantham (1976 p. 313-4) pointed out that the Récoltes could not be replicated during the 1837 agricultural inquiry and suggested that, at most the rapid rise in production from 1815 to 1825 shows recovery from the Napoleonic Wars. The evidence of Young's Travels, which we have suggested was carefully collected, must count as further evidence against interpreting the Récoltes in its early years as evidence of the "normal" level of French yields at the turn of the century.

Whether one accepts Young's findings for northeastern France or the Récoltes yields, Table 4 poses a serious dilemma for the usual stagnationist view of French agricultural history. (Heywood 1981 and Goldsmith 1984.) If the 1815-6 Récoltes yield is accepted, then there was undoubtedly an agricultural revol-

ution in northeastern France in the first half of the nineteenth century. The history of the district conforms to that of the chalk and stony districts, so the revolution was national. Alternatively, if Young's yield estimate for the late 1780's is accepted, there was indeed long term stagnation in the northeast, but at a very high level. Stasis to be sure, but not low productivity!

Where does this leave Arthur Young? He would not like the hypotheses just advanced. He believed France was backward. Rather than comparing the loam district with England, he preferred to compare average yields for France as a whole. But he still seemed troubled that the French, on average, were getting eighteen bushels per acre--even that was too high--and proposed various rationales (Young 1794, Vol. II, pp. 123-126) to denigrate the achievement. As with his dismissal of Irish performance, the judgement was not based so much on crop yields as on the failure to adopt clover and turnips.

The average [yield-seed ratio] may probably be stated at six for one. It is hardly to be conceived by what miserable management they can contrive to get such a wretched produce; but as they are universal fallowists, except on the richest soils, we may consider it as an exact picture of the consequences that flow from this absurd practice. (Young 1794, II, 119.)

4. Conclusion

Arthur Young collected a wealth of data for the economic historian, which, despite its faults, should not be discarded. For England, Ireland, and parts of France, the data are consis-

tent with slightly later, less detailed sources.

In this essay we have focused on crop yields and have emphasized the contradiction between Young's views on agrarian issues and the conclusions supported by his data. This disjunction raises three questions.

First, why did Young misinterpret his own data? There were intellectual barriers in the way, and yet it is hard to believe they were overwhelming. The mass of data in the English tours would have been difficult to analyze in a precomputer age. But Volume IV and part of Volume III of the Northern Tour were devoted to analysis and show that Young was adept at breakdowns and cross tabulations. There was no reason he could not have produced Table 1 of this paper had he thought to or wanted to.

One reason that he did not compute Table 1 is that he preferred other indicators of agricultural efficiency to crop yields. His judgement of agricultural performance generally hinged on whether the farmer was paying a high rent and whether new techniques, particularly clover and turnips, were being used. He condemned English open field farmers, Irish farmers, and French farmers for failing to grow those crops. Certainly, in the case of Irish farmers, the criticism was unfair and inappropriate. Why Young chose high rents and new crops--rather than corn yields--as his productivity measures is an important question.

Second, why were Young's judgments so popular in his age? We must remember the controversies surrounding the English

agricultural revolution. Landlords undoubtedly benefited from enclosures and the amalgamation of farms since rents rose. It was widely believed that labourers and consumers suffered due to declines in employment and increases in bread prices. Young's views were popular with the landed classes since his ideas provided a rationale for "unequal development." In contrast to the critics of enclosure, who pointed to the hardships it caused the poor, Young argued that it was in the public interest since it modernized agriculture. Hence, it was important to show that enclosed farmers grew the new crops, while open field farmers and foreigners did not. Young helped promote the myth that the diffusion of turnips and clover depended on the landed classes, so they deserved the higher rents they got. Moreover, he argued that it was necessary for landlords to push up rents--otherwise the farmers would slack off.

Agriculture forms one of the grand pillars of the riches of the state; improvements in it increase ...income...The rise of rent of 1 s. per acre increases the rental of the lands of England L.1,600,000 a year. Nor should it be considered as a transfer of income from the farmer to the landlord, but as a creation of fresh income. There is scarcely a track of country in the kingdom in which a rise of rent to a certain pitch, (which, by the way, is much higher than generally believed,) is not attended with a corresponding increase of product, but much beyond the proportion. Instances are every where innumerable of farms low rented that have been occupied by none but slovenly, poor, and ruined tenants; whereas the same farms doubled, or trebled in the rent, become the fortunes of succeeding occupiers. There is nothing in this difficult to be accounted for; high rents are an undoubted spur to industry; the farmer who pays much for his land, knows that he must be diligent, or starve. Land of 20s. an acre must yield good crops, or its occupier be ruined...The landlords, who, through a false pride, will not raise [rents], when they easily

might, do an inconceivable prejudice to their country. I will venture to assert, that the man who doubles his rental, benefits the state more than himself. (Young, 1771a, IV, pp. 343-5.)

If it were known that respectable productivity levels could be achieved by peasant farmers in Ireland--or especially by open field peasant farmers in France--then the case against enclosure and capitalist agriculture would have been much stronger. However, with Arthur Young focusing on clover and turnips and writing the reviews of the Irish and the French, there was no fear of that.

These considerations have a bearing on Young's use of his data. No one without a scientific temperament could have written the discussion of the "manco" that we quoted earlier. And yet, no one without an ideological preconception could have stared at Young's table of French wheat yields--the table that shows the loam district producing 25 bushels per acre--and then have written "in England, the average produce of wheat...is twenty-four bushels, which form a vast superiority to eighteen, the produce of France." (Young, 1794, II, pp. 118, 123.) Young's writings are a weaving together of the scientific and the ideological, but close attention allows the threads to be separated. In this paper, we have concentrated on his numerical data, which were collected by the scientific half of his brain, and left aside his opinions and conclusions, which emanated from the ideological half.

Third, why have so many historians instead accepted Young's judgments? There is no mystery why Tory apologists like Lord

Ernle did that. The real puzzle is why Marx and the Marxists did the same. The facts collected by Arthur Young do not support the conclusion that enclosures or capitalist farming caused the growth in English corn yields. That was just landlord ideology in the eighteenth century.

Table 1

English Crop Yields by Enclosure Status
(bushels per acre)

	<u>open</u>	<u>enclosed</u>	<u>partly open</u>	<u>all</u>
wheat	22.6 [54]	24.5 [137]	22.7 [19]	23.8
rye	23.3 [9]	27.2 [33]	19.5 [2]	26.0
barley	31.0 [55]	33.2 [129]	28.6 [19]	32.2
oats	34.5 [41]	38.7 [126]	32.5 [16]	37.2
peas	21.1 [34]	22.7 [81]	20.9 [15]	22.1
beans	27.6 [39]	29.5 [67]	25.1 [12]	28.4

Note: The number of observations is in square brackets. "Partly open" villages contained considerable quantities of both open and enclosed land.

Source: The returns for villages in Young (1771a, 1771b).

Table 2

Estimates of English Grain Yields, c. 1770 - c. 1850
(Bushels per Acre)

	<u>wheat</u>	<u>barley</u>	<u>oats</u>
c. 1770 (Young)	23.83	32.12	36.98
average 1790's	19.11	27.71	27.16
typical c. 1800	21.63	32.02	34.93
1794-1816 (Bd. Ag.)	22.63	32.64	36.1
c. 1850 (Caird)	26.72	39.61	46.43

Source: The "average 1790's" and "typical c. 1800" yields are computed from Turner (1982, pp. 506-510). The remaining means are computed from Appendix Tables 1A, 1B, and 1C.

Table 3

Estimates of Irish Grain Yields, 1770's - 1847/53

(Bushels per Acre)

	<u>wheat</u>	<u>barley</u>	<u>oats</u>
1770's (Young)	21.17	34.70	34.63
1801-24 (Dublin Soc)	22.12	34.69	36.55
c. 1812 (Wakefield)	23.29	39.33	41.39
early 1840s (Bourke)	23.3	39.7	36.4
1847-53 average	24.67	41.03	38.72

Source:

Bourke (1969) and Appendix Tables 2A, 2B, and 2C.

Table 4

French Wheat Yields, 1780's - 1850's

(bushels per acre)

<u>district</u>	Young's <u>own</u>	Young's <u>ours</u>	implied by Young's yield- seed ratio	<u>Recoltes</u> <u>1815-6</u>	<u>Recoltes</u> <u>1850-1</u>
loam	23.5	22.2	21.6	14.5	21.1
heath	19	17.5	14.4	11.1	15.5
mountain	18	20.2	11.0	10.6	12.6
stony	18	17.3	11.2	8.6	15.9
chalk	13.5	15.3	7.7	6.8	13.0

Notes and Sources:

The districts are Young's.

"Young's own" yields are from his summary table in Young (1794, Vol. II, p. 118). We have used the average for "loam, N.E." instead of the average for all loam districts (25 bushels per acre) since all the other data relating to loam in the table come from the northeast.

"Young's ours" are our averages of Young's data, as computed from Appendix Table 3.

"Implied by Young's yield-seed ratios" equal his yield ratios--in descending order by district they are 8, 6, 5, 4, 4.5 (Young 1794, Vol. II, pp. 104-5, 119--multiplied by seed rates collected in the agricultural inquiry of the mid-1830's. These were read off Clout's (1980, p. 112) map for the departments where Young recorded yields.

"Recoltes 1815-6" are average yields for 1815 and 1816 from Recoltes des cereales et des pommes de terre, 1815-1876 for the departments that include the places where Young recorded yields. Likewise for "Recoltes 1850-1." These averages are calculated from Appendix Table 3.

Appendix Table 1A

English Wheat Yields by County
(bushels per acre)

	<u>Young</u>	<u>Board of Agriculture</u>	<u>Caird</u>
Bedford	18.50	20.00	25.00
Berkshire	26.00	26.00	30.00
Buckingham	20.30	21.25	25.00
Cambridge	28.00	24.00	---
Cheshire	25.00	---	28.00
Cumberland	27.33	23.00	27.00
Derby	25.60	---	---
Devon	20.00	---	---
Dorset	19.63	17.00	21.00
Durham	29.00	20.00	16.00
Essex	25.25	24.25	28.00
Gloucester	21.33	---	23.00
Hampshire	24.00	---	30.00
Hertford	23.38	23.00	22.00
Hereford	---	22.00	---
Huntingdon	15.00	20.25	32.00
Kent	31.64	22.00	---
Lancashire	26.75	---	28.00
Leicester	25.33	---	---
Lincoln	22.11	28.00	26.00
Middlesex	30.67	---	---
Norfolk	25.27	24.00	32.00
Northampton	18.33	25.33	28.00
Northumberland	19.78	28.00	30.00
Nottingham	27.50	24.00	32.00
Oxford	23.60	24.00	25.00
Rutland	---	22.75	---
Shropshire	---	21.00	---
Somerset	21.50	---	---
Stafford	23.50	25.00	28.00
Suffolk	25.71	22.00	32.00
Surrey	24.00	---	22.00
Sussex	24.80	22.00	22.00
Warwick	24.00	---	30.00
Westmoreland	13.00	---	---
Wiltshire	25.00	22.00	26.00
Worcester	30.75	15.00	---
Yorkshire	22.43	---	26.67

Note: The figure for Yorkshire for Caird is the simple average of his East, West, and North Riding returns.

Appendix Table 1B

English Barley Yields by County
(bushels per acre)

	<u>Young</u>	Board of <u>Agriculture</u>	<u>Caird</u>
Bedford	26.00	32.00	42.50
Berkshire	34.67	---	44.00
Buckingham	25.90	30.50	32.00
Cambridge	44.00	36.00	---
Cheshire	34.33	---	---
Cumberland	28.33	21.00	---
Derby	39.80	---	---
Devon	30.00	---	32.00
Dorset	25.25	---	32.00
Durham	40.00	35.00	40.00
Essex	35.43	33.25	40.00
Gloucester	28.00	---	36.00
Hampshire	34.25	---	40.00
Hertford	32.25	32.00	40.00
Hereford	---	38.00	---
Huntingdon	24.00	30.75	---
Kent	40.82	---	---
Lancashire	26.67	---	---
Leicester	34.67	---	---
Lincoln	26.67	34.00	---
Middlesex	48.00	32.00	---
Norfolk	32.40	32.00	45.00
Northampton	31.43	31.00	45.00
Northumberland	30.33	45.00	40.00
Nottingham	38.00	40.00	40.00
Oxford	27.20	32.00	44.00
Rutland	---	32.25	---
Shropshire	---	31.00	---
Somerset	26.67	---	---
Stafford	35.00	30.00	---
Suffolk	33.71	28.00	44.00
Surrey	32.00	---	40.00
Sussex	35.33	32.00	---
Warwick	25.00	---	---
Westmoreland	20.00	---	---
Wiltshire	28.83	28.00	40.00
Worcester	37.50	35.00	---
Yorkshire	31.86	---	36.00

Appendix Table 1C

English Oats Yields by County
(bushels per acre)

	<u>Young</u>	<u>Board of Agriculture</u>	<u>Caird</u>
Bedford	21.00	----	----
Berkshire	42.67	----	----
Buckingham	29.75	33.00	----
Cambridge	----	27.00	50.00
Cheshire	38.33	----	33.00
Cumberland	42.67	21.00	----
Derby	52.00	----	----
Devon	30.00	----	----
Dorset	28.75	----	----
Durham	42.50	30.00	60.00
Essex	40.57	36.50	----
Gloucester	32.00	----	----
Hampshire	41.50	----	----
Hertford	34.29	32.00	----
Hereford	----	----	----
Huntingdon	16.00	25.00	----
Kent	45.14	----	----
Lancashire	30.00	----	----
Leicester	56.00	----	----
Lincoln	27.57	52.00	----
Middlesex	----	----	----
Norfolk	44.75	----	----
Northampton	34.00	42.00	----
Northumberland	41.45	50.00	44.00
Nottingham	44.00	44.00	64.00
Oxford	38.00	----	----
Rutland	----	42.25	----
Shropshire	----	----	----
Somerset	32.25	----	----
Stafford	42.50	35.00	----
Suffolk	36.57	----	----
Surrey	38.00	----	----
Sussex	37.00	----	26.00
Warwick	32.00	----	----
Westmoreland	29.50	----	----
Wiltshire	33.60	36.00	----
Worcester	50.00	----	----
Yorkshire	36.10	----	48.00

Appendix Table 2A

Irish Wheat Yields by County
(bushels per acre)

	Young	Dublin Society	Wakefield	1847-53
Antrim	17.5	23.3	26.3	25.8
Armagh	14.6	23.3	14.0	25.8
Carlow	16.0	--	22.4	23.8
Cavan	--	--	26.3	26.7
Clare	19.0	20.4	--	24.5
Cork	26.0	23.3	15.8	20.6
Donegal	--	--	18.2	23.2
Down	22.5	23.3	26.3	25.6
Dublin	21.9	21.9	21.9	27.5
Fermanagh	--	--	--	28.1
Galway	20.4	23.3	22.6	23.0
Kerry	--	--	20.4	23.9
King's	16.9	18.1	24.2	23.0
Kildare	20.1	--	17.5	24.3
Kilkenny	17.5	17.5	19.8	22.4
Limerick Limerick	23.3	26.3	--	26.0
Leitrim	--	--	33.3	25.8
Limerick	30.6	--	29.1	24.2
Longford	--	--	--	26.7
Louth	23.3	--	24.8	26.2
Mayo	--	--	20.4	21.6
Meath	19.5	23.3	22.0	24.4
Monaghan	20.4	--	--	28.7
Queen's	19.0	19.0	19.7	22.9
Roscommon	17.5	--	23.3	24.0
Sligo	18.2	--	33.3	27.7
Tipperary	27.7	--	25.4	23.4
Tyrone	--	--	--	25.8
Waterford	23.3	--	27.0	20.0
Wexford	24.1	26.3	19.0	21.6
Wicklow	28.4	20.4	20.4	27.3
Westmeath	20.4	--	32.1	24.9

Note:

The official data for 1847-53 have been converted to bushels at rates of 60 lbs. for wheat, 48 lbs. for barley, and 40 lbs. for oats. (Bourke 1965).

Appendix Table 2B

Irish Barley Yields by County
(bushels per acre)

	<u>Young</u>	<u>Dublin Society</u>	<u>Wakefield</u>	<u>1847-53</u>
Antrim	---	---	40.3	40.6
Armagh	--	40.8	31.2	39.8
Carlow	40.8	---	44.5	41.9
Cavan	---	32.8	43.8	40.6
Clare	35.0	40.8	23.3	40.0
Conk	---	35.0	27.7	37.4
Donegal	26.3	---	36.5	36.4
Down	29.2	33.5	39.4	40.7
Dublin	32.1	30.6	35.0	44.6
Fermanagh	29.5	---	---	40.9
Galway	35.0	40.8	43.8	41.5
Kerry	---	---	36.5	40.9
King's	46.7	34.7	40.8	43.2
Kildare	43.8	---	37.9	45.3
Kilkenny	29.2	29.2	49.6	42.5
Londonderry	26.3	32.4	---	39.7
Leitrim	---	---	42.6	39.9
Limerick	---	---	40.3	41.8
Longford	35.0	---	---	41.6
Louth	43.8	---	43.8	41.3
Mayo	---	---	29.2	40.6
Meath	---	29.2	44.5	42.5
Monaghan	26.3	---	32.1	39.6
Queen's	37.9	39.1	32.1	43.4
Roscommon	26.3	---	43.8	42.8
Sligo	41.1	---	42.6	42.0
Tipperary	43.8	---	42.9	40.9
Tyrone	---	---	50.0	40.6
Waterford	40.8	---	39.4	37.5
Wexford	26.3	---	30.6	38.0
Wicklow	33.5	32.1	37.9	41.3
Westmeath	---	---	58.3	43.1

Appendix Table 2C

Irish Oats Yields by County
(bushels per acre)

	<u>Young</u>	<u>Dublin Society</u>	<u>Wakefield</u>	<u>1847-53</u>
Antrim	24.5	--	37.5	37.5
Armagh	18.4	36.8	18.4	37.2
Carlow	36.8	--	49.0	38.1
Cavan	--	36.8	42.9	38.8
Clare	36.8	39.8	41.3	38.5
Cork	43.2	34.6	30.9	35.2
Donegal	23.7	--	49.0	35.6
Down	36.8	37.5	50.0	37.6
Dublin	39.8	36.8	29.9	44.1
Fermanagh	32.8	--	--	38.7
Galway	29.7	36.8	42.1	39.0
Kerry	--	--	34.9	35.1
King's	39.0	32.8	40.3	41.1
Kildare	41.0	--	39.8	42.0
Kilkenny	24.5	30.6	36.8	39.3
Londonderry	35.2	42.9	40.8	36.7
Leitrim	--	--	39.5	36.7
Limerick	44.4	--	49.3	44.3
Longford	45.9	--	--	41.5
Louth	45.9	--	50.5	41.4
Mayo	36.8	--	42.0	36.6
Meath	38.9	45.0	57.0	43.4
Monaghan	30.6	33.7	33.7	35.6
Queen's	32.9	33.7	36.8	39.7
Roscommon	30.6	--	42.0	38.1
Sligo	30.6	--	43.3	37.7
Tipperary	39.8	--	40.4	40.9
Tyrone	--	30.6	50.0	38.5
Waterford	36.8	--	39.8	36.1
Wexford	26.0	--	31.4	34.3
Wicklow	37.5	39.8	50.5	36.8
Westmeath	30.6	--	52.0	42.9

Appendix Table 3

French Wheat Yields by Department
(bushels per acre)

	Young's <u>tour</u>	1815/6 <u>average</u>	1850/1 <u>average</u>
<u>Loam district</u>			
Orne	17.25	8.86	18.04
Aisne	17.50	15.26	20.81
Eure-et-Loire	21.00	12.70	17.23
Nord	23.35	18.59	26.77
Somme	25.50	15.54	21.18
Oise	22.75	15.96	19.97
Seine-Inferieure	18.67	13.46	22.76
Seine-et-Oise	23.00	19.35	22.20
Pas-de-Calais	23.50	16.89	29.30
Seine-et-Marne	23.00	14.57	20.81
Bas-Rhin	22.50	14.82	19.08
Loiret	27.90	9.24	17.48
Puy-de-Dome	23.00	13.88	18.99
<u>Heath district</u>			
Maine-et-Loire	17.00	11.77	16.87
Basses-Pyrennes	16.00	11.43	14.54
Morbihan	17.00	11.37	14.74
Ille-et-Vilaine	20.00	9.71	15.65
<u>Mountain district</u>			
Bouches-du-Rhon	14.00	5.94	13.32
Drome	23.50	11.97	11.06
Aude	23.00	13.88	13.32
<u>Stony district</u>			
Haute-Marne	24.00	3.89	12.77
Haut-Rhin	12.00	10.21	17.87
Meurthe	15.50	9.70	17.09
Doubs	17.75	10.69	15.98
<u>Chalk district</u>			
Charente	9.00	6.11	13.32
Vienne	21.00	6.97	11.69
Indre-et-Loire	16.00	7.22	13.88

Note and Sources:

The districts are Young's.

"Young's tour" are the average yields from Young (1794) for departments Young visited. The averages for 1815/6 and 1850 from the Recoltes des cereales et des pommes de terre, 1815

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