

Agricultural Improvement and the Neglected Labourer*

By STUART MACDONALD

TECHNOLOGICAL change — in agriculture or in anything else — is simply what seems to be a better way of doing things: technological innovation is the introduction of what seems to be a better way of doing things. Such a view of technology goes well beyond the machine itself to include the way the machine is used.¹ Nowadays it would include computer software with computer hardware: in nineteenth-century agriculture it would embrace new crop rotations and the use to which new machinery was put, as well as the machinery itself. While information is readily available about the way things are already being done, that is not the case with novel technology. Yet information about new technology must come from somewhere and much effort has been expended determining whence came the information inherent in the new agricultural technology so prominent from the late eighteenth century.

1 *The Landlord and the Linear Model of Technological Change*

Not so very many years ago the common wisdom was that technological information emanated entirely from a few leading landlords.² Thus Coke of Norfolk, for example, could be portrayed as a revolutionary leading the way to a new agricultural

order by example and persuasion.³ Though such a portrayal conflicts with both Coke's own accounts and common sense,⁴ it is understandable why it should have been tolerated for so long. The simplicity of the heroic interpretation is always attractive and especially in agricultural history, where so much activity is anonymous. Moreover, the profusion of information on the activities of landlords is matched by only sparse and scattered sources for other participants in the agricultural industry.⁵ As it happens, information on the activities of improving landlords has been sufficient to fuel what is known as the linear model of technological change, the notion that science leads to technology, that invention produces innovation, and that basic research yields to applied research and then to development.⁶ The linear model places almost total emphasis on invention and makes the tacit assumption that the rest of the innovation process flows on inevitably and consequentially. In the real world, of course, it does not; there innovation may produce invention, development may inspire basic research, and technology seems much more likely to spring from other technology than from science.⁷ The linear model is acceptable to a

¹ Earl Spencer, 'On the Improvements which Have Taken Place in West Norfolk', *Jnl Royal Agric Soc*, 3, 1842, p 9; A M W Stirling, *Coke of Norfolk and his Friends*, 1912, p 190.

² See R A C Parker, 'Coke of Norfolk and the Agricultural Revolution', *Ec Hist Rev*, 2nd series, 8, 1955, pp 156-66; idem, *Coke of Norfolk: A Financial and Agricultural Study*, Oxford, 1975, p 199.

³ See E L Jones and E J T Collins, 'The Collection and Analysis of Farm Record Books', *Jnl Soc Archivists*, 3, 1963, pp 86-9.

⁴ M Gibbons and R Johnston, 'The Roles of Science in Technological Innovation', *Research Policy*, 3, 1974, pp 220-4.

⁵ See Sol Enkel, 'Science, Discovery and Innovation: an Australian Case History', *Internat Soc Sci Jnl*, 22, 1, 1970, pp 42-53; K Gannicott, 'Simple Economics and Difficult Policies: the Case of Public Money for Research and Development', paper presented to ANZAAS Congress, Adelaide, 1980.

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¹ See D Lamberton, S Macdonald and T Mandeville, 'Productivity and Technological Change: Towards an Alternative to the Myers Hypothesis', *Canberra Bull Pub Admin*, IX, 2, 1982, pp 23-30.

² See particularly Lord Ernle, *English Farming Past and Present*, 4th edn 1932, p 207.

country like Australia because it helps justify a preponderance of government-performed basic research, and it has been readily welcomed by those anxious to believe that following the initial spark of landlord inspiration the rest of the process of agricultural improvement is automatic.

While many landlords found agricultural improvement an amusing and patriotic pursuit,⁸ their enthusiasm was not necessarily shared by farmers more interested in best practice than in best theory.⁹ A letter from one such farmer to another in 1793 presents the situation as succinctly as it is possible to do.

I've just had a letter from Sir John Sinclair acquainting me with the establishment of a Board of Agriculture, and with Desiring me to attend it in London as they wished to try an experiment of watering Hyde Park and Saint James Park. I have not yet answered it—He is quite ignorant of my situation in Life—it will not suit my inclinations nor pocket to go two hundred miles as my expense to gratify the idle curiosity of every person that chuse to ask it—I have had one or two of these excursions already—*pro bono publico*, won't always do. I very much doubt of the utility of these things in the hands of Lords and Dukes. Plain Country Farmers are not *at home* when they are with such sort of Folks. My hand, heart and Table such as it is are allways at the command of my Friends and nothing give me greater pleasure than to exchange mutual knowledge; but to dance attendance upon great Folk, and to answer such Questions as they may deign to ask you and then with an ungracious Nod be told you are done with—will not suit the stomach of your sincere Friend.¹⁰

According to Caird, landlords were the least trained of all the agricultural classes,¹¹ though it took a brave man to say so. One imprudent small farmer wrote to his local newspaper to complain of

... such men as Lord Brougham, who, at the different meetings, makes a boast of his ignorance, and who, in

his dotage, pours out such ravings as would not be allowed for a moment from any poor farmer.¹²

The editor dissociated himself completely from the comment, asserting that the farmer must have written 'in the sourest and most cynical of moods',¹³ yet the editor of the *Farmer's Magazine* had earlier been more forthright in private correspondence.

I am under the Necessity sometimes of inserting Communications that are not altogether to my Mind, merely because that better cannot be got and also from a desire to keep well with people, who though imperfectly qualified to write are yet good friends to the Magazine.¹⁴

II Information, Innovation and the Entrepreneur

If farmers were not totally convinced of the usefulness of technological information emanating from dilettante landlords, whence came their information? Some effort has been spent in recent years exploring the impact on agricultural improvement of experimental farms, agricultural societies, and of the agricultural press.¹⁵ While all these certainly provided information about new methods, they did little to prove a connection between new methods and increased profits for those who used them.¹⁶ It is a basic tenet of innovation theory that the talent required for commercial exploitation of the novel is very different from that needed to devise the change in the first place.¹⁷ The

¹² *Westmorland Gazette*, 20 Oct 1849, quoted in Elizabeth Edwards, *The Agricultural Societies of the Upper Eden Valley, 1840-1900* (MA thesis, Leicester Univ, 1974), facing p 45.

¹³ *Westmorland Gazette*, op cit.

¹⁴ Editor of *Farmer's Magazine* to George Culley, 17 March 1803, NCRO/ZCU/25.

¹⁵ Eg H S A Fox, 'Local Farmers' Associations and the Circulation of Agricultural Information in Nineteenth-century England' in H S A Fox and R A Butlin (eds), *Change in the Countryside*, IBG, 1979, pp 43-63; Nicholas Goddard, 'Agricultural Societies' in G E Mingay (ed), *The Victorian Countryside*, 1981, I, pp 245-59; idem, 'The Development and Influence of Agricultural Periodicals and Newspapers, 1780-1880', *Ag Hist Rev*, 32, 1, 1983.

¹⁶ See, for example, Jonathon Binns, *Notes on the Agriculture of Lancashire with Suggestions for its Improvement*, Preston, 1851, pp 90-1; Stuart Macdonald, 'Model Farms' in G E Mingay (ed), op cit, I, pp 214-26.

¹⁷ Joseph Schumpeter, *Business Cycles*, New York, 1939, I, pp 84-6.

⁸ J R Walton, 'Agriculture 1730-1900' in R A Dodgshon and R A Butlin, *An Historical Geography of England and Wales*, 1978, p 244.

⁹ See *Farmer's Magazine*, 21, 1820, p 480.

¹⁰ George Boswell to George Culley, 1793, Northumberland County Record Office (NCRO)/ZCU/18. See also Stuart Macdonald, 'The Diffusion of Knowledge among Northumberland Farmers, 1780-1815', *Ag Hist Rev*, 27, 1, 1979, pp 30-9.

¹¹ James Caird, *English Agriculture in 1850-51*, 1852, p 493.

entrepreneur was as necessary for innovation in nineteenth-century agriculture as he is for innovation in twentieth-century electronics.¹⁸ There has been some work in recent years which suggests that leading farmers fulfilled the function of entrepreneurs in late eighteenth- and early nineteenth-century agricultural improvement. Sometimes they actually sold their innovations to neighbours — as George Culley, the Northumberland farmer, did with his breeding stock — but more commonly it was their acumen in using new methods for their own commercial gain that attracted the attention and emulation of their neighbours.¹⁹ While the original source of information is still relevant to this entrepreneurial process, it is clearly less seminal than in the heroic model of landlord-inspired improvement. It may be that leading farmers did receive inspiration from landlords, experimental farms, agricultural societies and shows, and the agricultural press, but it seems much more likely that their information sources were nearer the use being made of the information: a case, in a sense, of the medium being the message.²⁰ Thus, leading farmers made pilgrimages to the farms of other prominent farmers, they conducted an active agricultural correspondence with such practitioners, and they turned their farms into training camps for the sons of ambitious farmers from other districts.²¹

carried out by geographers, which is regrettable in that they have been preoccupied with spatial diffusion.²² This is particularly unfortunate because those who adhere to the linear model follow technological change from invention to innovation — by which they mean first commercial use — and no further. Those with a disposition for putting dots on maps can trace adoption over space and time and draw the appropriate curves, but that is seen as a development quite distinct from the process which produced the technological innovation.²³ Of course, it is not: the whole is one innovative process from invention to development and innovation, to production and marketing, with all parts interdependent, with no part more important than the others and with far too much irregularity for the process to be described as linear. In modern studies of the innovative process the notion of horizontal innovation is now being mooted, suggesting that change actually derives from users of new technology and that the horizontal information linkages among these innovative users are much more important than any vertical linkages to an inventive core.²⁴ Such a model is attractive not just for its bold iconoclasm, but because it poses a question that agricultural historians have generally avoided: just what was the role of the real user — the agricultural labourer — in the process of agricultural improvement?

III *The Innovative Process*

Much historical research on the role of farmers in the innovative process has been

IV *The Agricultural Simpleton*

Much conventional and contemporary opinion of the agricultural labourer reinforces the

¹⁸ Stuart Macdonald, 'The Need to Succeed', *Jnl Gen Man*, 4, 3, 1979, pp 74–83; idem, 'The Role of George Culley of Fenton in the Development of Northumberland Agriculture', *Archaeologia Aeliana*, 5th ser, III, 1975, pp 131–41.

¹⁹ Stuart Macdonald, 'The Role of the Individual in Agricultural Change: the Example of George Culley of Fenton, Northumberland', in H S A Fox and R A Butlin, op cit, pp 5–21.

²⁰ See Marshall McLuhan, *Understanding Media*, 1964, pp 15–30.

²¹ Léonce de Lavergne, *The Rural Economy of England, Scotland and Ireland*, Edinburgh, 1855, pp 112, 285; June Hall, *Let Agriculture Flourish* (MA thesis, Leicester Univ, 1979), p 82; Stuart Macdonald, 'The Diffusion of Knowledge among Northumberland Farmers, 1780–1815', op cit, *Farmer's Magazine*, 7, 1806, pp 153–6.

²² Eg J R Walton, op cit, pp 239–65; idem, 'Variations in the Adoption of Agricultural Machinery in Nineteenth Century Oxfordshire', paper given to Annual Conference of Institute of British Geographers, Birmingham, January 1973.

²³ See Herbert Lionberger, *The Adoption of New Ideas and Practices*, Iowa State UP, 1964; E Rogers and F Shoemaker, *Communication of Innovations*, New York, 1971. For an exhaustive list of such works see E Rogers, *Bibliography on the Diffusion of Innovations*, Diffusion of Innovations Research Report No 6, Department of Communication, Michigan State Univ, 1967.

²⁴ D Leonard-Barton and E Rogers, *Horizontal Diffusion of Innovations: An Alternative Paradigm to the Classical Diffusion Model*, Working Paper 1214, Alfred P Sloan School of Management, MIT, 1981.

landlord-centred, heroic view of agricultural improvement. An illiterate country bumpkin was unlikely to have been a dynamic force in the innovative process. Even by the mid-nineteenth century, an American traveller could portray farm labourers in the West Country as beings little better than animals.

The laborers in this part of England (Hereford, Monmouth, Gloucester, and Wiltshire) were the most degraded, poor, stupid, brutal, and licentious that we saw in the kingdom . . . I did not see in Ireland, or in Germany or in France, nor did I ever see among our negroes or Indians, or among the Chinese or Malays, men whose tastes were such mere instincts, or whose purpose of life and whose mode of life was so low, so like that of domestic animals altogether, as these farm-laborers.²⁵

Far from playing an active role in innovation, labourers were often seen as that part of the agricultural industry itself most in need of improvement,²⁶ and there is a large established literature on the plight of oppressed agricultural labourers.²⁷ Their ignorance and cupidity seemed to be barriers to innovation, except in those cases where labour relations were so poor that innovation was required to circumvent labourers' incompetence and dishonesty. Thus one reason for the adoption of the threshing machine was said to be that it avoided pilfering of corn by labourers and other vermin.²⁸ According to Jethro Tull, who loathed agricultural labourers with all the strength his ailing health allowed, the perfidy of his employees was a major inspiration for his horse-hoeing husbandry.

. . . the Thing that is most detrimental to perpetual Crops of Wheat, is the Deceit and Idleness of the Weeders . . . their Tongues are much nimbler than their Hands; and unless the Owner, or some Person who faithfully represents him, (and is hard to be found) works constantly amongst them, they'll get their

Heads together half a Dozen in a Cluster, regarding their Prattle more than the Weeds; great part of their Time they spend in Play, except a few of them who bring their own Work with them, some their Sewing, some their Knitting, and these must be paid for doing their own Work upon my Land: This Wrong I have seen done both to myself and my Neighbours; and it has put me upon endeavouring to find a Way of disappointing the Weeders . . .²⁹

While the image of the labourer as a helpless, ignorant wretch squared well with the charitable intentions of those dedicated to bettering his lot and saving his soul, it is not the impression given by those at the work-face of agricultural improvement. Farmers' sons spending their educational year on progressive farms were advised to leave their horses behind and to mix with the labourers as much as possible as this was the only way to learn how the best methods were used.³⁰ The diary of one such apprentice from the south of England spending his year on a Northumberland farm records with amazement the absence of juvenile labour because all the boys were at school.³¹ Indeed, literacy seems to have been almost universal among labourers in Scotland and the North of England.³²

The education in Northumberland is very good; the people are intelligent and acute, alive to the advantages of knowledge, and eager to acquire it; it is a rare thing to find a grown-up labourer who cannot read and write, and who is not capable of keeping his own accounts.³³

It is said there are very few servants or labourers in the agricultural districts of Scotland, who are not able, from their education, to take a bailiff's place! To the superior education of the Scotch may, in part, be attributed their successful agriculture; for it cannot be expected that the land will be properly cultivated by an ignorant peasantry.³⁴

It is probably no coincidence that it is the North of England and Scotland which

²⁵ Frederick Law Olmsted, *Walks and Talks of an American Farmer in England*, Ann Arbor, 1967, pp 238-9.

²⁶ See Pamela Horn, 'An Eighteenth-century Land Agent: the Career of Nathaniel Kent (1737-1810)', *Ag Hist Rev*, 30, 1, 1982, pp 1-16.

²⁷ Eg W Hasbach, *A History of the English Agricultural Labourer*, 1908; J L and B Hammond, *The Village Labourer*, new edn, 1978.

²⁸ Sir John Sinclair, *The Husbandry of Scotland*, 1812, p 83.

²⁹ Jethro Tull, *Horse-Hoeing Husbandry*, 1733, Notes, p 226.

³⁰ William Hutt, op cit, p 40.

³¹ NCRO/NRO/851, 1842; cf Russell M Garnier, *Annals of the British Peasantry*, 1895, p 378.

³² See William Hutt, op cit, p 53.

³³ Evidence of F H Doyle in *Reports of Special Assistant Poor Law Commissioners on the Employment of Women and Children in Agriculture*, HMSO, 1843, Vol 12, p 300. See also 'Report on the Exhibition of Implements at the York Meeting, 1848', *JRASE*, 9, 1848, pp 381-2.

³⁴ Jonathon Binns, op cit, p 95.

provide examples of labourers risen to become farmers,³⁵ and which supplied the rest of the country with enlightened foremen, bailiffs and tenants.³⁶ Even the 'half crazy, half cunning, Scotchman, Gourlay' who crossed swords with Cobbett in Winchester had, according to Cobbett, come 'to teach the moon-rakers "hoo to farm, mon"'.³⁷

The agricultural labourer in the South was not well educated, but neither was he quite the low-paid rustic drudge, the ignorant simpleton good for stock jokes in *Punch* as seen by late nineteenth-century contemporaries.³⁸ According to Jesse Collings,

... he had a shrewd common sense, while his knowledge and powers of observation with regard to crops, weather, seasons, and all other things that came within the narrow range of his hard and dismal life, were marked and hereditary.³⁹

Indeed, the same point had been made long before by Adam Smith.⁴⁰ The Southern labourer lived on the brink of poverty and was more concerned with survival than education.⁴¹ His station in life determined his education — gangs of the poorest children, for example, were sometimes apprenticed to farmers to learn basic agricultural tasks⁴² — and if he chanced to become educated above his station, he was not slow to leave it for an urban existence.⁴³ It is salutary to reflect that Victorian high farming demanded increased input from all but this most fundamental of agricultural resources. The South neglected its manpower; as one observer reported in 1882,

... from my intercourse with the labourers in country villages for the last forty years I can say it confidently, that many keen intellects have been wasted from want of cultivation; many more than those who class all rustics as bumpkins, chawbacons, louts, have any idea of.⁴⁴

The work of the agricultural labourer had the potential to be skilled and specialized;⁴⁵ whether it became so was determined by the aptitude of the labourer and by the incentives he perceived.⁴⁶ As Caird noted, 'The labourer must perfect himself by years of patient application in the peculiar department of work in which he hopes to excel',⁴⁷ though there must have seemed little point if such application was to go unrecognized and unrewarded.⁴⁸ Under these circumstances, the only benefit labourers might receive from their skills was self-satisfaction.

V The Labourer in the Innovative Process

It is necessary to re-emphasize that the innovative process continues well beyond the innovation stage, that change occurs in the way new methods are applied, in the way hardware is employed, and even in the hardware itself long after the stage of first acceptance. The early threshing machine provides a simple example of the importance of what happens after innovation. The machine first appeared in northern Britain and was introduced on a grand scale as a custom-made power unit for a variety of barn tasks. In the South, the advantages of the machine were less obvious, and cheap, miniature versions too weak to do anything properly were generally improvised by local

³⁵ Eg *ibid.*, pp 35–6; *Farmer's Magazine*, 23, 1822, p 512.

³⁶ G E Mingay, *Rural Life in Victorian England*, 1976, pp 70–1; G E Fussell, 'The "Foreign" Invasion of Essex', *Essex Farmers Jnl*, 30, 5, 1951, pp 41–3; Léonce de Lavergne, *op cit*, p 286; Cuthbert Headlam, *The Three Northern Counties of England*, 1939, p 129.

³⁷ William Cobbett, *Rural Rides*, 1958, pp 328–9.

³⁸ G E Mingay *Rural Life in Victorian England*, *op cit*, p 106.

³⁹ Jesse Collings, *Land Reform*, 1906, p 24.

⁴⁰ Adam Smith, *The Wealth of Nations*, 1950 edn, I, pp 141–2.

⁴¹ Rowland Prothero, *The Pioneers and Progress of English Farming*, 1888, p 224.

⁴² Caird, *op cit*, p 232; William Marshall, *Rural Economy of the West of England*, 1796, pp 110–13 in G E Mingay, *The Agricultural Revolution. Change in Agriculture 1650–1880*, 1977, pp 200–1.

⁴³ Rowland Prothero, *op cit*, p 231; Jesse Collings, *op cit*, p 23; William Coles Finch, *Life in Rural England*, 1928, p 114.

⁴⁴ Treasurer Hawker, 'The Devonshire Farm-labourer Now and Eighty Years ago', *Reports and Trans Devonshire Assoc*, 14, 1882, p 332.

⁴⁵ See Alun Hawkins, 'In the Sweat of thy Face: the Labourer and Work' in G E Mingay (ed), *The Victorian Countryside*, *op cit*, II, pp 506–20.

⁴⁶ See E H Hunt, 'Labour Productivity in English Agriculture, 1850–1914', *Econ Hist Rev*, 2nd ser, XX, 2, 1967, pp 280–92.

⁴⁷ Caird, *op cit*, p 492.

⁴⁸ *Ibid.*, pp 515–16; George Ewart Evans, *The Horse in the Furrow*, 1960, p 141.

blacksmiths and travelling builders.⁴⁹ It was in the post-innovation stage that the threshing machine failed in the South, and farmers often joined with labourers in the Swing Riots of 1831 in the destruction of worthless hardware.⁵⁰

There was frequently a tendency to blame the labourer when new implements 'failed to answer'. As one frustrated farmer complained,

I am sure that any one who has had anything to do with the introduction of a new implement will bear me out, that we have the greatest difficulty in getting our men to use even common judgement in its use. They hate — with a dreadful hatred — any innovation . . .⁵¹

According to Young, drill ploughs light enough for the horses were never sufficiently robust for the labourers.

All the drill ploughs I have seen are so weak that I am confident they would not live a week in constant use to take the chance of the servants' and labourers' roughness like the other machines of a farm. Common ploughs and harrows the fellows tumble about in so violent a manner that, if they were not strength itself, they would be perpetually dropping in pieces. In drawing such instruments into the field the men generally mount their horses and drag the things after them. In passing gateways they seldom think of what is behind them, which twenty to one but they draw against the gate-post. It is, however, of little consequence, for the implements are strong enough to bear such usage: but suppose a drill plough treated in the same manner!⁵²

Labourers, it would seem, were often reluctant to oblige their masters in the trial of new implements; Andrew Grey referred to

. . . the unwillingness (by no means unnatural) of the labouring servants, to take the trouble, by a fair trial, of

⁴⁹ See E J T Collins, 'The Diffusion of the Threshing Machine in Britain, 1790-1880', *Tools and Tillage*, III, 1, 1972, pp 16-33; Stuart Macdonald, 'The Progress of the Early Threshing Machine', *Ag Hist Rev*, 23, 1, 1975, pp 63-77; idem, 'John Raistrick, Civil Engineer of Morpeth', *Durham Univ Jnl*, LXIV, 1, 1976, pp 67-75; idem, 'The Early Threshing Machine in Northumberland', *Tools and Tillage*, II, 3, 1978, pp 168-84; idem, 'Further Progress with the Early Threshing Machine: a Rejoinder', *Ag Hist Rev*, 26, 1, 1978, pp 29-32.

⁵⁰ E J Hobsbawm and G Rudé, *Captain Swing*, 1969, pp 231-6. See also William Stevenson, *Agriculture of Surrey*, 1809, pp 134-5.

⁵¹ R M Weeks, 'On Grubbers, Cultivators and Autumn Cleaning', paper read to Newcastle Farmers' Club, 1 July 1854, Newcastle Lit and Phil Soc, Bolbec N630.6/3.

⁵² Quoted in G E Mingay, *The Agricultural Revolution. Changes in Agriculture 1650-1880*, op cit, pp 124-5.

acquiring the same facility in managing the improved instruments, as that which they had attained in managing those to which they had been so long accustomed.⁵³

When Sir John Delaval was seized with a desire in 1783 to improve his northern estates, he sent from London a succession of implements for evaluation. His steward reported on the first to arrive:

The two ploughs was received some time ago and has been tried. Matthew [the ploughman] says they will nether of them answer well for this strong Land — they can't get the smaller one to answer at all, he imagines the Beam has been made of Green wood, or otherwise has been twisted since it was made and stands quite from the Land. The larger one goes much better and I do not hear of any fault only its not effectually turning the furrows.⁵⁴

A double plough arrived next, which did 'not meet with Matthew's approbation',⁵⁵ followed by a drill rake which Lady Delaval had ordered constructed from directions in Harte's *Essays on Husbandry*. That was sabotaged by use of a particularly untrained horse and a dozen women and children who followed the machine and obliterated the drills.⁵⁶ A scythe sent later that year was evaluated on the stoniest of fields, selected by a labourer skilled in use of the sickle: the scythe was found to be wanting.⁵⁷

These are not just cases of the intransigence of the working class in the face of progress, of instinctive resistance to change by a stubborn agricultural labour force,⁵⁸ but rather they are the reasoned reaction of those aware of the personal value of their own resources. Just as the transistor was resented by those with decades of experience in valve technology,⁵⁹ so labourers who had taken

⁵³ Andrew Grey, *The Plough-Wright's Assistant*, 1808, p xi.

⁵⁴ John Bryers to Sir John Delaval, 14 February 1783, NCRO/2DE/4/20/35.

⁵⁵ Joseph Oxley to Sir John Delaval, 22 February 1783, NCRO/2DE/4/15/3.

⁵⁶ John Bryers to Sir John Delaval, 14 March, 4 April 1783, NCRO/2DE/4/20/39, 42.

⁵⁷ John Bryers to Sir John Delaval, 28 Sept 1783, NCRO/2DE/4/20/66.

⁵⁸ Cf G E Mingay, *Rural Life in Victorian England*, op cit, pp 63-4.

⁵⁹ Stuart Macdonald and Ernest Braun, 'The Transistor and Attitude to Change', *American Jnl of Physics*, 45, 11, 1977, pp 1061-5.

years to acquire skills were reluctant to learn new ones which, as William Lester put it, 'will set them back in life, even on a par with the youth that is just entering on business, without his incitements to persevere'.⁶⁰ Late nineteenth-century labourers refused to work with the Oliver Digger not because the machine made work harder or reduced wages, but because it left no straight furrow — the hallmark of a skilled ploughman.⁶¹ Northern labourers were said to be,

... obstinate to maintain their rights, and will spend twenty shillings in moving miles away to a new place, for a difference of ten shillings in the year's wages.⁶²

Neither is Stephen's advice on how to treat ploughmen compatible with the notion of mindless manual labour.

When one displays more skill than the rest, he is sufficiently honoured by being intrusted to execute the most difficult kinds of work, such as drilling; and such a preference gives no umbrage to the others, because they are as conscious of his superiority in work as the farmer himself.⁶³

Psychic return may be no substitute for material reward, but it is important.⁶⁴ More important, though, is the indication that the labourer was also aware of the significance of his role in the innovative process — not, of course, because his role enhanced the glory of British agriculture, but because it affected his own welfare.

VI Technological Information and Labour Mobility

Just occasionally an example emerges of a labourer actually initiating technological change. The first Chevallier barley was apparently grown by a labourer and later cultivated by his landlord.⁶⁵ According to Marshall, the practice of dibbling wheat originated with a labourer and spread to

farmers in Norfolk.⁶⁶ The labourer's main role, though, was in the later part of the innovative process. It was the successful implementation of new technology that was dependent on the labourer's skills.

Where there is evidence of labourers mastering a technology in one area and then being used to transfer that technology to other areas, it may be assumed that the labourers possessed information that was not conveniently embodied in machinery or as readily available from landlords, diagrams, newspapers, societies, experimental farms or the voluminous agricultural literature. In coming to terms with innovation, labourers made adaptations to suit their own requirements; they made user modifications which determined the ultimate success of the technology. It was George Boswell, the farmer, who provided the drill for his Dorset farm in 1789, but it was his labourers who determined how thickly the seed was to be sown.⁶⁷ William Dawson, newly returned to Scotland from an agricultural apprenticeship in England, supposedly introduced drill husbandry to the Borders, but it was from his labourer, James MacDougal, that the region learned the associated skill of ploughing with two horses abreast.⁶⁸ When labourers took technological change with them from one region to another, they carried not just the information they themselves had received, but also that which they had added to make the innovation successful. Thus Berwickshire reapers in 1790 refused to exchange their sickles for scythe hooks provided by farmers, but rapidly accepted the new implement when imported labourers demonstrated just how it could be used to obtain superior performance.⁶⁹ Perkins has noted how much more information was required to use the scythe than was

⁶⁰ William Lester, *A History of British Implements and Machinery Applicable to Agriculture*, 1811, pp 205–6.

⁶¹ Fred Kitchen, *Brother to the Ox*, 1943, pp 46, 79, 86.

⁶² Walter White, *Northumberland and the Border*, 1859, p 202.

⁶³ Henry Stephens, *Book of the Farm*, 3rd ed, 1877, I, p 7.

⁶⁴ See Howard Newby, *The Deferential Worker*, 1977, pp 32–4.

⁶⁵ George Ewart Evans, *op cit*, p 105.

⁶⁶ William Marshall, *Rural Economy of Norfolk*, 1795, II, pp 36–7.

⁶⁷ George Boswell to George Culley, 6 April 1789, NCRO/ZCU/14.

⁶⁸ *Farmer's Magazine*, 4, 1803, pp 316–17.

⁶⁹ *Farmer's Magazine*, 23, 1822, pp 235–6.

contained in the scythe itself,⁷⁰ as did the Rev Benjamin Newton on his visit to Cumberland when he discovered, to his embarrassment, that using the straight scythe was a very different art from using the curved scythe.

My man who mows as they do in the South without ever quitting the stooping attitude could not make near such good work but had to mend it every time as the strait scythe left a piece of grass standing almost every stroke he took.⁷¹

It is perhaps understandable that the labourer has received so little attention in what is generally seen as a hardware-oriented process of change, crystallizing in innovation, and followed by a separate process in the diffusion of ready-formed technological crystals. Yet a novel agricultural implement without someone familiar with how it worked would have been no more useful than a modern computer without its programme or programmer. Changes in hand-tool technology have been much neglected by historians in favour of changes associated with agricultural engineering, yet the former were probably both responsible for greater productivity growth,⁷² and were also dependent on the knowledge of labourers. Gardeners, for example, were in great demand in the eighteenth century, as labourers sufficiently skilled to hoe field crops of turnips.⁷³ In many cases change involved the application of new technology with no associated hardware; and with no hardware at all to embody technological information, its transfer was entirely dependent on other means. No doubt formal channels, such as the agricultural literature, did carry some of this information, but it is

much more likely that informal channels were rather more important. Apparently the only way to learn anything useful from a visit to the ill-mannered Bakewell's farm was to bribe or hire one of his labourers.⁷⁴ After all, even with all our modern sophisticated means of transferring technological information, informal, personal contact is probably the main means by which technological information travels.⁷⁵ The modern semiconductor industry maintains its breathless pace of technological change by means of personal contact among the industry's highly mobile experts.⁷⁶ In that industry's parlance, information comes 'on the hoof', an appropriately agricultural phrase which would seem to be at least as applicable to technological change in eighteenth- and nineteenth-century agriculture.

Advice from agricultural pundits abounds that there was not much point in introducing a new implement without also acquiring a labourer familiar with how the implement worked.⁷⁷ Marshall observed that information from drawings of implements was quite inadequate.

I have found even patterns insufficient guides to workmen: so much depends on minutiae in the construction of the more complex implements of agriculture. Nay, the very implement which gives rise to these observations [the Norfolk plough], constructed in Norfolk in the most complete manner, and furnished with every necessary appendage, has lain useless upon a soil it suited, until a Norfolk plowman was sent to hold it. . . . I will beg leave to observe, here, in general terms, that whoever wishes to introduce an implement which is in use in some distant District, would do well to have it not only constructed, but set to work, in the

⁷⁰ J A Perkins, 'Harvest Technology and Labour Supply in Lincolnshire and the East Riding of Yorkshire 1750-1850', *Tools and Tillage*, III, 1, 1976, pp 47-58.

⁷¹ C P Fendall and E A Crutchley (eds), *The Diary of Benjamin Newton*, CUP, 1933, pp 187-8.

⁷² E J T Collins, 'Harvest Technology and Labour Supply in Britain, 1790-1870', *Econ Hist Rev*, 2nd ser, XXII, 3, 1969, pp 453-73.

⁷³ Raine Morgan, *The Root Crop in English Agriculture* (PhD thesis, Univ Reading, 1978), pp 515-19.

⁷⁴ George Culley to Matthew Culley, Nov 1784, NCRO/ZCU/9.

⁷⁵ Stuart Macdonald, 'Personal Communication in Research and Development' in W Callebaut et al (eds), *Theory of Knowledge and Science Policy*, Univ Ghent, Belgium, 1980, pp 255-71, Stuart Macdonald and Thomas Mandeville, 'Sources of Technological Information in Australia', paper to ANZAAS Congress, Sydney, 1982.

⁷⁶ Ernest Braun and Stuart Macdonald, *Revolution in Miniature. The History and Impact of Semiconductor Electronics*, Cambridge, 2nd ed, 1982.

⁷⁷ Eg Matthew Peters, *The Rational Farmer*, 1771, p 94; Basil Quayle, *General View of the Agriculture of the Isle of Man*, 1794, p 15.

country where it is in use; and I will venture to add, that success cannot be insured unless a person accustomed to the working of it accompanies it, and sets it to work in the District into which it is intended to be introduced.⁷⁸

So, the Duke of Northumberland's interest in more wire fencing in 1852 required the attendance from Scotland of one Charles Duff, the 'first rate labourer' who had assisted in the Duke's first fencing venture.⁷⁹ When George Culley sought to introduce the water meadow system to Northumberland, he was advised by Bakewell to import a labourer from George Boswell, a master of the art in Dorset.⁸⁰ Boswell was uneasy with this strategy and wrote to Culley that such a man,

... by his self consequence, and *acquired* importance ... might withhold much useful instruction. The method I shall submit to you is; to fix upon a healthy, robust Man, who has been *used to labour* ... it is absolutely necessary for him to be a *Labourer* and to be both willing and able to go through the manual part of the work in all weather, as the Watermen do here.⁸¹

That was precisely what happened; Culley's labourer spent three months in Dorset and returned to construct the first water meadows in Northumberland. Culley himself was constantly pestered by correspondents from all over the country wishing to be sent skilled labourers for a year or so until their skills had been learned by local workers:

If it happens that you know of a sturdy good Ploughman unmarried, and who has been accustomed to work oxen ...;⁸²

... if any steady young Man who has merely been accustomed to go with Draughts etc is willing to come to this Country ...;⁸³

⁷⁸ William Marshall, *op cit*, Vol I, pp 54-5.

⁷⁹ (unknown) to Mr Burnett, 1852, NCRO/ZHE/34/9.

⁸⁰ Robert Bakewell to George Culley, 8 February 1787, in H C Pawson, *Robert Bakewell*, Crosby Lockwood and Son, 1957, p 107.

⁸¹ George Boswell to George Culley, 25 March 1787, NCRO/ZCU/12.

⁸² Martin Dalrymple to George Culley, 16 October 1806, NCRO/ZCU/28.

⁸³ George Laing to George Culley, 19 April 1803, NCRO/ZCU/25.

Lord K wishes much to have a good Plowman from you — and one that will be steady and not led foolishly away by the men of the Country.⁸⁴

Tull, too, although he never obliged anyone by sending labourers familiar with his practices, was concerned that skilled men would be so wayward that they would refuse to demonstrate their skills.⁸⁵ This is quite fascinating because it suggests, of course, that labourers were well aware that new skills increased their personal value,⁸⁶ which is totally at odds with the caricature of the rustic simpleton instinctively resisting change. To gain new skills, the labourer was advised to travel.

... let him pass from the service of a master under whom he has seen the practice of husbandry, common in one part of the country, into that of one who pursues on his fields, the practice of a different country.⁸⁷

There was considerable mobility among labourers in the North,⁸⁸ and among farm servants at least in the South.⁸⁹ Northern newspapers often carried advertisements from those requiring specific new skills in the South — a knowledge of drill management or the ability to mow with an Aberdeen Corn Scythe, for example.⁹⁰ Frequently the labourer was spoken of as the embodiment of the skills of a district:

Wanted immediately, as a Steward and Hind, to take the Management of a Farm in Berkshire, which will be entered on the 29th of this Month, — an experienced Husbandman, who is well acquainted with the modern Improvements in Agriculture, particularly those practiced in Northumberland ...⁹¹

A labourer sent south from Northumberland in 1789 was assumed to be able to

⁸⁴ William Mure to George Culley, 31 March 1793, NCRO/ZCU/18.

⁸⁵ Jethro Tull, *op cit*, Preface, p vi; Notes, p 250.

⁸⁶ See Jennifer Tann, 'Marketing Methods in the International Steam Engine Market: the Case of Boulton and Watt', *Jnl Econ Hist*, 38, 2, pp 363-91.

⁸⁷ *Commercial and Agricultural Magazine*, 2 1800, p 97.

⁸⁸ Stuart Macdonald, 'The Diffusion of Knowledge among Northumberland Farmers, 1780-1815', *op cit*.

⁸⁹ A S Kussmaul, 'The Ambiguous Mobility of Farm Servants', *Econ Hist Rev*, 2nd ser, 34, 2, 1981, pp 222-35.

⁹⁰ *Newcastle Courant*, 5 March 1808, 5 September 1845.

⁹¹ *Newcastle Courant*, 8 September 1804.

ridge for turnips 'as he belonged to this Country'.⁹² Another labourer sent south in 1801 because he was 'said to understand a Mill well' involved the farmer in buying all the household goods the labourer could not sell to neighbours, guaranteeing a good house, paying £1 to cover possible break-ages, a further £5 for conveyance, and protracted negotiations with the wife, described as a 'whinging, peevish, fretful body'.⁹³ For that sort of sacrifice, there must have been an anticipated return. Of course, there is no means now by which that particular return can be calculated, or

the value of the labourers' contribution to agricultural progress estimated. This paper has suggested only that the contribution should not be neglected. The use of new technology is an integral part of the innovative process, and those responsible for that use and consequent modification and adaptation would seem to deserve at least as much scholarly attention as have the propagandists of agricultural improvement. The motto 'Speed and Plough' no doubt expressed hope of divine guidance in agricultural improvement, but new sorts of ploughs were required and their more immediate guidance was in the hands of agricultural labourers.

⁹² George Culley to John Welch, November 1789, NCRO/ZCU/6.

⁹³ Matthew Culley to John Welch, 26 March 1801, NCRO/ZCU/6.

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