

A neglected innovation: the double-furrow plough in Scotland, its early adoption and use, 1867 to 1880*

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Abstract

The double-furrow plough, which enabled two furrows to be ploughed at a time instead of a single one, allowed for significant savings in both manpower and horsepower. While it was regarded as a major innovation at the time, historians of agricultural implements and machines have given it little attention, its importance having been overshadowed by developments in steam ploughing. But for many areas of Scotland steam ploughing could not be used owing to the topography of the fields and soil types. Indeed, by 1878 it was estimated that there were no more than 50 sets of steam ploughs at work throughout the country. But double-furrow ploughs were widely and successfully adopted and had considerable success. This paper asks a number of key questions about the innovation, early adoption and use of the double-furrow plough in Scotland: how did its developer, Thomas Pirie encourage interest in his plough, and double-furrow ploughs more generally? How were his plough, and other double-furrow ploughs more generally, received by farmers and other agriculturists? How did plough makers respond to the demand for this new innovation? How was the plough adopted in particular areas of Scotland? And how was it incorporated into the ploughing technologies on farms?

In Britain, during the middle decades of the nineteenth century, a number of technologies were used for ploughing land. The oldest and most widely employed was the horse-drawn single-furrow plough, made of iron, which turned one furrow at a time. Scotland was strongly associated with swing ploughs while in England their role was taken by the wheeled plough whose wheels guided the plough and regulated its depth.¹ In the 1850s, '60s and '70s steam ploughing tackle started to challenge this familiar technology. Instead of taking one furrow at a time, a steam plough could plough multiple furrows, as many as five or six. In 1867 the 'modern' double-furrow plough, one that turned two furrows at a time, emerged as a competitor to the single-furrow plough and the steam plough.

In Scotland, Thomas Pirie's patent double-furrow plough of 1867 prompted the development of practical double-furrow ploughs that could work under a wide range of conditions. It also

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¹ Henry Stephens, *Stephens' Book of the Farm* (fifth edn, revised and largely rewritten by James Macdonald, 3 vols, 1908), I, p. 370.

created a revolution in ploughs and ploughing.² However, the significance of the double-furrow plough as an implement that challenged other ploughing technologies has not been recognized. British agricultural historians have focused on steam ploughing as the most significant development of the period. Major writers on agricultural implements and machines of the period have not mentioned the double-furrow plough, or considered its role as an intermediate between the single-furrow plough and the steam plough.³ This paper examines the early adoption and use of this innovative ploughing technology in Scotland between 1867 and 1880.

I

Patent no. 2088 of 16 July 1867, sealed on 14 January 1868, was for ‘an improvement in ploughs’ (Figure 1). In that patent, Thomas Pirie of Kinmundy, Aberdeenshire, registered a double-furrow plough in which the sole plate and the side plate were dispensed with and an innovative arrangement developed for the framework and mould boards. It was a design that Pirie and other plough makers continued to develop and modify in following years to bring it to a greater state of perfection, making it suitable for an even wider range of soils, including stony ones, and a more practical implement.⁴

Thomas Pirie was born on 11 August 1823 in the parish of Longside, Aberdeenshire.⁵ In the 1840s he set up a blacksmith and ploughwright’s shop at Nether Kinmundy, also in that parish, by the name of Thomas Pirie & Company; he was its sole partner.⁶ In 1853 he described himself as a ‘smith, millwright and house carpenter’.⁷ In 1871 his census return records him as an implement maker; in that year his business employed ten men and four boys.⁸

Pirie was one of a large number of agricultural implement and machine makers in Scotland. They generally had small businesses serving a local area of a parish, a few parishes, a county or even a region; but few had a national standing, even in the early 1870s. They developed, manufactured and sold agricultural implements and machines, generally their own. Some of them also extended their range of manufactures to include the making of patented designs under licence, or acted as agents for other manufacturers. The making of ploughs was associated with specific makers, their shops and foundries, towns and villages. By 1870 the leading Scottish plough makers included John Gray & Co., Uddingston, and George Sellar & Son, Huntly.⁹

The idea of the double-furrow plough was not a new one when Pirie patented his ‘improvement in ploughs’ in 1867. It had a long history in other parts of Britain. G. E. Fussell notes that one was included in Blyth’s drawings of ploughs around 1650. Lord Somerville patented an improved one in 1802 which was recommended by the Board of Agriculture and manufactured

² National Records of Scotland [hereafter NRS], SC275/31/87. See *Brisbane Courier*, 25 Jan. 1873.

³ Peter Dewey, *‘Iron harvests of the field’: The making of farm machinery in Britain since 1800* (2008).

⁴ *Aberdeen Journal* [hereafter AJ], 26 July 1871.

⁵ General Register Office for Scotland (GROS), 218/0000300026.

⁶ GROS, Census 1871 218/00002/00002. SC1/36/81,

SC1/37/80. *North British Agriculturist* [hereafter NBA], 29 Mar. 1871.

⁷ *Cornwall’s New Aberdeen Directory for 1853–54* (1853).

⁸ ScotlandsPeople, www.scotlandspeople.gov.uk, 1871, 218/00002/00002.

⁹ *Highland and Agricultural Society of Scotland* (1870), pp. 52, 73.

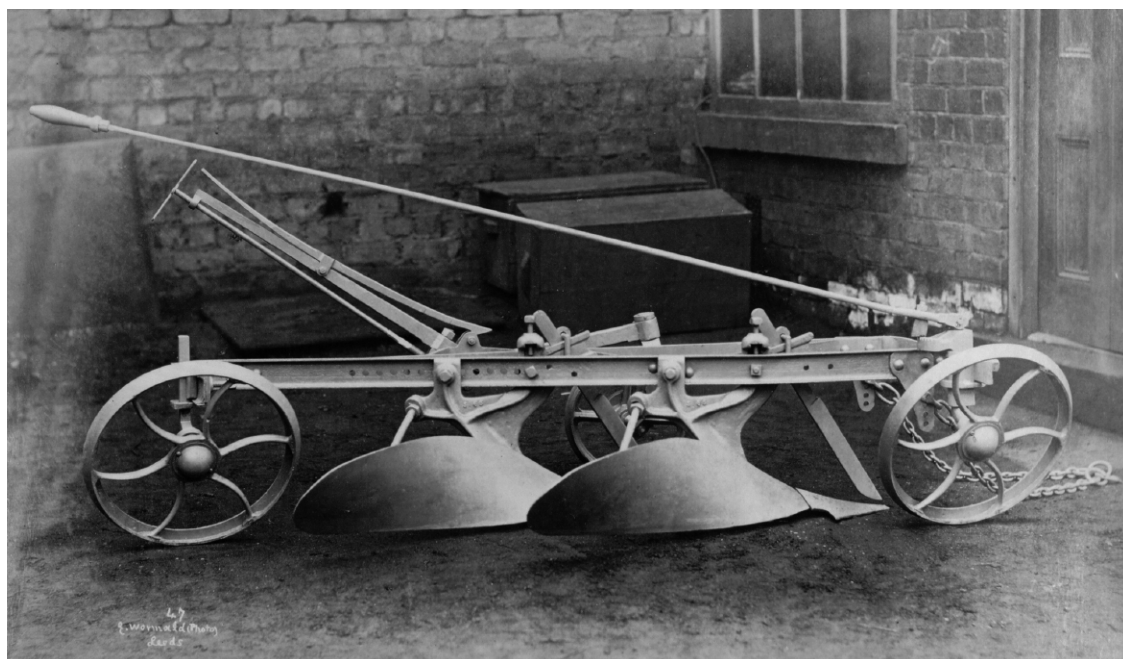


FIGURE 1: Pirie's double-furrow plough, 1868.

Source: University of Reading, Museum of English Rural Life, John Fowler & Co. (Leeds) Ltd, FOW PH/1/32

in later years by Ransome at Ipswich (later Ransomes, Sims and Head), one of the leading English plough makers.¹⁰ J. & F. Howard, Bedford, another of the leading English plough makers, had manufactured them 'for a great many years' prior to the 1870s, and 'had been very successful' in doing so.¹¹ Double and other multiple-furrow ploughs were also developed and used in steam ploughing: reversible turnwrest ploughs which turned two furrows at a time, and balance ploughs which could turn larger number of furrows.¹² The balance ploughs of John Fowler & Co, Leeds, used with the company's double-engine system of traction engines, were the most popular way that steam ploughing was undertaken in Britain from the 1870s onwards.¹³

Aspects of the plough design used by Pirie were already known. As J. F. Howard observed, 'the main features of it were not new'.¹⁴ But Pirie's invention 'had not been publically known or used previous to his patent'. Indeed, J. E. Ransome asserted that to Pirie

belongs the credit of bringing out the double plough in an entirely new form, and especially of fitting to it a friction wheel to run behind the plough in the angle of the furrow in place of the slade, in order to reduce the draught.¹⁵

¹⁰ G. E. Fussell, *The history of the farmers tools: British farm implements, tools and machinery, AD 1500-1900* (1981), p. 59; NBA, 26 Jan. 1870.

¹¹ NBA, 29 Mar. 1871.

¹² Jonathan Brown, *Steam on the Farm* (2008), p. 90.

¹³ Dewey, 'Iron harvests', p. 66.

¹⁴ NBA, 29 Mar. 1871.

¹⁵ NBA, 7 Feb. 1872.

II

Agriculturists quickly recognized that Pirie's plough was an 'important invention'.¹⁶ In March 1868 the Royal Northern Agricultural Society considered that it was 'one of the most important agricultural implements exhibited for many years'.¹⁷ According to the *North British Agriculturist*, the Scottish agricultural newspaper, it 'wrought a revolution in the manufacture of agricultural implements'.¹⁸ It created a sensation in ploughs, plough making and ploughing. One leading agriculturist, and an ardent enthusiast for steam ploughing and cultivation, George Greig, believed that Pirie's plough was the greatest improvement that had been effected on ploughing for the last 50 or 60 years.¹⁹ By July 1868 it had 'attracted a great deal of attention from machine makers and agriculturists'.²⁰ Less than a year later in March 1869 it was considered to be 'famous', and by August 1870 Pirie was reported to have gained a pre-eminence as a manufacturer of double-furrow ploughs.²¹ In the following year he suggested that his plough:

has gained for itself a reputation with the practical farmer, not only in Great Britain, but over the whole of the civilized world, such as was never achieved by any other agricultural implement in so short a time.²²

By 1878 James Melvin and Thomas Milne believed that Pirie's plough had been 'a considerable success'.²³

Pirie's plough, and double-furrow ploughs made by other makers, became widely used throughout Scotland and further afield; in England they had been heavily advertised in districts as far apart as Northumberland and Oxfordshire.²⁴ By November 1870 Pirie could assert that his plough was 'now in regular use both at home and abroad'.²⁵ Their early manufacturing figures were impressive. In March 1871, two reports suggested that 'considerably over 3000' ploughs had been manufactured using Pirie's patent while there was 'an incalculable number of [double-furrowed] ploughs made by other manufacturers'.²⁶ During that month there was a 'steadily growing demand' for it: by 1874 had become 'so widely spread over the country'.²⁷ In 1908, James MacDonald, writing in *Stephens' Book of the Farm* could comment that 'double furrow ploughs are used to a considerable extent'.²⁸

¹⁶ *AJ*, 26 Feb. 1868, 17 Nov. 1869.

¹⁷ *AJ*, 11 Mar. 1868.

¹⁸ *NBA*, 9 May 1877.

¹⁹ *Bell's Weekly Messenger*, 28 Dec. 1868.

²⁰ *The Times*, 31 July 1868.

²¹ *NBA*, 3 Aug. 1870, *The Scotsman*, 6 Mar. 1869.

²² *NBA*, 19 July 1871.

²³ James Melvin and Thomas Milne, 'Farm machinery', *Report on the Present State of the Agriculture of*

Scotland, arranged under the Auspices of the Highland and Agricultural Society (1878), p. 148.

²⁴ For example, *Newcastle Courant*, *Oxford J.* in 1869.

²⁵ *AJ*, 30 Nov. 1870.

²⁶ *AJ*, 8 Mar. 1871, *Glasgow Herald* [hereafter *GH*], 4 Mar. 1871.

²⁷ *GH*, 4 Mar. 1871, *NBA*, 29 July 1874.

²⁸ James Macdonald (ed.), *Stephens' Book of the Farm* (5th edn, Edinburgh, 1908), I, p. 372.

III

While Pirie had some capacity to manufacture his plough at Nether Kinmundy, he must have anticipated that this would have been insufficient to deal with demand. He made arrangements to increase its production, ensure its distribution and manage his patent and its rights, by means of various deeds of arrangement. He put in place arrangements that allowed authorized makers to manufacture and sell it. While they were 'busily employed' manufacturing it in October 1868, it was not until the summer of 1869 that deeds of arrangements were made and signed. In June 1869 a share of the patent had been assigned to two directors of John Fowler & Co., Leeds: Robert Fowler and Robert William Eddison. They were given exclusive rights and privileges to use the patent and to manufacture and sell Pirie's plough in England and Scotland south of the Forth, excluding Glasgow, for a period of 14 years.²⁹ The choice of that maker is significant: Fowler was the largest maker in Britain of steam ploughing engines and ploughing and cultivating tackle, for which it had a world repute. But while steam ploughing represented an innovative ploughing technology, it was also one that competed against the double-furrow plough. The deed of arrangement gave Fowler the potential to spread multiple-furrow ploughing more widely, even with horsepower. Another deed of arrangement was made with John Fraser and Alexander Mitchell of Robert Mitchell & Son, Peterhead (hereafter referred to as Mitchell). It permitted them to manufacture Pirie's plough for sale in Scotland, Ireland and for export to the British Colonies. The company had been in business since the early 1850s as a general maker of a broad range of agricultural implements and machines; it had a reputation for its manufactures. By 1870 it described itself as agricultural implement makers, ironfounders, mechanical engineers and smiths.³⁰

Further agreements were made in 1871 and 1872, which enabled the manufacture and sale of Pirie's plough to be extended further. In 1871 agreements were made with a number of Scottish implement makers, including well-known and renowned ones. In 1871 Alexander Jack and Sons, Maybole, Ayrshire, a prominent implement maker, was able to exhibit at the general show (or the Highland Show) of the Highland and Agricultural Society of Scotland a 'double furrow plough with triple adjustment cast steel skife and mould board, and two sets irons, invented by Thomas Pirie, made by exhibitors'.³¹ George Sellar & Son, Huntly, Aberdeenshire, exhibited six double-furrow ploughs 'invented by Thomas Pirie, made by exhibitors', while in the following year, 1872, Sellar also exhibited a range of double-furrow ploughs 'invented by Pirie & Sellar'.³² George Sellar & Son was the largest plough maker in Scotland, again with 'a world-wide reputation as ploughmakers'.³³ A further arrangement was made with another leading Scottish plough maker, John Gray & Co., Uddingston, Lanarkshire, after it lost the court case brought against it by John Fowler & Co. for breach of Pirie's patent in 1871. Gray

²⁹ University of Reading, Museum of English Rural Life, TR FOW Co5/83; NRS, SC275/31/87.

³⁰ NBA, 8 Sept. 1858, *The Post Office Directory of the Engineers and Iron and Metal Trades* (1870).

³¹ Highland and Agricultural Society of Scotland (HASS), *Catalogue of Implements, Machines, and Other*

Articles, at the Perth Show [hereafter *Catalogue*], 26, 27, and 28 July 1871 (1871), p. 66.

³² *Ibid.*, p. 82; *Catalogue* 1873, p. 69.

³³ James Black, 'On the agriculture of Aberdeenshire and Banffshire', *THASS* (fourth ser., 3, 1870-1), p. 70.

thus developed and manufactured double-furrow ploughs which combined the 'patents of Pirie & Gray'.³⁴ In January 1872 a further deed of arrangement allowed Pirie's plough to be more easily and widely produced and sold by the leading English plough makers, Ransomes, Sims & Head, Ipswich, J. & F. Howard, Bedford, and Richard Hornsby & Sons, Grantham, who were able to grant licenses under the patent.³⁵

IV

Pirie created an interest in his plough by careful promotion, which in turn stimulated an interest in double-furrow ploughs more generally. He wanted to ensure that agriculturists, including farmers, were aware of it and its advantages. As an implement maker and farmer, he would have been aware of the benefits of seeing implements and machines at work so that they could be examined and fully assessed. He used means already available to promote and stimulate interest in agricultural implements and machines in Scotland: agricultural shows, trials of implements and machines, private and public, ploughing matches, and the Scottish agricultural press, represented by the national agricultural newspaper, the weekly *North British Agriculturist*. Each had their own roles in undertaking promotional activities and in doing so at different times of the year: the agricultural shows, ploughing matches and trials were shaped by the cycle of the agricultural year. In turn, their annual cycle shaped the activities of plough and implement makers in developing and exhibiting their manufactures. The summer shows, especially those of the regional and national societies, were important for launching new implements and efforts were made to ensure that manufacturers were ready for them; societies sometimes arranged spring and winter shows, though each had a distinct focus. For plough makers, it was also important that new ploughs were ready for sale before the early winter when ploughing started. The ploughing match season was another important focal point and new ploughs, including competition models, had to be available at the start of it. Trials of implements and machines were generally undertaken at the appropriate season when they were to be used in practice. Trials were usually high profile events, and because of this, early notice could be given of the implements and machines that were to be assessed, and submissions sought, giving makers time to finalize their designs and manufacture them.

V

Between 1867 and 1869 Thomas Pirie undertook a number of steps to draw attention to his plough. The first public exhibition of his plough appears to have been at the show of the Royal Northern Agricultural Society, which then entered it for trial in September 1867 alongside a number of reaping machines.³⁶ After the end of the show season, he trialled it at various ploughing matches and trials. In February 1868, he made 'various trials of its capabilities' in Aberdeenshire, Banff and Morayshire, and demonstrated it at ploughing matches, including

³⁴ For example, HASS, *Catalogue 1871*, p. 61.

NBA, 15 Dec. 1869.

³⁵ MERL, TR FOW Co5/84, deed of arrangement.

³⁶ AJ, 18 Sept. 1867.

the 'great annual ploughing match' arranged by the Morayshire Farmers' Club. He also conducted private trials for 'several eminent agriculturists'.³⁷

In 1868 he exhibited his plough at a number of the major agricultural shows, notably the Royal Northern Agricultural Society's spring show in March, and the Highland Show in July, where Mitchell also exhibited the plough.³⁸ The Highland and Agricultural Society of Scotland selected Pirie's plough for trial as part of a wider trial of ploughs; it gained second prize behind Mitchell while Fowler's plough came third.³⁹ In December 1868 Fowler exhibited Pirie's plough at the Smithfield Club Show in London, a major forum for the showcase of new implements and machines, especially English ones.⁴⁰ After ploughing commenced at the end of 1868, he continued to demonstrate his plough; a trial was arranged at Hatton of Carse, Angus in early December.⁴¹

During 1868 Pirie also started to establish a network of agents in Scotland. The use of of agricultural implement agents was not, however, widely used at this time in the Scottish agricultural implement and machinery industry. Pirie's first agent appears to have been a local one: Ben. Reid & Co., Aberdeen, a firm which had arranged a public trial of Pirie's plough at Laurencekirk, Kincardineshire, in February 1868.⁴² A second one was appointed in Angus by early December: W. D. Brown, Turin.⁴³

In the first half of 1869 Pirie built on the strong presence that he had developed at trials, ploughing matches, locally important agricultural shows and the Highland Show. He again exhibited his plough at the spring show of Royal Northern Agricultural Society and at the Highland Show where Mitchell and Fowler also exhibited their ones. Again, both societies set aside his plough for trial; those of Mitchell and Fowler were also selected.⁴⁴ As Fowler had its own show circuit in England, it also entered the plough for trial at the meeting of the Bath and West of England Society in June.⁴⁵

Pirie continued to appoint agents during 1869. They included major implement agents. In the South of Scotland, John Pringle, 33 Horsemarket, Kelso, and 1 Victoria Street, Edinburgh, was appointed by June; Pringle exhibited Pirie's plough at Glasgow Agricultural Society's show.⁴⁶ In western Scotland, the sole agent was P. & R. Fleming & Co., 29 Argyle Street, Glasgow, appointed in November; it announced its agency with a series of adverts in the Scottish provincial press, principally the *Glasgow Herald* and *The Scotsman*.⁴⁷ The agents changed in following years as new ones were appointed and others discontinued.⁴⁸

Although Pirie's plough was widely reported in the national, provincial and local press, as well as Scottish agricultural press, it was not advertised in the *North British Agriculturist* until early 1869. Fowler and Pirie both undertook their own promotional activities. (Mitchell did not advertise the plough in that newspaper.) Fowler was an extensive advertiser from 10

³⁷ *AJ*, 26 Feb. 1868.

³⁸ HASS, *Catalogue of Implements*, 1868, p. 52.

³⁹ *AJ*, 28 Oct. 1868.

⁴⁰ *NBA*, 16 Dec. 1868.

⁴¹ *Dundee Courier* [hereafter *DC*], 3 Dec. 1868.

⁴² *AJ*, 26 Feb. 1868, 21 July 1869.

⁴³ *DC*, 3 Dec. 1868.

⁴⁴ *AJ*, 28 July 1869, *The Scotsman*, 6 Mar. 1869, 18

Aug. 1869, HASS, *Catalogue of Implements*, 1869, p. 73.

⁴⁵ *NBA*, 9 June 1869, HASS, *Catalogue of Implements*, 1869, p. 49.

⁴⁶ *NBA*, 16 June 1869.

⁴⁷ For example, *GH*, 20 Nov. 1869; *The Scotsman*, 9 Dec. 1869.

⁴⁸ Thomas Scott, Edinburgh, is recorded as an agent in 1870 (*The Scotsman*, 30 Apr. 1870).

FIGURE 2: Fowler's first advert in the *North British Agriculturist*, 24 March 1869.

J. FOWLER & CO.'S DOUBLE-FURROW PLOUGH.
(PIRIE'S PATENT)



JOHN FOWLER & CO., ENGINEERS, LEEDS, have much pleasure in drawing the attention of the public to this New Implement. The object of the Plough is to save draught; and by turning two furrows at once, one man—and either two or three horses, according to the nature of the soil—can do as much work as two ploughs of the best ordinary description.

The construction of the Plough is different from any other, the land side and slide being entirely dispensed with, and two wheels substituted. These wheels run at such an angle, and are so shaped, that the whole of the thrust caused by lifting and turning the furrow is taken on them, and thus a rolling friction is substituted for a dragging friction, and the draught is diminished by at least 30 per cent.

J. F. & Co. have now arranged this Plough on a bevel frame, and have reduced the price to
TEN POUNDS.
If with STEEL SKIFFS, ... 20s EXTRA.

REPRESENTATIVE FOR SCOTLAND—
GEORGE GREIG, HARVIESTON, STONEHAVEN;
OR, INDIA BUILDINGS, EDINBURGH.

February 1869. However, rather than announce it as a new implement, promoting its merits and importance as might be expected for an important innovation, that first advert drew attention to Fowler's rights to Pirie's patent and the dangers of infringement. This notice was repeatedly issued in following weeks, with an invitation to send reports of any infringements of the patents to Fowler's Scottish agent, George Greig, Harvieston, Stonehaven.⁴⁹ Fowler's name is first associated with the plough a few weeks later, on 24 March 1869 (Figure 2). This advert, the largest one that the company placed in this newspaper to advertise the plough, was to draw 'the attention of the public to this New Implement'.⁵⁰ The plough was advertised separately from its steam ploughing and cultivating machinery, though adverts for both could be published next to one another. Fowler continued to advertise the plough throughout the summer months, seeking to build up a market for the winter ploughing season of 1869–70.⁵¹

VI

Pirie's plough quickly stimulated a wider interest in double-furrow ploughs amongst farmers and other members of the farming community, who were eager to see both his plough and the similar ones that were starting to be made by other makers. While the ploughs were inspected by large numbers of visitors at agricultural shows, including district ones, it was at the trials and ploughing matches where they had the opportunity to see them at work that they received the greatest attention.⁵² As one commentator observed in January 1870: 'ploughing match follows ploughing match, and still the double-furrow is in the ascendant'.⁵³ Especially

⁴⁹ NBA, 10 Feb. 1869.

⁵⁰ NBA, 24 Mar. 1869.

⁵¹ For example, NBA, 24 Mar. 1869, 21 July 1869, 22 Sept. 1869.

⁵² GH, 28 Apr. 1869; NBA, 12 July 1870; *The Scotsman*, 28 Apr. 1870.

⁵³ GH, 25 Jan. 1870.

until 1871, ploughing matches that had double-furrow ploughs attracted crowds of a significant size.⁵⁴ Some even drew their largest-ever attendances.⁵⁵ Even at private trials, large crowds assembled.⁵⁶

Double-furrow ploughs made by other makers started to appear at agricultural shows, ploughing matches and trials in increasing numbers. There is a distinct increase in their numbers and in the range and number of events where they are recorded, especially between 1868 and 1871. At agricultural shows, there were few double-furrow ploughs from other makers exhibited during the show season of 1868. The number of makers and the shows at which they exhibited increased in 1869, when they were also recorded at a wider range of shows, including regional ones such as Ayrshire Agricultural Association and local shows such as Biggar Cattle Show in Lanarkshire.⁵⁷ Their diffusion from the regional show in the geographical area of the plough's invention, and the Highland Show, to more local ones is especially important, showing its acceptance by agriculturists as a practical implement. That expansion continued in 1870 when double-furrow ploughs were recorded at an even larger number of shows and over a wider geographical area of the country, including counties such as Easter Ross, Perthshire, Stirling, Midlothian, Lanarkshire and Ayrshire, all some distance from Aberdeenshire.⁵⁸

They were also present at specially arranged trials, though the numbers of these were small in 1867 and 1868.⁵⁹ In 1868 they included one arranged in November by the Garioch Farmer Club; a further one was arranged by Fyvie Agricultural Association, which invited makers and 'others'.⁶⁰ Further trials were not common until the autumn of 1869. During the winter of 1869–70 there were no less than 28 such trials specifically set up to test double-furrow ploughs (15 were held between October and the end of December 1869). This was the largest number held in any season. Most of them were arranged by agricultural societies, both local and county, as well as some ploughing societies (demonstrations were an innovative feature as the focus of the event was on competitive ploughing). Regional and national societies which had held trials in previous years held further ones: the Highland and Agricultural Society of Scotland had ploughs by seven makers including Pirie, Mitchell, and Fowler, and the Royal Northern Agricultural Society had 'a dozen entries of double-furrow ploughs', including ones from Pirie and Mitchell.⁶¹ A few makers or their agents also arranged special ones.⁶² Trials were held throughout a wide geographical area of the country. They included, for example, five arranged in Aberdeenshire, and one in Morayshire.⁶³ There were seven in the Lothians,⁶⁴ three in Stirlingshire,⁶⁵ two in Lanarkshire,⁶⁶ two in Renfrewshire,⁶⁷ and two in Dumbartonshire.⁶⁸ There was one at Fife,⁶⁹

⁵⁴ For example, *AJ*, 9 Dec. 1868; *GH*, 20 Dec. 1869; *NBA*, 22 Dec. 1869; *The Scotsman*, 29 Nov. 1869.

⁵⁵ *GH*, 9 Feb. 1870.

⁵⁶ *GH*, 24 Nov. 1869.

⁵⁷ *GH*, 28 Apr. 1869; *The Scotsman*, 27 Aug. 1869.

⁵⁸ *GH*, 9 July 1870; *NBA*, 11 May, 12 July, 20 July, 27 July, 3 Aug. 1870; *The Scotsman*, 28 Apr., 5 May, 18 July, 26 July, 28 Sept. 1870.

⁵⁹ *AJ*, 18 Sept. 1867.

⁶⁰ *AJ*, 11 Nov., 2 Dec. 1868.

⁶¹ *AJ*, 17 Nov. 1869; *The Scotsman*, 18 Aug., 15 Nov. 1869.

⁶² *AJ*, 10 Nov. 1869; *GH*, 24 Nov. 1869; *The Scotsman*, 12 Oct., 15 Oct. 1869.

⁶³ *AJ*, 10 Nov., 17 Nov., 1 Dec., 21 Dec. 1869, 2 Feb., 9 Mar. 1870; *The Scotsman*, 4 Mar. 1870.

⁶⁴ *The Scotsman*, 12 Oct., 15 Oct. (2 references), 6 Nov. 1869, 8 Jan., 19 Jan., 9 Feb. 1870.

⁶⁵ *The Scotsman*, 6 Nov. 1869; *GH*, 24 Nov. 1869, 8 Feb. 1870.

⁶⁶ *GH*, 29 Oct. 1869, 12 Jan. 1870.

⁶⁷ *GH*, 17 Dec., 31 Dec. 1869.

⁶⁸ *GH*, 17 Dec., 20 Dec. 1869.

⁶⁹ *The Scotsman*, 4 Mar. 1870.

and a further one in Perthshire, at Coupar Angus.⁷⁰ The earliest ones were held in the Lothians, a progressive district, followed by those in Aberdeenshire, Stirlingshire and Renfrewshire, though competitions in Midlothian continued into January.⁷¹ Some of the trials were large events. At Stirling some 16 double-furrow ploughs were entered for trial, while there were also 16 entries at Fettercairn.⁷² At Morayshire Farmers' Club there were 13 entries, though, two or three 'did not put in an appearance'.⁷³

Further trials were held during the winter ploughing season of 1870–71. Although a smaller number were held than in the previous season, they were recorded throughout the major agricultural districts such as Aberdeenshire, Midlothian, Lauderdale, Dumbartonshire, and Perthshire. They were, however, generally larger competitions than had been previously held, with a significant number of ploughs by different makers being entered at each. At Niddrie Mains, Edinburgh, there were some 21 double-furrow ploughs, while at Halkerston, also in Midlothian, 22 ploughs were entered, though only 12 came forward.⁷⁴ The ploughing season of 1871–72 had a smaller number of trials, though they continued to be large competitions. By this time, the competition at Dalkeith, Midlothian, had become an established annual event; it was to become the 'Midlothian double furrow plough competition' and continued to be held each year until 1878.⁷⁵

Classes for double-furrow ploughs started to be arranged at ploughing matches. The first matches with such a class were all held in Aberdeenshire, at Formartine, Ythanside and Belhelvie, in December 1868.⁷⁶ By 1870 they were recorded in many districts of Scotland, though such a class was by no means universal.⁷⁷ Between January and March 1870 they are recorded in 15 of the 42 ploughing matches whose results were published in provincial newspapers and the *North British Agriculturist*.⁷⁸ Not only were they found in the north-east,⁷⁹ but also throughout Lowlands areas, including Renfrewshire,⁸⁰ Argyll (Cardross),⁸¹ Stirlingshire, West Lothian,⁸² Campbeltown (Argyll), Dumbartonshire, Dumfriesshire, Ayrshire,⁸³ Perthshire,⁸⁴ Fife, the western district of Midlothian,⁸⁵ and East Lothian.⁸⁶ They were also found in highland districts, such as Kilfinan (Argyll).⁸⁷

Their presence continued to grow at ploughing matches in 1871, though again, they were not found at all of them. Between January and March they were recorded at 22 of the 40 matches reported in the provincial press and the *North British Agriculturist*.⁸⁸ They were recorded for the first time as an established class.⁸⁹ Between January and March 1872 they are recorded at

⁷⁰ *The Scotsman*, 18 Mar. 1870.

⁷¹ *The Scotsman*, 8 Jan., 24 Jan. 1870.

⁷² *The Scotsman*, 6 Nov., 6 Dec. 1869.

⁷³ *AJ*, 1 Dec. 1869; *The Scotsman*, 29 Nov. 1869.

⁷⁴ *NBA*, 25 Jan., 1 Feb., 15 Feb. 1871.

⁷⁵ *NBA*, 25 Jan. 1871, 1 Jan. 1873, 13 Jan. 1875, 2 Feb. 1876, 24 Jan. 1877, 23 Feb. 1878; *The Scotsman*, 17 Feb. 1872, 7 Dec. 1874.

⁷⁶ *AJ*, 9 Dec., 23 Dec., 30 Dec. 1868.

⁷⁷ For example, Renfrewshire (*NBA*, 26 Jan. 1870), Currie, Midlothian (*NBA*, 26 Jan. 1870), Blairdrummond, Stirlingshire (*NBA*, 9 Feb. 1870), Falkirk, Stirlingshire (*NBA*, 9 Feb. 1870), Kirkcaldy, Fife (*NBA*, 23

Feb. 1870).

⁷⁸ Evidence from *GH*, *NBA*, and *The Scotsman*.

⁷⁹ *NBA*, 5 Jan., 30 Mar. 1870.

⁸⁰ *NBA*, 12 Jan. 1870.

⁸¹ *GH*, 29 Jan. 1870.

⁸² *NBA*, 9 Feb. 1870.

⁸³ *NBA*, 16 Feb. 1870.

⁸⁴ *NBA*, 9 Mar. 1870.

⁸⁵ *NBA*, 21 Dec. 1870.

⁸⁶ *The Scotsman*, 7 Mar. 1870.

⁸⁷ *GH*, 12 Mar. 1870.

⁸⁸ Evidence from *NBA*, *The Scotsman* and *GH*.

⁸⁹ *The Scotsman*, 21 Dec. 1870, 23 Jan. 1871.

seven of the 12 matches reported in the press. For that same period in 1873, they are recorded at eight of the 14 matches. At them, there was generally a small entry of double-furrow ploughs, though at the Western District of Midlothian match in January 1871 there were 19.⁹⁰

VII

The impact of Pirie's plough on the manufacture of ploughs in Scotland can be traced through evidence from accounts of agricultural shows, trials, ploughing matches and the Scottish agricultural press. Because of the importance of Pirie's innovation, other makers quickly began to make double-furrow ploughs. The speed of adoption stands in comparison to the decades that the steam ploughing engine and tackle or the reaping machine took to be adopted in Scotland. This paper sets out that adoption by other makers in the period 1867 to 1875, with an account of how the fully established makers exhibited their ploughs in the years between 1876 and 1880.

Underpinning the making of the double-furrow plough by other makers was a number of considerations: their awareness of developments in ploughs; their ability to make a design that would not infringe on Pirie's patent; the demand for the plough in their customer area; the awareness of other local makers also making double-furrow ploughs; and the seasonal round of promotional events at which they could announce and exhibit new manufactures such as a double-furrow plough. This last factor was especially important in the shaping when plough and implement makers announced and brought forward their new double-furrow ploughs.⁹¹ We can break down the adoption of the plough by other manufacturers into six stages. The manufacturers are named in Table 1.

(a) Stage 1: Early steps taken by other makers to manufacture double-furrow ploughs by the time of the Highland Show in July 1868

Until the Highland Show of July 1868 only a small number of other implement and machine makers had started to manufacture their own double-furrow ploughs (Table 1). Three are recorded, all in north-eastern Scotland, especially Aberdeenshire, the home county of Pirie's plough. Of the three plough makers with ploughs at the Highland Show of 1868, the plough of at least one, William Shivas of Kinmundy, Longside (also residing and working in the same parish as Pirie), was of a 'simpler construction than Pirie's, but upon the same principle'.⁹² Shivas' plough demonstrates the early stages of the diffusion of Pirie's design, using the same principles, though with some modification. During this period the double-furrow plough was still an innovation, though other local makers were trying to adapt the design.

⁹⁰ *The Scotsman*, 23 Jan. 1871.

⁹¹ For example, John R. Walton, 'Mechanization in agriculture: a study of the adoption process', in H. S. A. Fox and R. A. Butlin (eds), *Change in the*

Countryside: Essays on Rural England, 1500–1900 (1979), pp. 23–42.

⁹² *AJ*, 28 Oct. 1868; *NBA*, 28 Oct. 1868.

TABLE 1: New makers of double-furrow ploughs recorded in the agricultural and general press and at the general show (Highland Show) of the Highland and Agricultural Society of Scotland following Pirie's plough of 1867, 1867-75.

<i>Date</i>	<i>Names of maker</i>	<i>Date</i>	<i>Names of maker</i>
<i>Stage 1</i>		<i>Stage 3</i>	
July 1867	Thomas Pirie, Kinmundy, Aberdeenshire	November 1869	Picksley & Sons, Bedford Foundry, Leigh, Lancashire
July 1868	Robert Mitchell & Son, Peterhead, Aberdeenshire William Shivas, Kinmundy, Longside, Aberdeenshire	December 1869	A. R. Guthrie, Craggs, Renfrewshire Mr McCreath, Cadder, Renfrewshire Mr McRaith, Cadder, Renfrewshire Ransomes, Sims & Head, Ipswich
<i>Stage 2</i>		January 1870	James Geddes, Manderlee, Alvah William Gossip, Parkhill, Aberdeenshire Mr Skinner, Rhynie, Aberdeenshire
By October 1868	John Fowler & Co., Leeds Robert Mitchell & Son, Peterhead, Aberdeenshire	March 1870	Auchinachie & Simpson, Keith, Morayshire William Dewar, Couttie Bridge, Perthshire Mr Ross, Stonehaven, Kincardineshire
November 1868	Alexander Brodie, Auchterless, Aberdeenshire J. & F. Howard, Bedford G. W. Murray & Co., Banff Foundry, Banff	February 1870	William Kirkwood, Lothian Bridge, Midlothian Law, Duncan & Co., Glasgow Mr McIlwraith, Cadder, Dumbartonshire John McKirdy, Bute Peter Winton, Thorn, Stirlingshire
December 1868	George Coutts, Menie, Aberdeenshire Mr Craig, Tarves, Aberdeenshire William Craig, Old Meldrum, Aberdeenshire Mr Duncan, Tarves, Aberdeenshire Mr Philip, Newscat, Aberdeenshire Mr Tough Pitmedden, Aberdeenshire	By July 1870	William Black, Lockerbie, Dumfries John Bonella, Foodieash, Fife Halliday & Thompson, Dumfries J. & F. Howard, Britannia Iron Works, Bedford Alexander Jack & Sons, Maybole, Ayrshire John Kerr, Mouswald, Dumfries William McCormick, Dumfries A. & J. Main & Co., Glasgow David Scoular & Co., Forest Mill, Clackmannan James Taylor & Sons
By July 1869	John Anderson, Monifieth, Dundee, Angus William Mitchell, Montrose Foundry, Montrose, Angus David Hinton, Lunan, Arbroath, Angus Benjamin Bisset, Brechin, Angus John Gray & Co., Uddingston, Lanarkshire Alexander Guthrie, Craigo, Montrose, Angus William Horn, near Rothmaise, Rayne, Aberdeenshire Alexander Jack & Sons, Maybole, Ayrshire George Ponton & Son, Linlithgow, West Lothian James Robertson, Coupar Angus, Perthshire George Sellar & Son, Huntly, Aberdeenshire	<i>Stage 4</i>	
		November 1870	Alexander Newlands, Inverurie, Aberdeenshire
		December 1870	John Barrowman & Co., Saline, Fife Mr Martin, Dalkeith, Midlothian
		January 1871	Thomas Hunter, Maybole, Ayrshire

TABLE 1: *continued*

<i>Date</i>	<i>Names of maker</i>	<i>Date</i>	<i>Names of maker</i>
February 1871	David Paterson, Carnock, Stirlingshire		Mellard's Trent Foundry Co., Rugeley, Staffordshire
March 1871	Charles Robertson, Maryculter, Banchory		Robert Roxburgh, Kinross
		<i>Stage 5</i>	
May 1871	Robert Miller, Mauchline, Ayrshire	January 1872	Robert Kennedy, Halls of Airth, Stirlingshire
By July 1871	James D. Allan & Sons, Culthill, Dunkeld, Perthshire		Mr Young, East Calder, Midlothian
	Richard Bickerton & Sons, Berwick on Tweed	By July 1872	R. Hornsby & Sons, Grantham
	Richard Hornsby & Sons, Grantham		Ransomes, Sims & Head, Ipswich
	Kemp, Murray & Nicholson, Stirlingshire	July 1874	Northern Agricultural Implement and Foundry Company, Inverness
	Thomas McCulloch & Co.	July 1878	A. Thompson, Dumfries

Source: Aberdeen Journal, 28 Oct., 2 Dec., 9 Dec. 23 Dec., 30 Dec. 1868, 21 July, 28 July, 10 Nov., 17 Nov. 1869, 12 Jan., 19 Jan., 9 Mar. 1870, 8 Mar. 1871; *Glasgow Herald*, 22 Dec. 29 Dec., 31 Dec. 1869, 21 Jan. 1871, 9 Feb. 1870, 11 Feb. 1871, *North British Agriculturist*, 28 Oct., 2 Dec. 1868, 28 July, 29 Sept. 1869, 9 Mar., 13 July, 27 July, 21 Dec. 1870; 29 Mar., 3 May, 17 May, 13 Sept., 27 Sept., 4 Oct., 11 Oct., 18 Oct., 1 Nov., 8 Nov., 22 Nov., 29 Nov., 6 Dec., 20 Dec., 27 Dec. 1871, 24 Jan. 1872, *The Scotsman*, 26 July, 15 Nov. 1868, 10 Nov., 15 Nov. 1869, 9 Feb., 7 Nov. 1870, 26 July 1871, 2 Apr. 1873, Highland and Agricultural Society of Scotland, *Catalogue of Implements, Machines and Other Articles*, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1878.

(b) Stage 2: Steps taken by other makers after the Highland Show of 1868 and the following Highland Show of 1869

In the year following the Highland Show of 1868 there were significant developments in the manufacture of double-furrow ploughs, and in particular an increase in the number of new makers recorded, their character and their geographical location (Table 1). The period until December 1868 continued to see the local developments in north-east Scotland, and especially Aberdeenshire, where the plough was starting to be made by an increasing number of makers; this was also a trend that continued in the following months. In November 1868, G. W. Murray & Co., Banff Foundry, Banff, entered a plough into a double-furrow plough competition at Fyvie.⁹³ Murray was one of the major agricultural implement and machine makers in that part of Scotland and had a national (and indeed international) standing.⁹⁴ The company was to extensively advertise its ploughs in the *North British Agriculturist* in the following months and years and to take its double-furrow plough to the Vienna International Exhibition of 1873.⁹⁵ The appearance of Murray marked an important development: a major implement and machine maker in Scotland that recognized the significance of the double-

⁹³ *AJ*, 2 Dec. 1868.

⁹⁴ *The Scotsman*, 2 Apr. 1873, *NBA*, 15 July 1874.

⁹⁵ G. W. Murray advertised in *NBA* on 28 July, 11 Aug., 18 Aug., 25 Aug., 1 Sept., 15 Sept., 29 Sept., 13 Oct.,

27 Oct., 10 Nov., 24 Nov., 8 Dec., 22 Dec. 1869 and 5 Jan. 1870. Murray also launched a further intensive advertising campaign in *NBA* from 6 July 1870. *The Scotsman*, 2 Apr. 1873.

FIGURE 3: G. W. Murray and Co.'s advert for his double-furrow plough in *North British Agriculturist*, 10 November 1869.

PATRONISED BY HER MOST GRACIOUS MAJESTY THE QUEEN.



PATENT COMBINED PLOUGH AND SUBSOILER, CONVERTIBLE AT WILL INTO A PATENT DOUBLE-FURROW PLOUGH.

PRICES.

G. L. M., for Light Land, £9 15s. Steel Sheaths, £1 Extra.
 G. L. P., for Medium Soil, £10 10s. Steel or Iron Shares, 10s per Pair Extra.
 D. M. R., for Heavy Land, £12 12s. No Extras.

Either of the foregoing Ploughs are convertible at pleasure to the Patent Combined Subsoiler; but only D. M. R. are recommended as having abundant strength for such work.
 Subsoiler, £3 3s (Extra).

G. W. MURRAY AND CO.,
AGRICULTURAL ENGINEERS, BANFF FOUNDRY, N.B.,

Beg to call the attention of Agriculturists to their
NEW PATENT IMPROVED DOUBLE-FURROW PLOUGH,
 AND TO THEIR
NEW PATENT COMBINED SINGLE-FURROW AND SUBSOILER,
 As Sold to Her Majesty THE QUEEN for the Royal Farm at Windsor.

At the Highland and Agricultural Show at Edinburgh, 1860, G. W. M. & Co. gained the
 LARGE SILVER MEDAL for these Ploughs and other Exhibits; and their Patent Double-Furrow
 Ploughs are pronounced by all who have seen them to be the Lightest in Draught, the Simplest, and
 the Best Constructed, of any yet invented.
 G. W. M. & Co. manufacture these Ploughs in three varieties, marked G. L. M., G. L. P.,
 and D. M. R.

*In consequence of reports circulated in the interest of the Proprietors of Pirie's Patent Double-Furrow, to
 the effect that G. W. M. & Co.'s Patent is an infringement on that of the latter, G. W. M. & Co. beg to intimate
 that they are in a position to, and do, give in every Receipt a Guarantee, freeing their Customers
 from all Penalties.*

furrow plough and made and sold their own design (Figure 3). Murray was followed by another of the major plough and implement makers of Aberdeenshire, George Sellar & Son of Huntly, who first exhibited their double-furrow plough at the show of the Royal Northern Agricultural Society in July 1869 and entered it into a trial arranged by that Society; it also entered a plough for trial at Inverurie in November 1869.⁹⁶

Some of the larger manufacturers from other areas of the Lowlands also started to make double-furrow ploughs. They included John Gray & Co., Uddingston Iron Works, Uddingston, Lanarkshire, a leading plough maker (Figure 4). As Gray stated that he started to make his double-furrow ploughs in August 1869, his display at the Highland Show must have been of models to advertise their forthcoming availability.⁹⁷ Thereafter, Gray extensively advertised his double-furrow plough in the *North British Agriculturist*.⁹⁸ Alexander Jack & Sons, Maybole,

⁹⁶ AJ, 28 July, 17 Nov. 1869, *The Scotsman*, 15 Nov. 1869.

⁹⁷ NBA, 29 Mar. 1871.

⁹⁸ John Gray & Co., Uddingston, extensively

advertised in the NBA between 29 Sept. 1869 and 15 Dec. 1869, throughout 1870, and from 4 Jan. to 26 July 1871.

GRAY'S CHAMPION PATENT DOUBLE-FURROW PLOUGHS.



JOHN GRAY & CO.'S DOUBLE-FURROW PLOUGHS have beaten those of every other Maker at all the late Competitions, and can be relied upon as the best made.

J. G. & CO. beg to inform the public that their Plough is their own invention, and no infringement of Pirie's Patent, and the reports of interested parties to the contrary are utterly without foundation.

These Ploughs are made of the best Wrought-Iron, and are characterised by Strength, Simplicity, Durability, and Excellence of Work in Stubble or Lea.

Prices—From £9 10s upwards. Particulars on application to

JOHN GRAY AND CO.,
UDDINGSTON IRON WORKS, NEAR GLASGOW.

These Ploughs gained **EIGHT FIRST PRIZES** last week, viz. :—**TUESDAY**, at **CAMPBELTON**, **EAST KILPATRICK**, and **GRETNA**; **THURSDAY**, **NORTHUMBERLAND**; **FRIDAY**, **EAST-LOTHIAN** and **DALRYMPLE**.

29th January 1870.

FIGURE 4: John Gray and Co.'s advert for his double-furrow plough in *North British Agriculturist*, 16 February 1870.

was a leading implement maker in Ayrshire, while George Ponton & Son, Linlithgow, West Lothian, was a well-known plough maker who had received awards for his ploughs from the 1850s onwards from the Highland and Agricultural Society of Scotland.⁹⁹

The exhibition of double-furrow ploughs at the Highland Show of 1869, held at Edinburgh (one of the larger shows for the exhibition of implements and machines) reflected these developments. It confirmed the large numbers of makers that had emerged in a short time. There were 34 such ploughs on display, displayed by 17 exhibitors, which made up a significant part of the 85 exhibits, shown by 31 exhibitors.¹⁰⁰ Some ten of the exhibitors of double-furrow ploughs displayed ploughs that they had manufactured themselves. A further seven – including Pirie, Mitchell, and Fowler, and some of Pirie's agents – exhibited Pirie's plough or Fowler's plough which used Pirie's patent.¹⁰¹ A further five displayed only ploughs made by

⁹⁹ For example George Ponton & Son was awarded two sovereigns for the best two-horse plough for general purposes (*THASS*, new ser. (1849–51), p. 409). He also won the bronze medal for second-best two-horse plough for general purposes in 1861 (Highland and Agricultural Society of Scotland, *Perth Show*, 30th and 31st July and 1st and 2nd August 1861. Award of Premiums. Perth: printed by C. G. Sidey, Post-office, Perth, 1861, p. 20). Alexander Jack & Son was recorded as an implement maker as early as 1844 (*Ayrshire Agriculturist*, 22 Oct. 1844).

¹⁰⁰ Royal Highland and Agricultural Society of Scotland [HASS], *Catalogue of Implements, Machines, and other Articles at the Edinburgh Show*, 28th, 29th, and 30th July, 1869. Edinburgh: printed by Neill and Company, 1869, pp. 23, 25, 27, 43, 44, 49, 52, 53, 54, 59, 63, 64, 67, 73, 76.

¹⁰¹ Agents included Kemp, Murray & Nicholson, Stirling, John Pringle of Edinburgh, Berwick and Kelso, Alexander Jack & Sons, Maybole, A. and J. Main & Co. of Glasgow (HASS, *Catalogue of Implements*, 1869, pp. 25, 27, 59, 66).

other makers, and for which they acted as agent, including Pirie's and Fowler's ploughs, thus helping to spread the availability and use of the plough.

There were a number of improvements made to the design of the double-furrow ploughs: as early as July 1868 some of these were significant. In that month, David Hanton, smith at Lunan, Arbroath, had effected an 'ingenious improvement on Pirie's plough'.¹⁰² By the following summer, there was a greater variation in designs as makers were seeking to make the plough more versatile and applicable to a greater range of soil types. At the Highland Show of 1869 some of the exhibitors had started to display a number of models. While local plough makers generally exhibited one, Pirie and Mitchell had three each; Fowler had seven.

(c) Stage 3: Steps taken by other makers after the Highland Shows of 1869 and 1870

This was a stage that saw a number of trends that built upon earlier developments in the first two stages: the continued strengthening of the north-east as the centre for double-furrow plough manufacture, with further new makers in the area; the spread of makers over a wider geographical area of the Lowlands to include counties such as Renfrewshire, Dumbartonshire, Stirlingshire, Dumfriesshire, Fife, Clackmannanshire and Midlothian and there was increasing use made of agents to sell Pirie's plough (Table 1).

One important development was the increased presence of English plough makers in Scotland, through exhibition at trials and demonstrations. While Mr Leslie, a banker, of Turiff entered a plough made by J. & F. Howard, Bedford, at the trial at Fyvie in November 1868, that firm participated more extensively in these events in late 1869, entering a plough at a trial in the Lothians in October 1869; it also displayed its plough at the Smithfield Club Cattle Show in December that year.¹⁰³ However, it did not advertise its double-furrow plough widely in the Scottish agricultural press until the latter part of 1871.¹⁰⁴ Picksley & Sims, Bedford Foundry, Leigh, Lancashire, competed at another trial in the Lothians in November 1869.¹⁰⁵ In addition, by late 1869, Ransomes, Sims and Head, Ipswich, appointed A. & J. Main & Co., of Glasgow, as its Scottish agents for its double-furrow plough.¹⁰⁶

The Highland Show of 1870, held in Dumfries, which usually had the smallest exhibition of implements and machines, demonstrates the developments in plough making that had taken place since the last show. A total of 19 exhibitors exhibited 56 double-furrow ploughs. These accounted for a significant proportion of the overall display of ploughs, of which there were 94 by 26 exhibitors.¹⁰⁷

As with the earlier Highland Shows, the exhibitors displayed a number of trends in the manufacture and exhibition of double-furrow ploughs. There were five new exhibitors who have not previously been recorded as having manufactured one of these ploughs. There were also exhibitors that had been at the 1869 Show. There were seven of these, including Pirie, Mitchell, and Fowler, as well as some of the most important plough makers in Scotland who were now playing an increasingly important part in the development and manufacture of

¹⁰² *The Scotsman*, 26 July 1868.

¹⁰³ *AJ*, 2 Dec. 1868; *The Scotsman*, 15 Oct., 16 Oct. 1869; *The Times*, 10 Dec. 1869.

¹⁰⁴ *NBA*, 13 Sept., 27 Sept., 4 Oct., 11 Oct., 18 Oct., 1 Nov., 8 Nov., 22 Nov., 29 Nov., 6 Dec., 20 Dec., 27 Dec.

1871.

¹⁰⁵ *The Scotsman*, 10 Nov. 1869.

¹⁰⁶ *GH*, 31 Dec. 1869.

¹⁰⁷ HASS, *Catalogue of Implements*, 1870.

double-furrow ploughs: G. W. Murray & Co. and John Gray & Co. Another, Alexander Jack & Sons, Maybole, who had exhibited Pirie's plough until at least the end of 1870, exhibited for the first time a plough of their own manufacture.¹⁰⁸ There were also makers that had exhibited at other events, but not at the Highland Show, and were now exhibiting there for the first time, of which the most important was George Sellar & Son. The ploughs of J. & F. Howard, Bedford, were also exhibited at it for the first time, by an agent, R. L. MacTaggart of Edinburgh.¹⁰⁹

The exhibitors displayed ploughs from a wider range of provenances than in earlier years. John Pringle of the Scottish Implement Depot, an agent for Pirie in 1869, exhibited 'double furrow ploughs, from different makers'.¹¹⁰ The backbone of the display was ploughs made by Pirie and Fowler and other major makers in the north-east such as G. W. Murray & Co. and George Sellar & Son. Other major makers from outwith this area were also starting to gain inroads into the south-west. They included John Gray & Co., whose ploughs were distributed by John Gordon, Castle Douglas.

Exhibitors also displayed a larger number of ploughs and a wider range of models. For example, Pirie and Fowler each displayed eight different models while Robert Mitchell & Son had a further three, all of which were different to those of Pirie. In addition, G. W. Murray & Co. had some six models. Other exhibitors, including local makers from the south-west, and some of the smaller makers from elsewhere, had two or three.

(d) Stage 4: Steps taken by other makers after the Highland Show of 1870 until the Highland Show of 1871

Developments in this stage built on earlier ones. Additional makers of double-furrow ploughs continued to appear, some in the north-east, but most were from outwith this area and were scattered throughout the Lowlands. Most of them were local makers serving a small geographical area, but they also included noted plough makers such as John Barrowman & Co., Saline, Fife, and the implement maker Thomas Hunter of Maybole.

The Highland Show of 1871, held at Perth, demonstrated that there had been significant changes in the making of double-furrow ploughs. The show had a larger demonstration of these ploughs than either of the previous two: in fact it was the largest one ever. A total of 62 double-furrow ploughs were displayed by 17 exhibitors; they accounted for a significant part of the exhibition of ploughs, of which a total of 105 ploughs were exhibited by 29 exhibitors.¹¹¹ The size of the show not only reflected interest in the double-furrow ploughs but also the size of the market for them and the large number of makers.

The character of the exhibitors had changed significantly. While the earlier shows had a large number of local makers, only a small number of them were at the 1871 Show. Those that did exhibit were located in the neighbouring show district and were seeking to expand their markets. Most of the exhibitors were the larger and more important plough and implement makers. At least two of them, James D. Allan & Sons, Culhill, Dunkeld, Perthshire, and Kemp, Murray & Nicholson, Stirling, were also exhibiting for the first time their own double-furrow

¹⁰⁸ HASS, *Catalogue of Implements*, 1870, p. 56, GH, 1 May 1869, NBA, 21 Dec. 1870, 17 May 1871.

¹⁰⁹ HASS, *Catalogue of Implements*, 1870, p. 32.

¹¹⁰ HASS, *Catalogue of Implements*, 1870, p. 34.

¹¹¹ HASS, *Catalogue of Implements*, 1871.

ploughs rather than ones by Pirie, which they had at earlier shows. Their manufacture shows a move away from Pirie's patented design to new designs from the influential makers that were also located outwith the home district of the plough.

There was for the first time a significant presence of English manufacturers – Richard Bickerton & Sons, Berwick on Tweed, Richard Hornsby & Sons, Grantham, and Mellard's Trent Foundry Co, Rugeley, Staffordshire – all of whom had their own stands.¹¹² This marked the firm establishment of English makers in Scotland that was to continue in following years.

The exhibitors also displayed the largest selection of models that had been seen at the show, demonstrating that they had been able to further extend the application and practicality of the plough. There were models for different types of soil, as well as ones that had different features such as lifting levers and lifting apparatus, subsoiling apparatus, governing steerage, and improved frames. The largest makers had some of the most extensive displays. Pirie exhibited 12 ploughs, including eight models, while Mitchell had four different models. George Sellar & Son displayed eight models, and G. W. Murray & Co. some seven. John Gray & Co., with 11 ploughs, had eight models.

(e) Stage 5: Steps taken by other makers between 1872 and 1875

By 1872 there were few new makers exhibiting their double-furrow ploughs at the Highland Show; all were from areas outwith the home district of the plough (Table 1). By this time the largest makers in Scotland – as well as the most renowned implement makers – had established themselves as makers of double-furrow ploughs and had a reputation for them. That the double-furrow plough was no longer seen as a new implement was reflected in the scale of its exhibitions at the Highland Show. In each of the years between 1872 and 1875, the show had a much smaller display of double-furrow ploughs, both in terms of the number of exhibits and exhibitors. These four shows, held in Kelso, Stirling, Inverness and Glasgow, each had 29, 27, 15 and 18 ploughs on display by 14, 10, 8 and 9 exhibitors respectively. The overall display of ploughs declined after 1872 while the number of overall exhibitors of ploughs varied between 21 in 1872 and 16 in 1875. By the 1872 Show the double-furrow plough had ceased to be a new innovation; it had become an established agricultural implement. It therefore followed the trajectory as other new agricultural innovations: when they were no longer considered to be an innovation, and were generally accepted by the farmers, they were given less prominence and exhibited in smaller numbers. Their place was taken by other innovations and new manufactures.

The exhibition of double-furrow ploughs at the Highland Show from 1872 to 1875 shows further changes to their manufacture. While Pirie and Mitchell continued to make ploughs from Pirie's patent, a number of other makers, all leading agricultural Scottish implement and machine makers, also become recognized for their double-furrow ploughs and closely associated with them: G. W. Murray & Co., George Sellar & Son, Alexander Jack & Sons, and John Gray & Co. In addition, English manufacturers also established a role as exhibitors, the most important being Richard Hornsby & Sons, and Ransomes, Sims & Head, Ipswich. (The latter used agents to exhibit at the 1872 and 1875 Shows and did not start to exhibit in its own

¹¹² HASS, *Catalogue of Implements*, 1871, pp. 14, 52, 63.

right until the Highland Show of 1877.)¹¹³ Most of the exhibitors made the ploughs that they exhibited. Only a small number of exhibitors acted as agents for other makers.

The increase in the number of prominent and leading double-furrow plough makers raises the question of whether local makers continued to manufacture them. This cannot be easily determined. There are, however, only a few references to them at the Highland Show, or at other shows and ploughing matches after the early 1870s.

(f) Steps taken by other makers between 1876 and 1880

Between 1876 and 1880 there were relatively few reports of the double-furrow plough in the agricultural or general press. The implement was regarded to have become well-established in Scotland. Its assimilation was reflected by the Highland Show, where there was a decline in the number of double-furrow ploughs and exhibitors. While there were 13 such ploughs exhibited in the display of 57 ploughs at the Aberdeen show of 1876, their numbers declined sharply after the 1878 show at Dumfries, when they comprised 15 of the 62 ploughs at the Show. The 1879 and 1880 shows at Perth and Kelso each had eight and two ploughs respectively; each had 45 and 26 ploughs respectively exhibited at them. The number of exhibitors of double-furrow ploughs also fell sharply after 1879.

During this period all of the exhibitors were well-established makers of double-furrow ploughs; there were no longer any local makers exhibiting. The exhibitors included all the major players that had emerged in earlier years: G. W. Murray & Co., George Sellar & Son, and John Gray & Co., Uddingston. Pirie exhibited until the 1876 Show, but he died in April 1877. Mitchell exhibited sporadically at the shows in 1876 (Aberdeen) and 1879 (Perth). The presence of English makers continued to grow, with three of them becoming well-established exhibitors: Richard Hornsby & Sons, and Ransomes, Sims & Head, and J. and F. Howard. Those who had previously employed agents to exhibit at the Show now had their own stands, which they continued to have in the early 1880s.

VIII

Between 1868 and 1880 a total of 50 exhibitors displayed double-furrow ploughs at the Highland Show. Of them 31 made their own ploughs or exhibited Pirie's plough. While a large number of them exhibited for only one or two years, largely as a result of the peripatetic nature of the Show as it moved around the eight show districts, which largely corresponded to the different agricultural regions, all the major makers took their ploughs to successive shows (Table 2).

The innovators of the double-furrow plough, Pirie and Mitchell, started to exhibit their double-furrow ploughs at the Highland Show in 1868 (Table 3). Most of the important makers started to exhibit their double-furrow ploughs in the following year, with four of them being recorded: J. Fowler & Co, Leeds (with Pirie's patent), G. W. Murray, Banff Foundry, Banff, John Gray & Co., Uddingston, and Alexander Jack & Sons, Maybole. George Sellar & Son, the largest plough maker in Scotland, did not start to exhibit at the Show until 1870. While they

¹¹³ HASS, *Catalogue of Implements*, 1872, pp. 48, 60, HASS, *Catalogue of Implements*, 1875, p. 73.

TABLE 2: The major exhibitors of double-furrow ploughs at the Highland Show 1868–80

<i>Double-furrow plough maker</i>	<i>Years exhibited at Highland Show</i>
Thomas Pirie & Co., Kinmundy, Longside, Aberdeenshire	1868, 1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876 (died 1877)
Robert Mitchell & Son, Peterhead	1868, 1870, 1871, 1873, 1874, 1875, 1876, 1879
J. Fowler & Co, Leeds	1869, 1870, 1871, 1872
G. W. Murray, Banff Foundry, Banff	1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880
John Gray & Co., Uddingston	1869, 1870, 1871, 1872, 1874, 1875, 1876, 1877, 1878,
Alexander Jack & Sons, Maybole	1869, 1870, 1871, 1872, 1873, 1874, 1875, 1878, 1879
George Sellar & Son, Huntly	1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880
R. Hornsby & Sons, Grantham	1871, 1872, 1875, 1876, 1877, 1878, 1879
Ransomes, Sims & Head, Ipswich	1877, 1878, 1879
J. & F. Howard, Bedford	1873, 1877

Source: Highland and Agricultural Society of Scotland, Show catalogues, 1868–80.

TABLE 3: Ploughs exhibited by the leading makers of double-furrow ploughs, 1878–1880

<i>Double-furrow plough maker</i>	<i>Years ploughs exhibited at Highland Show by maker or agent and number of ploughs exhibited (in brackets)</i>
Thomas Pirie & Co., Kinmundy, Longside, Aberdeenshire	1868 (2), 1869 (6), 1870 (13), 1871 (27), 1872 (11), 1873 (7), 1874 (6), 1875 (9), 1876 (5) [Pirie d. 1877]
Robert Mitchell & Son, Peterhead, Aberdeenshire (Pirie's patent)	1868 (1), 1870 (2), 1871 (4), 1873 (2), 1874 (1), 1875 (1), 1876 (10), 1879 (1)
J. Fowler & Co, Leeds (Pirie's patent)	1869 (13), 1870 (10), 1871 (3), 1872 (1)
G. W. Murray Banff Foundry, Banff	1869 (4), 1870 (7), 1871 (7), 1872 (5), 1873 (7), 1874 (3), 1875 (1), 1876 (1), 1877 (2), 1878 (2), 1879 (2), 1880 (1)
John Gray & Co., Uddingston, Lanarkshire	1869 (4), 1870 (5), 1871 (6), 1872 (2), 1874 (2), 1875 (5), 1876 (4), 1877 (4), 1878 (4)
Alexander Jack & Sons, Maybole, Ayrshire	1870 (1), 1871 (1), 1872 (2), 1873 (2), 1874 (2), 1875 (2), 1878 (2), 1879 (1)
George Sellar & Son, Huntly, Aberdeenshire	1870 (3), 1871 (8), 1872 (6), 1873 (3), 1874 (1), 1875 (1), 1876 (1), 1877 (1), 1878 (1), 1879 (1), 1880 (1)
R. Hornsby & Sons, Grantham	1871 (3), 1872 (2), 1875 (2), 1876 (1), 1877 (1), 1878 (3), 1879 (1)
Ransomes, Sims & Head, Ipswich	1872 (3), 1875 (1), 1877 (2), 1878 (2), 1879 (1)
J. & F. Howard, Bedford	1870 (1), 1872 (1), 1873 (1), 1877 (1), 1879 (1)

Source: Royal Highland and Agricultural Society of Scotland, *Catalogue of Implements, Machines, and other Articles, 1868–1880*.

represented the first wave of adopters, who followed the innovators, the English manufacturers largely exhibited at the Show as later adopters. They entered their ploughs for exhibition at a time when the market for double-furrow ploughs was already established and where they could use their stature and reputation to secure sales. The stages from innovators to early adopters and then later adopters was a very short period, confirming Pirie's words that his plough 'has gained for itself a reputation with the practical farmer, not only in Great Britain, but over the whole of the civilized world, such as was never achieved by any other agricultural implement in so short a time'.¹¹⁴

IX

Why were Pirie's plough and the introduction of the double-furrow plough so successful in the late 1860s and early 1870s? Evidence from John Gray of John Gray & Co., Uddingston, suggests that the double-furrow plough was only developed and manufactured at a time when there was a need and a demand for it. On being asked why he had not manufactured one before July 1869, he replied 'Because I had never had an order for one ... Because I did not think the time had arrived for manufacturing them'.¹¹⁵ J. E. Ransome, of Ransomes, Sims & Head, Ipswich, speaking at Framlington Farmers Club, added that 'when, however, the "Pirie" plough made its appearance in 1868, the time *had* come when farmers were well prepared to adopt any new implement that would help them in their labour department'.¹¹⁶

A number of factors contributed to the need for the double-furrow plough. In the late 1860s economic conditions were changing.¹¹⁷ Farmers had to be more competitive and reduce the costs of production in the face of foreign imports, especially from Canada, the United States and North America. As an agricultural commentator writing in *The Scotsman* commented:

Any instrument which will enable the agriculturist to work his land with economy must in these days of immense competition of the home and foreign trades be peculiarly acceptable: and the trials of different double-furrow ploughs are, therefore of great importance to farmers.¹¹⁸

That point was also emphasized by the Royal Northern Agricultural Society, which believed that Pirie's plough 'was more calculated than any to facilitate the work of the farm'.¹¹⁹

The supply and cost of labour were also important factors. In the late 1860s and 1870s there was increasing pressure on both, and difficulty in obtaining skilled labour. J. E. Ransome believed that 'the daily increasing scarcity of labour has been a most powerful stimulus during the past few years to the introduction of the double plough'.¹²⁰ By 1874 the rise in labour costs also made 'the improvement of farm implements of increasing importance to agriculturists'.¹²¹

¹¹⁴ NBA, 19 July 1871.

¹¹⁵ NBA, 29 Mar. 1871.

¹¹⁶ NBA, 7 Feb. 1872.

¹¹⁷ T. M. Devine, 'Scottish farm labour in the era of agricultural depression, 1875-1900', in T. M. Devine (ed.), *Farm and labour in Lowland Scotland, 1770-1914*

(1984), p. 243.

¹¹⁸ *The Scotsman*, 24 Jan. 1870.

¹¹⁹ AJ, 11 Mar. 1868.

¹²⁰ NBA, 7 Feb. 1872.

¹²¹ NBA, 29 July 1874.

The terms of Pirie's patent suggest that he developed his plough as a labour-saving implement. It had 'for its chief object the diminution of the labour of draught, that is to say the horses are enabled to draw the improved plough with greater ease than they can draw a plough of the arrangement and construction hitherto adopted'.¹²² The double-furrow plough had significant savings in labour savings over the single-furrow plough. A ploughman with a double-furrow plough could undertake double the amount of work of one using a single-furrow plough.¹²³ As it was worked in a different manner to the swing plough with the ploughman guiding it rather than holding it, it was considered to require less skill to use and less experienced ploughmen could be employed to work one.¹²⁴

With the reduction in draught, less horsepower was required, allowing a third horse to be employed so that two furrows could be ploughed at once, instead of one. On some lighter soils, two horses could pull a double-furrow plough, thus effecting an even greater saving.¹²⁵ These savings could be significant. In Dumfriesshire, one farmer observed that 'my own experience has been that one man and three horses can do more than double the work of two men and four horses'.¹²⁶ It had an impressive output. It was suggested that 'with two horses in eight hours, one double plough turns over two imperial acres of light loamy lea'.¹²⁷ The plough was considered to be an important way to reduce the number of horses required on a farm.¹²⁸

The use of the double-furrow plough could lead to significant reductions in costs on the farm. By November 1873 Thomas Pirie could assert that 'the practical farmer being now satisfied that land can be ploughed at a much cheaper rate ... than by using the swing plough'.¹²⁹ Between 1868 and 1872 a number of agriculturists sought to calculate their extent. Even on an 'ordinary-sized farm' they were said to be 'very considerable'.¹³⁰ This figure varied from farm to farm, and the calculations of the observers. Thus, on a 200-acre farm with two single ploughs, one farmer calculated that the double-furrow ploughs could save 'nearly £60 per annum', a figure that was not considered to be fully representative of all the savings that could be achieved.¹³¹ Another farmer suggested that on an 'average' sized farm, a 'direct saving of about £100 a year would be at once effected'.¹³² For another, this figure was between £70 and £80 a year.¹³³ In 1872 Pirie suggested that his plough would allow a saving 'from 30 to 50 per cent in the cultivation of his land'.¹³⁴ He revised that figure in October 1874, calculating that land could be ploughed at from 30 to 40 per cent less cost.¹³⁵

The double-furrow ploughs made after 1867 were considered to be practical to use. According to J. E. Ransome, 'the old form of double ploughs was not so convenient and easy for the ploughmen to manage as those lately introduced'.¹³⁶ The new ones could be turned more easily at the headlands. They were 'suitable for the general work of the farm' and could work on a

¹²² NRS, SC275/31/87.

¹²³ NBA, 6 Dec. 1871.

¹²⁴ AJ, 11 Nov. 1868, 17 Nov. 1869.

¹²⁵ NBA, 20 Dec. 1871.

¹²⁶ NBA, 21 Feb. 1872.

¹²⁷ *The Scotsman*, 26 Feb. 1867.

¹²⁸ AJ, 11 Mar. 1868, 20 Dec. 1871.

¹²⁹ NBA, 5 Nov. 1873.

¹³⁰ AJ, 20 Dec. 1871.

¹³¹ NBA, 21 Feb. 1872.

¹³² AJ, 20 Dec. 1871.

¹³³ AJ, 26 Feb. 1868.

¹³⁴ NBA, 4 Sept. 1872.

¹³⁵ NBA, 21 Oct. 1874.

¹³⁶ NBA, 7 Feb. 1872.

wider range of situations than formerly, their use having been confined 'almost entirely to light soils'.¹³⁷ Indeed, by 1871 Pirie noted that 'we have now specially adapted [ploughs] for all different soils and classes of ploughing, both at home and abroad'.¹³⁸

In discussions of its practicality, it was the draught of the double-furrow plough that was the most widely debated issue. This was because it was critical to how the horses undertook their work. At most of the trials and demonstrations its draught was tested and was frequently compared with that of the single-furrow plough. While this varied according to ploughs, soil types, type of land to be ploughed (lea, stubble, potato), the best double-furrow ploughs had less draught than some of the single-furrow ploughs.¹³⁹

There was significant debate about the quality of work, an important aspect of ploughing which affected the crop raised. The question was asked: 'can a plough, turning over two furrows at once, and drawn by three horses, do its work as thoroughly and efficiently as two single ploughs each drawn by a pair of horses?'¹⁴⁰ Its work was closely compared and scrutinised with that of the single-furrow plough. There were numerous comments that the double-furrow plough turned over better quality work compared to that of the single-furrow one. In January 1870, one observer commented that:

On every occasion on which a fair trial between double and single furrow ploughs has been made, the superiority of the former over the latter has been demonstrated, and all the leading agriculturists who have witnessed the operations of the two ploughs have pronounced that there will be a considerable saving by the use of the double plough.¹⁴¹

Because of the intense scrutiny under which double-furrowed ploughs were placed, as a result of the keen competition at matches and trials, their design, and hence their quality, improved from year to year. Thus, at the trial of the Royal Northern Agricultural Society in November 1869, the work performed 'was the best and most satisfactory yet accomplished'.¹⁴² This improved performance continued. By 1871 and 1872 there were general comments that 'the work is better done': 'in the general work of the farm the double-furrow plough makes the most regular and best ploughing, its work being marked by a good, solid, honest-cut furrow slice firmly packed together'.¹⁴³ When Pirie advertised his plough in November 1873, he suggested that 'the practical farmer being now satisfied that land can be ploughed ... in a much superior manner, than by using the swing plough'.¹⁴⁴

The double-furrow plough was also compared with another ploughing technology: steam ploughs. In particular, comparisons were made between their costs and output. One observer thought that the double-furrow plough 'will compare favourably with the steam plough as a handy, economical, and efficient cultivator'.¹⁴⁵ In East Lothian, the leading district for steam ploughing in Scotland from the 1860s onwards, it was considered that 'the steam plough sometimes did not do more than double the work in a day which the three horses would have done themselves with double-furrow ploughs'.¹⁴⁶ Compared to steam ploughing tackle, the

¹³⁷ NBA, 30 Nov. 1870, 7 Feb. 1872.

¹³⁸ NBA, 19 July 1871.

¹³⁹ GH, 14 Feb. 1871.

¹⁴⁰ *The Scotsman*, 24 Jan. 1870.

¹⁴¹ *The Scotsman*, 24 Jan. 1870.

¹⁴² *The Scotsman*, 15 Nov. 1869.

¹⁴³ AJ, 20 Dec. 1871, NBA, 21 Feb. 1872.

¹⁴⁴ NBA, 5 Nov. 1873.

¹⁴⁵ NBA, 6 Dec. 1871.

¹⁴⁶ *The Scotsman*, 2 Mar. 1872. See also *The Scotsman*,

cost of which varied according to the system used (a double-engine set of 12 horsepower with associated tackle, by John Fowler & Co., Leeds, cost around £1280), with its one-off cost being seen as a hindrance to its introduction, the double-furrow plough was relatively modest.¹⁴⁷ While the first ones that Pirie manufactured cost between £25 and £30, drawing comment in November 1868 that such a price would hinder 'more general adoption',¹⁴⁸ this was quickly reduced, and many of the double-furrow ploughs could be purchased for between £10 and £13. By comparison with the steam plough and its tackle, the double-furrow plough was considered to be 'within the reach of every farmer'.¹⁴⁹

In Scotland, the double-furrow plough allowed multiple-furrow ploughing to be extended on a much wider scale than could be achieved by steam ploughing. Indeed, steam ploughing was undertaken to only a very limited extent in the country by the early 1870s. By 1878, at the height of its use (and of the manufacture of steam ploughs in Britain) there was 'probably not more than fifty sets of steam ploughing tackle' in the country.¹⁵⁰ Most of them were only introduced in the 1870s when Pirie's plough and double-furrow ploughs were known and already widely used.¹⁵¹ In some parts of the country steam ploughing was rarely used or not used at all. As already indicated, the double-furrow ploughs quickly reached highland districts such as Kilfinan in Argyllshire.¹⁵²

The double-furrow plough was considered to have other advantages. It let farmers arrange and manage their work in more flexible ways. One observer suggested that:

If even one-half more ploughing can be accomplished within a given time, by the adoption of this implement, of which we entertain no doubt, then on a farm having three pairs of horses, one pair might be spared for other purposes; and on a farm of a larger extent perhaps one man and a pair of horses might be spared altogether.¹⁵³

The increased range of double-furrow ploughs allowed some farms to work even more flexibly. One model of Pirie's plough allowed farmers to work their land more efficiently on 'braeset farms': two horses could take two furrows downhill and one uphill, the second plough being 'slipped'. Therefore, three furrows could be turned against two with the single-furrow plough by using the same number of horses.¹⁵⁴

The double-furrow plough enabled ploughing to be undertaken more quickly, thus ensuring that 'less risk is entailed from the weather'.¹⁵⁵ One farmer considered that 'one of the chief advantages arising from their use is found in having the work well forward at all times and

Note 146 *continued*

4 Jan. 1868. Robert Scott Skirving, 'On the agriculture of East Lothian, with special reference to the progress made during the last twenty-five years', *THASS* fourth ser. 5 (1873), p. 25.

¹⁴⁷ *The Scotsman*, 11 July 1871.

¹⁴⁸ *AJ*, 26 Feb. 1868, 11 Nov. 1868.

¹⁴⁹ *GH*, 22 Dec. 1869.

¹⁵⁰ James Melvin and Thomas Milne, 'Farm machinery', p. 149. See also William Macdonald, 'On the agriculture of Inverness-shire', *THASS*, fourth ser. 4 (1872), p. 20. *NBA*, 29 Mar. 1876. Jane S. McCutchan,

'The steam mechanisation of agriculture, 1840–1930' (unpublished PhD thesis, University of Reading, 2013), p. 323.

¹⁵¹ For example, James Macdonald, 'On the agriculture of the county of Fife', *THASS* fourth ser. 8 (1876), p. 34, Thomas Farrall, 'On the agriculture of the counties of Edinburgh and Linlithgow', *THASS*, fourth ser. 9 (1877), p. 53.

¹⁵² *GH*, 12 Mar. 1870.

¹⁵³ *AJ*, 26 Feb. 1868.

¹⁵⁴ *NBA*, 21 Feb. 1872.

¹⁵⁵ *NBA*, 6 Dec. 1871.

so being able to get everything done in proper tid and season'.¹⁵⁶ They also allowed land to be ploughed in different ways. These were summed up at a much later date in *Stephens' Book of the Farm* of 1908. Revising that book, James Macdonald suggested that they:

are especially suitable for spring ploughing where a shallow furrow is desired. They expedite the preparation of land for sowing, and in a late spring this is a matter of great importance.¹⁵⁷

Land ploughed by them in spring, including turnips land, was considered to be 'much more friable and easily harrowed than when done by the common plough'.¹⁵⁸

The adoption of Pirie's plough and other double-furrow ploughs by farmers in the first decade of their adoption to 1880 can be examined in newspaper advertisements for farm displenishing sales, usually held at the end of a lease. As they provide an inventory of stock on a farm for sale, they record whether such ploughs were part of the farm stock, their numbers (though not all adverts give detail on this), as well as the other ploughs on a farm, and thus how the different ploughing technologies related to one another. In a few cases, they also record the names of their manufacturers.

A survey of 64 such adverts in the *Aberdeen Journal* and *The Scotsman* between 1871 and 1880 show that double-furrow ploughs were widely distributed throughout the main circulation areas of these newspapers, with the first having an Aberdeenshire focus and the second a Lothians and south-east Scotland one. They provide evidence for the home-area of the plough (Aberdeenshire) (through some 30 adverts) as well as a leading agricultural district (the Lothians and south-east).

In the two areas, the double-furrow ploughs were found on a wide range of farms. In the north-east they ranged from one with six-horse teams (that is, having six single-furrow ploughs) to others with a one-horse team. The six horse-plough farm at Tippetty, Logie-Buchan, Aberdeenshire,¹⁵⁹ was the only one of this size in the north-east that had these ploughs. All others were smaller. They included four horse-team farms such as Nether Angustown, Peterculter.¹⁶⁰ Three horse-team farms were more frequent and included Balquharn, Tullynessie.¹⁶¹ There were a large number of two horse-team farms, such as Selby, Keith Hall, Boghead of Orrock, and Milltimber, Culter.¹⁶² The only one horse-team farm was Mill of Brogans, Slains, whose advert dated from 1880.¹⁶³

The farms in the Lothians were historically larger in size than those in the north-east. The farms that had double-furrow ploughs were generally larger than those in the north-east. Castleton, North Berwick, East Lothian, which had double-furrow ploughs had seven single-furrow ploughs, as did Temple and Braidwood, Midlothian, and Lingerwood, Midlothian.¹⁶⁴ Dalhousie Chesters, Midlothian, had six single-furrow ploughs.¹⁶⁵ Three- and four-horse team farms were more frequently recorded, including those of Gilchriston, Townhead, near

¹⁵⁶ *AJ*, 20 Dec. 1871.

¹⁵⁷ Macdonald (ed.) *Stephens' Book of the Farm*, I, p. 372.

¹⁵⁸ *AJ*, 20 Dec. 1871.

¹⁵⁹ *AJ*, 7 May 1880.

¹⁶⁰ *AJ*, 23 Apr. 1880.

¹⁶¹ *AJ*, 10 May 1871.

¹⁶² *AJ*, 17 May 1871, 13 May 1874, 5 May 1875.

¹⁶³ *AJ*, 7 May 1880.

¹⁶⁴ *The Scotsman*, 6 Nov. 1873, 16 May 1874, 3 May 1876.

¹⁶⁵ *The Scotsman*, 29 Sept. 1877.

Gifford, Athelstaneford Mains, Prora, West Barns, all in East Lothian, and Hundleshope, Peebleshire.¹⁶⁶ There were, nevertheless, a few that had two single-furrow ploughs, including Hopepringle at Gala Water, and Begbie.¹⁶⁷ There was one farm that had only one single-furrow plough, St Catherine's.¹⁶⁸ By the early 1880s, the farms in the Lothians that had double-furrow ploughs at their dispenishing sales provide a roll call of the most significant and leading ones: Bonnington (North Berwick), West Barns, Ferrygate, Nether Hailes, West Fortune, Dolphingston, Samuelston East Mains, Smeaton, and Borrowstoun Mains.¹⁶⁹

On 63 of the 64 farms the double-furrow plough was used alongside the single-furrow ploughs. Coalston Mains, Haddington, East Lothian, was the only farm that only used double-furrow ploughs.¹⁷⁰ Most of the farms had only one double-furrow plough, though some sixteen had two, their numbers being nearly equal in the two areas of this survey.¹⁷¹ Only two farms had three ploughs. Only one farm, Coalston Mains, had four double-furrow ploughs, in 1880.¹⁷²

The evidence from these adverts shows that the double-furrow plough was an implement that could be widely used on farms from the largest to the smaller ones. It was an implement that could meet the needs of a wide range of farmers who had a wide range of ploughing and cropping needs. It could also easily be incorporated within existing ploughing systems and used alongside them.

X

Pirie's double-furrow plough, patented in 1867, created a revolution in ploughs and ploughing in Scotland, and quickly became known more widely, the patent also being used under licence by John Fowler & Co., Leeds, the largest manufacturer of steam ploughs in Britain, and the major English plough makers such as Ransomes, Sims & Head, and J. & F. Howard. Its manufacture by other makers in Scotland and other parts of Britain was rapid, as was its adoption by farmers. From an innovation to an implement that was manufactured by major manufacturers took less than two years from July 1867 to the summer of 1869. By 1870 all the major plough makers throughout Scotland were making double-furrow ploughs. They were seen to be the innovators of modern double-furrow ploughing. One observer writing in *The Glasgow Herald* noted that 'our Scotch agriculturists have been the first to lead the way in the double ploughing of modern times'.¹⁷³ English makers, especially the largest ones, explored the Scottish market from an early stage but they did not fully enter it until the Scottish makers had a well-established and tested market for the plough. In its first decade it came to be used on a wide variety of farms, from the smallest to the largest, and working on a range of soils.

¹⁶⁶ *The Scotsman*, 26 Apr., 10 May 1873, 6 Nov. 1874, 2 May 1877, 1 May 1878, 3 May 1880.

¹⁶⁷ *The Scotsman*, 24 Apr. 1874, 2 May 1877.

¹⁶⁸ *The Scotsman*, 19 Aug. 1873.

¹⁶⁹ *The Scotsman*, 18 May, 24 Sept., 26 Oct., 5 Nov. 1881, 10 May, 21 Oct. 1882, 10 May 1884, 31 Oct. 1885, 9 Nov. 1887.

¹⁷⁰ *The Scotsman*, 28 Jan. 1880.

¹⁷¹ *AJ*, 6 May 1874, 4 Aug. 1875, 1 May, 9 May, 11 May, 16 May 1879, *The Scotsman*, 25 Sept. 1872, 6 Nov. 1873, 16 May, 6 Nov. 1874, 3 May 1876, 2 May 1877, 5 Nov. 1879, 21 Aug. 1880.

¹⁷² *The Scotsman*, 17 Oct. 1874, 22 May 1875, 28 Jan. 1880.

¹⁷³ *GH*, 14 Feb. 1871.

Why was this local innovation so successful? It was immediately recognized as an important innovation and was supported by the institutional framework in Scottish agriculture: the national and regional agricultural societies, as well as smaller clubs and ploughing societies, and the agricultural press, in the *North British Agriculturist*, which gave it significant attention and support. They offered the plough – as did Pirie – a framework in which to test out and examine the plough and its work.

The double-furrow plough had a number of ‘advantages’ over existing ploughing technologies such as the steam plough, and competed well alongside them. The advantages were primarily economical and technical, but also offered greater flexibility in farm management. But it was also an innovation that could be easily adopted and used alongside existing ploughing technologies. It was an innovation that came when there was a clear need for it and farmers quickly recognized its advantages.