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IMPROVED PASTURE IN NEW ENGLAND IN THE NINETEENTH CENTURY

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If the value of researches of the scientist and the agricultural economist is now uncontested, the historian may at least make a modest claim to contribute to the understanding of present-day land use, for this is conditioned to some extent by its previous use and especially by historical tradition and experience. The development of improved pasture, which now gains ever-increasing importance, is a fit subject for study as it enables us to analyse the effect of favourable and restrictive factors, of which some are still operative.

When Oxley, the first European known to have passed through southern New England, came he found the country near Muluerindi River "perfectly open though much covered with fallen timber, the banks of the river sloping and quite clear of timber".¹ Other evidence confirms the impression that the greater amount of land was lightly covered with timber with some natural clearings.² While the land was immediately useful to the pastoralist the early farmer on the other hand had to spend up to £8 an acre for clearing and stumping.³ But the native pasture probably then as certainly now lacked the legumes and herbaceous species which are so valuable to livestock.⁴ As early as 1855, William Gardner, the Scotch dominie resident in New England, recognized that after frost the native herbage lost its nutritious qualities.⁵ In the nineteenth century ringbarking, often at a cost of no more than a shilling an acre, came to be the principal means of improving the native pasture. In 1890 out of the total area (10,875,520 acres) of the four northern tablelands electorates 973,060 acres were ringbarked compared with only 122,741 acres under cultivation. There are no statistics concerning new draining but in 1890, 1,849,317 acres were enclosed, thus enabling a more efficient use of the natural pasture. The chief advantages here, however, were better lambing, security from trespass, reduced labour costs, and fulfilment of improvement conditions imposed by the land laws, rather than an improved pasture. General overstocking in the colony was a bar to this.

The honour of having sown the first improved pasture in New England may be claimed for M. H. Marsh, the squatter of Salisbury Court, near Uralla. He wrote:—

I sowed the white clover first in New England in 1841, but it never spread much until bees were taken up there. It is well known that many plants do not seed well without bees, but perhaps in this case the wet seasons, which began about the same time, had much to do with it.⁶

¹ Oxley's Field Book, *Royal Australian Historical Society, Journal and Proceedings*, Vol. VIII, Pt. V, p. 278.

² *Armistead Express*, April 12, 1856, November 20, 1858, (hereafter cited as *A.E.*).

³ *A.E.* November 20, 1858.

⁴ R. Roe, *Preliminary Survey of the Pastures of the New England District*, CSIR Bulletin No. 210, 1947.

⁵ W. Gardner, *Productions and Resources of the Northern and Western Districts of New South Wales*, MSS Vol. 1, pp. 25-26, 1855, (Mitchell Library, Sydney).

⁶ M. H. Marsh, *Overland from Southampton to Queensland*, London, 1867, p. 54.

Lack of the appropriate strains of nodule bacteria in the soil may have prevented the spread of clover. Native bees although capable morphologically of pollinating white clover have to learn to do so.⁷ Bumble-bees are necessary for the pollination of red but not of white clover, and the holder of Tenterfield station introduced this bee to further the spread of the clover he had sown.⁸

In calling attention to winter anaemia Gardner had recognized two remedies; sickly sheep might graze on young wheat; or they might be removed to the coast during severe weather. The general impracticability of the latter alternative is obvious. In this context Gardner failed to refer to cultivated grasses, but some squatters are known later to have sown grasses to provide winter feed. C. T. Bagot, a graduate of an English agricultural college and holder of Ben Lomond station, put his livestock on improved pasture from June to August.⁹ At Kangaroo Hills after a mowing in spring the prairie grass was allowed to grow in order to provide green stuff for invalid livestock in winter.¹⁰ In 1874 at Westholm Hugh Wyndham was subdividing, clearing, and sowing lucerne and grasses insofar as funds allowed,¹¹ while at Saumarez the squatter, H. A. Thomas, was a warm advocate of what he called the "NEW STYLE of pastoral occupation," which included draining and sowing improved grasses.¹² In the 'eighties the sheep at Balala and Ranger's Valley and the cattle at Tenterfield station were feeding on improved pasture. Nevertheless these instances were rather remarkable than typical, and the squatter generally was more concerned with the undeveloped use of an extensive holding largely of leasehold than the intensive occupation of a smaller freehold. Thus in 1879 176 New England stations were leasing between them 72.7 per cent of the total area of the district,¹³ but only 2,004 acres of sown grass were then reported in the whole of the district.

John Robertson's Crown Lands Alienation Act of 1861 was widely expected to unlock the lands, hitherto securely leased to squatters in fourteen year terms, for the benefit of the farmer. On depositing 25 per cent of the purchase money any person might select up to 320 acres (doubled by an amending Act in 1875) at the rate of £1 per acre. Out of the surrounding leasehold he could take a prelease three times the area of his free selection. In New England most of the old leases expired in 1866, after which the land was open to selection. Wheat growing first became the staple crop of the farmer-selector, 46.7 per cent of the cultivated area being under wheat in 1874. It was sanguinely expected that New England would become the granary of the north, capable of feeding more than half of the inhabitants of the colony.¹⁴ Despite the high yield these hopes were later completely falsified as local costs of production proved pro-

⁷ Information kindly supplied by Mr. T. Rayment and Mr. B. Fennessy, CSIRO, Armidale.

⁸ Reminiscences of Mrs. K. Cameron to writer, December 16, 1953.

⁹ *A.E.* April 23, 1870; letter from C. T. Bagot.

¹⁰ A. A. Wright, *Diary*, February 17, 1888.

¹¹ *Bukkulla Letter Book*; Hugh Wyndham to Alward, July 31, 1867.

¹² *A.E.*, August, 28, 1874.

¹³ Calculated from *Occupation of Crown Lands, Reports*, 1879.

¹⁴ e.g., W. Gardiner, *op cit.*, II, p. 5; also Hon. John Richardson, M.L.C., quoted in *A.E.*, August 28, 1874.

hibitive and Adelaide flour was imported for use in New England itself.¹⁵ The extension of the railway to Tamworth in 1878 and Armidale in 1883 overcame the protective isolation that had favoured the farmers. Indeed one squatter, Richard Hudson of Balala, welcomed the railway, foreseeing that it would cause the small farmers to sell out to the runholder.¹⁶ By 1895 oaten hay (28.6 per cent) had ousted wheat (26.5 per cent) as the crop most cultivated, with maize (24.4 per cent) coming next. At this time nearly all selectors were partly or almost wholly dependent on grazing. The more intensive use of land with the development of fat stock production and dairying therefore became vital to the further progress of the region.

Despite some optimistic views to the contrary,¹⁷ it was generally admitted that New England was not a fattening district.¹⁸ In winter local butchers regularly brought in fat stock from the Western and Liverpool Plains.¹⁹ In spring and summer, depending on the state of the colonial market, the district exported some fat stock, especially after the railway connection was gained. In 1891-92 for instance 28,750 sheep, or 1.04 per cent of the total number of sheep, were sent away by rail.²⁰ This was only a fraction of the annual "cast". If the district were to develop it must find means to improve the quality of stock, especially in the winter months.

Although livestock returns rarely particularized the breed of sheep it is clear that nearly all were fine-woolled merinos. The district had a reputation for fine wool. R. Hudson, of Balala, said that he could rely on the climate producing a fine wool, and he therefore strove principally to increase the weight of the fleece. Gardner thought incorrectly that the coarsest breed of Leicester sheep would run fine after a few years in New England.²¹ The coldness of the district permitted density of fleece, the rainfall preserved it from much of the dust characteristic of the drier West, and the native pasture was better suited to the merino than to the heavier-feeding long-woolled sheep. Yet there were some long-woolled sheep kept, especially in the well-favoured tract of country near Inverell. In 1860 Marouan station replaced its merinos with long-woolled sheep on the ground that the latter were better suited to a cold climate.²² Ranger's Valley produced quarter Cheviot three-quarters merino sheep with a combing wool attractive to the London market.²³ Long-wools and crossbreds were to be found at Swanvale, near Inverell, at Byron Plains, at Clairvaux, and at Balaclava.²⁴ Sheep at the latter station were three-quarters merino

¹⁵ For a fuller discussion see my article, "Squatter and Selector in New England, 1862-1895", *Historical Studies of Australia and New Zealand*, Vol. 8, No. 29, (November, 1957).

¹⁶ *Balala Letter Book*; R. Hudson and M. Traill, February, 14, 1883.

¹⁷ e.g., *A.E.*, March 21, 1863; Glen Innes Correspondent.

¹⁸ e.g., *A.E.*, July 24, 1869; letter from W. A. Dumaresq.

¹⁹ e.g., *A.E.*, September 28, 1872; March 30, 1885.

²⁰ In the twelve months preceding June 30, 1892, 1,115 cattle and 28,750 sheep were railed from New England; *Legislative Council of New South Wales, Journal*, 1892-93, Pt. V, p. 38.

²¹ W. Gardner, *op. cit.*, I, p. 37.

²² *A.E.*, January 7, 1860.

²³ *A.E.*, September 29, 1866; October 6, 1866.

²⁴ *A.E.*, February 8, 1868; March 21, 1868; April 13, 1867, December 17, 1870.

and cut 6½ lb. each in the grease compared with the average of 4 lb. 12 oz. for pure merino. In 1874 there were 214 long-woolled and 6,080 crossbred sheep in the Glen Innes district, representing 1.8 per cent of the number of sheep there.²⁵ At this time most of the long wools were in the coast district and were kept for the breeding of lambs for the Sydney market.²⁶

Throughout the 'seventies and 'eighties there continued to be crossbred flocks here and there in New England.²⁷ The breeds used were Cheviots, Leicesters, and Lincolns. The first successful shipment by the *Strathleven* of frozen meat in 1880 opened new possibilities for mutton and increased the attractiveness of crossbreds. What was needed was to associate crossbreeding with improved pasture. To some extent the conditions favoured this development. Sown grass counted towards the £1 worth of improvements which the land laws required to be made on each acre of land. In the first Pastoral and Agricultural Show at Armidale in 1865 prizes were offered for exhibits of the best perennial rye, prairie grass, lucerne, and white clover seeds respectively.²⁸ It is important to note, in view of the large proportion of the population born in the British Isles,²⁹ that since the seventeenth century lucerne, clovers, and grasses shown as leys in a designed rotation of crops has been employed in the old country. However most pastures there were not sown and in the 'seventies only a fraction of the land used for pasture was laid down carefully in cultivated grasses.³⁰

Such were the circumstances when Alexander Bruce, Chief Inspector of Stock for the colony of New South Wales, after a study of the New Zealand industry returned home declaring himself a vigorous advocate of the policy of adopting cross-breeding in those districts of the colony which showed a fair prospect of success.³¹ Amongst them he included New England. At that time only one-third of that colony's sheep were merinos, Lincoln and Border Leicester and Leicester breeds and crosses outnumbering the merinos. A prime crossbred at two years old was as heavy as a prime merino at four, its mutton more valuable and its fleece as heavy.³² Although merino wool reached a higher price per pound than did crossbred, its inferiority in other respects counterbalanced this. Bruce therefore thought that the New Zealand methods of crossbreeding on improved pasture were suitable to the tablelands of New South Wales, and that it should also be adopted on some of the natural pasture of the Western Slopes.

²⁵ Calculated from *Legislative Assembly of N.S.W., Votes and Proceedings*, 1875-76, V. p. 727.

²⁶ *Agricultural Society of N.S.W., Journal*, June 23, 1871, p. 90.

²⁷ e.g., Moredun; *A.E.*, April 24, 1874; Saumarez Ponds; *A.E.*, March 31, 1876; Balaclava; *A.E.*, April 26, 1878.

²⁸ *A.E.*, February 11, 1865.

²⁹ In 1861 43.5 per cent of the population of the colony and in 1891 23.5 per cent were British born.

³⁰ W. Davies, *The Grass Crop*, London, 1952.

³¹ A. Bruce, "Stock Breeding and Fattening in New Zealand", *Agricultural Gazette of New South Wales*, 1893, pp. 340-368.

³² A. Bruce, "What are the Best Sheep to Export and How They Should be Fattened", *Legislative Assembly of New South Wales, Votes and Proceedings*, 1896, V, pp. 16-20.

Bruce failed to recognize fully the geographical differences between New South Wales and New Zealand, and between the regions of New Zealand itself. That the latter are very important can be seen from the modern distribution of merino sheep which are confined chiefly to a belt of hill country in the South Island.⁸³ Bruce based much of his argument of homoclimates on mean temperature and mean rainfall figures, without considering the annual range of temperatures and the number of days of rain. By such means he constructed a table which concealed rather than revealed the differences between four places in New Zealand and half a dozen in this colony. Having glossed over these variations he concluded that "it may be safely said that the climate of these places is similar for agricultural purposes".⁸⁴ He was not fully aware that New Zealand's gentle and well-distributed rainfall is more favourable than the less well-distributed rain of New England. For instance, Auckland has an average of 183 rainy days, Dunedin 160, Christchurch 126, Nelson 118, compared with Armidale 103, Glen Innes 94, Tenterfield 90 and Inverell 82. He also failed to see that New Zealand pastures were less retarded by frost and low temperatures. Recent research has shown that there is no pasture growth when the soil temperature falls below 42°F. to 40°F. A table of comparative readings reveals in this respect of superiority of the Christchurch district in particular where today, with the aid of improved pasture and root crops, fat lambs are produced.⁸⁵

Notwithstanding the opinion of Chief Inspector Bruce, New England does not afford an exact homoclime to any district in New Zealand. Perhaps Central Otago, with 192 ground frosts a year, is the nearest parallel. With this many may be compared Armidale's average of 178 days of frost each year and 213 at Guyra. It is significant that Central Otago is still given over mainly to extensive and semi-extensive sheep grazing with merino or three-quarters merino on the high country. As in New England most of the pasture is still natural and unimproved.⁸⁶ It may be added that Central Otago has an additional disadvantage not shared by most of New England, inadequate rainfall.

Bruce thought that New Zealand had no conclusive advantage in the richness of its soils. New England was not disqualified on this account. Indeed, one reason for the establishment of sown pasture in New Zealand had been the exhaustion of land through continuous grain crops and the injury to the nutritious sub-tussock stratum of vegetation occasioned by burning-off. Bruce himself made it clear that success depended on the administration of superphosphate or gypsum every five or six years. It does not seem that the primacy of New Zealand cross-breeding can be justly attributed to inherent superiority of its soils.

Bruce estimated the cost of clearing land for sown pasture in New Zealand at 15s. 0d. to 32s. 6d. an acre and in New England at 32s. 6d. or less. The latter figure greatly underestimated current costs which varied from

⁸³ A. H. Clark, *The Invasion of New Zealand by People, Plants and Animals*, New Brunswick, 1949, p. 178, map.

⁸⁴ *Agricultural Gazette of New South Wales*, 1893, p. 362.

⁸⁵ R. B. Walker, *A History of the Pastoral and Agricultural Industries in New England from 1862 to 1895*, University of Sydney, M.A. thesis, 1957, p. 235.

⁸⁶ *Government of New Zealand, Farming in New Zealand*, 1950, p. 267.

£3 10s. 0d. to £5 an acre.³⁷ New Zealand tussock could be cleared at much less cost than the characteristic New England mantle of trees. This factor alone, since methods of establishing improved pasture without previous clearing were inferior, goes far to explain why New England lagged behind New Zealand. Not man but nature was to blame.

The success of crossbreeding in New England depended on the establishment of ley pasture, often in a planned rotation with one or two crops of wheat every seven or eight years, the use of fertilizer, the intensive working of the soil and the provision of turnips that were eaten down in the field. In New Zealand improved pasture and turnip cultivation achieved an importance unparalleled in New South Wales. In Canterbury in 1873 improved pasture made up 62 per cent of the cultivated area, and in 1882 near 30 per cent of the cultivated area in South Canterbury was under turnips.³⁸ But despite Bruce's advocacy turnips remained an insignificant crop in New England, although the climate was favourable. The explanation probably is that oats were grown extensively as winter feed (in 1895 oaten hay occupying 28.6 per cent of the area cultivated in New England) because they did not demand the same enrichment of the soil as did turnips. In New Zealand oats were grown, but less extensively, as a green crop to be eaten down and for hay.

In New Zealand the land was prepared for turnips by the distribution of 1 to 1½ cwt. of superphosphates or 2 cwt. of bone dust to the acre.³⁹ Armidale had had a short-lived bone mill in 1866⁴⁰ and in the 'eighties and 'nineties superphosphate at £5 a ton was also available. Judging from the National Prize Competition in 1892, the only manure used by even the best local farms was farmyard dung, and there was but little system in its use.⁴¹ Without superphosphate or sulphur the usefulness of a root crop and improved pasture was limited. The fault did not lie with the Department of Agriculture which recommended the administration of 2 cwt. of bone dust, guano, or superphosphate per acre.⁴²

Bruce's advice to extend improved pasture was also disregarded. In fact, the local acreage of sown pasture fell from 12,220 acres in 1890 to 9,421 in 1900. Some interest therefore attaches to the local graziers who used improved pasture with success. At Urandangie, south of Guyra, A. F. Dutton cultivated English trefoil, perennial rye and cocksfoot without the aid of fertilizer, depastured Leicester and Romney Marsh sheep, and threshed out the seed of his own grasses.⁴³ At Tenterfield, where a chilling works opened in 1890, W. H. Walker raised the average weight of fat bullocks from 700 to 800 lb. Over the years his boundary riders had scattered prairie grass seed at cattle and salt camps and near creeks, and in 1894 he sowed 200 acres of ploughed land with a cheap mixture of cleanings of New Zealand rye grass, cocksfoot, Yorkshire fog and prairie.⁴⁴ Even more

³⁷ Balala, £5 (Balala Accounts Book, 1874-84); Glen Innes, £3; *Legislative Assembly of New South Wales, Votes and Proceedings*, 1892-93, V, p. 1206; Inverell, £3 10s. (*Ibid.*, p. 1326).

³⁸ A. H. Clark, *op. cit.*, pp. 339, 356.

³⁹ *Agricultural Gazette of New South Wales*, 1893, p. 124.

⁴⁰ *A.E.*, July 21, 1866.

⁴¹ *Agricultural Gazette of New South Wales*, 1893, pp. 236-256.

⁴² *Ibid.*, 1892, pp. 705-709.

⁴³ *A.E.*, March 20, 1896; *Australasian Pastoralists' Review*, May 15, 1894, p. 140.

⁴⁴ *Ibid.*, p. 199.

original was the method of A. Nivison, of Yarrowitch, near Walcha. He hurdled 100 pigs on small areas and then sowed with Yorkshire fog the ground which had been rooted up. He also cultivated small paddocks of 5 to 10 acres within larger paddocks. When the grass seeded, he put in horses which by having to walk outside sowed the seed by their manure throughout the larger paddock. At Hillgrove⁴⁵ and at Kangaroo Hills⁴⁶ the squatters sowed grass casually from their pocket as they rode about the station.

It may be asked what were the factors unfavourable to the improvement of pasture. In 1891 the *Pastoral Review* was saying that it had not yet been demonstrated that the sowing of grasses was economically sound; six years later the chief reason for neglect was said to be the fear of unprofitable expense and labour of cultivating.⁴⁷ In 1892 an agronomist wrote:

"Little has been done to test by analysis the nutritive value of different kinds (of grasses) and few attempts have been made to improve the pastures as such."⁴⁸

In 1894 observations on sown grasses were being made at Wagga Wagga Experimental Farm.⁴⁹ but there was no model farm in New England until Glen Innes was established in 1903. Locally there was no clear demonstration of the profitability of improved pasture; and C. T. Bagot, who used it extensively on his station at Ben Lomond, was later declared insolvent.⁵⁰ Improved pasture did not reach the stage where increasing familiarity with it would have ensured its wide extension in the district. Nothing succeeds like success.

In the colony long-woolled sheep greatly increased in popularity after 1892, particularly as a result of large importations of New Zealand sheep after that colony had been reported scab free. The number of long-woolled sheep sold at Sydney rose from less than 200 in 1892 to 8,290 in 1895.⁵¹ While merinos showed a steady decline, the number of long-woolled sheep in the colony reached a peak of 1,279,180 in 1896 and crossbreds of 3,886,961 in 1897. Drought and the revival of merino wool prices caused the non-merino sheep to lose favour from that same year.⁵² Lincoln and Leicester sheep were the breeds most favoured, New Zealand's Border Leicesters being scarcely to be found in the colony.

There are no separate figures for New England but there is other evidence of long-woolled sheep being introduced locally. In December, 1892, there had been scarcely any demand for long wools,⁵³ but in the following year Lincoln ewes were introduced to Glen Innes and Romney

⁴⁵ *A.E.*, October 24, 1879.

⁴⁶ A. A. Wright, *Diary*, May 6, 1888.

⁴⁷ *Australasian Pastoralists' Review*, August 15, 1891, p. 200; November 15, 1897, pp. 427-28.

⁴⁸ *Agricultural Gazette of New South Wales*, 1892, p. 11.

⁴⁹ *Legislative Assembly of New South Wales, Votes and Proceedings*, 1894-95, IV, p. 1049.

⁵⁰ *A.E.*, April 23, 1870, for views of C. T. Bagot.

⁵¹ *Australasian Pastoralists' Review*, August 15, 1895.

⁵² *Legislative Assembly of New South Wales, Votes and Proceedings*, 1899, III, p. 660.

⁵³ *A.E.*, December 24, 1892.

Marsh lambs to Saumarez.⁵⁴ Forty Border Leicesters and forty Romney Marsh rams were imported for Ranger's Valley in 1894, and several selectors near Aberfoyle also imported New Zealand sheep.⁵⁵ One at least of these grazed his sheep on improved pastures and turnips. In April, 1894, some New England crossbred wool secured the top price at Sydney sales.⁵⁶ In March, 1894, a commentator on the Armidale Show expected that it would only be a question of time before coarse-woolled sheep and crossbreds occupied the leading place in the district.⁵⁷ Yet in succeeding shows the competitions for these classes were to be marked by a lack of entries and in some cases by the refusal to make an award.⁵⁸ The difficulty of fencing, the small extent of improved pasture, the dry conditions of 1897 to 1899, the revival of merino wool prices in 1897, proved unfavourable factors. The number of sheep treated at local chilling works was not great.⁵⁹ In 1900 New England was still overwhelmingly a region of fine-woolled merinos. In later years the hope of progress continued to rest in a diversification of this with longwools and mutton sheep.⁶⁰

At the end of the century by far the greatest acreage of sown and cultivated grass was in the coastal districts, being mainly associated with dairying. It might seem that if wheat growing and fat lamb raising had failed to furnish the basis for intensive land use in New England, there was yet the possibility that dairying would provide support for small selectors. The prosperous Illawarra district might be held up as an example. In the 'seventies the land there was worth £15 an acre, improved pasture was common, and from herds of 50 to 100 cows butter was sent by sea to the Sydney market.⁶¹ Could New England do the like? In fact local butter production doubled, and cheese production trebled in the period 1887-91. This was part of a general trend which made the colony from 1892 a nett exporter of butter.⁶² Between 1892 and 1894 butter factories were established at Tilbuster, Glencoe, Guyra, Glen Innes and Armidale.⁶³ This sudden proliferation was to some extent forced by the drastically reduced price of the "farm" butter which had been produced hitherto. The producers either had to establish a local factory—perhaps on a co-operative basis as at Glen Innes⁶⁴—or lose their market.

The enumeration of the establishment of butter factories might give the impression of success and prosperity. This, however, would be misleading. The industry was still on a small scale, the participation in extra-regional

⁵⁴ *Glen Innes Examiner*, June 13, 1893, December 12, 1893.

⁵⁵ *Ibid*, January 19, 1894; *A.E.*, January 2, 1894.

⁵⁶ *Dalgety's Review*, May, 1894, p. 17.

⁵⁷ *A.E.*, March 23, 1894.

⁵⁸ E.g., *A.E.*, February 28, 1896, March 20, 1896.

⁵⁹ At Tenterfield 8,324 sheep in 1896 and 6,581 in 1897; at Glen Innes 1,020 sheep in 1898. Tenterfield was not working in 1898 and 1899, and Glen Innes not in 1899.

⁶⁰ Cf., the advice by R. H. Gennys, manager of Glen Innes Experimental Farm, to farmers in 1905; *Agricultural Gazette of New South Wales*, 1905, p. 548. In the previous year the Experimental Farm had mated merino ewes with Suffolk Downs and Lincoln rams.

⁶¹ C. Lyne, *The Industries of New South Wales*, Sydney, 1882, p. 74.

⁶² T. A. Coghlan, *An Historical and Statistical Account of New South Wales*, Sydney, 1894, p. 239.

⁶³ *A.E.*, November 4, 1892, September 12, 1893, July 3, 1894; *Glen Innes Examiner*, November 3, 1893, January 9, 1894.

⁶⁴ *Glen Innes Examiner*, January 9, 1894.

markets as at Newcastle⁶⁵ was not great, and at Glen Innes, for which information is available, the fat content of the milk was low.⁶⁶ Improved pasture seems to have been used only to a moderate extent. In 1873 at A. J. Maister's "Model Farm" at Tilbuster twenty-six milking cows and a bull were kept on 160 acres, a large proportion of which had been sown with clover, prairie, cocksfoot and lucerne.⁶⁷ At Kelly's Plains and at Glen Innes in 1893 improved pasture was being used.⁶⁸ In the latter case 35 dairy cows and 1,000 sheep were depastured on an 800 acres holding, of which 100 acres were under oats, maize, and potatoes, and an equal acre in sown grasses. Yet the district still lacked sufficient means to prevent a sharp decrease in output in the winter months. In 1894 for example butter had to be imported from outside the region to supply Armidale.⁶⁹ In establishing the Glen Innes factory in 1900 the Haymarket Company had to overcome the farmers' fear of cold winters.⁷⁰ Dairying was not yet established as the small landholder's usual means of support. This remained as grazing, with some cultivation of oaten hay and maize.

Despite the lack of sown pasture there was in the nineteenth century a noticeable increase in the rate of stocking. It may be calculated that on 13 sheep stations in 1848 there was one sheep to 4.43 acres and in 1857 one to 3.9 acres. From a return of 1884 it may be calculated that on 17 sheep stations there was an average of two acres to each sheep. In their natural state it was then estimated that 5.78 acres would have been required for each sheep.⁷¹ In 1891 Newstead station was running one sheep to each 1.36 acres and seventeen selectors at Ollera were depasturing 19,939 sheep on 20,200 acres, almost one to the acre.⁷² Abington station in 1892 had one sheep to 1.4 acres.⁷³ No great exactitude can be claimed for these figures and the possibility of overstocking should not be overlooked, yet they may be taken to show the trend towards heavier stocking. One cause of this undoubtedly was the replacement of shepherding by enclosing in paddocks, which in itself was said to increase the carrying capacity by one-third.⁷⁴ The provision of oats as a green crop must also have contributed here. Yet another factor was pasture improvement by means of ringbarking which was said to double the number of livestock.⁷⁵ McElhone declared with some exaggeration that a fat beast was almost a thing unknown in New England before ringbarking came into vogue.⁷⁶ It is known that ringbarking can greatly reduce the coarse tussocky *poa caespitosa* which is frequently found under trees. After ringbarking

⁶⁵ *Glen Innes Examiner*, February 16, 1894.

⁶⁶ *Glen Innes Examiner*, March 6, 1894. The Armidale factory aimed only to supply the local market. *A.E.*, January 30, 1900.

⁶⁷ *A.E.*, March 22, 1873.

⁶⁸ *Agricultural Gazette of New South Wales*, 1893, p. 247.

⁶⁹ *A.E.*, May 25, 1894.

⁷⁰ *Agricultural Gazette of New South Wales*, 1900, p. 372.

⁷¹ See my thesis, *A History of the Pastoral and Agricultural Industries in New England from 1862 to 1895*, App.A, pp. 368-372.

⁷² *Legislative Assembly of New South Wales, Votes and Proceedings*, V, pp. 1,318, 1,380, 1,383.

⁷³ T. R. Forster, *Diary*, 1892.

⁷⁴ *Legislative Assembly of New South Wales, Votes and Proceedings*, 1875, IV, p. 517.

⁷⁵ A. S. Armstrong and G. O. Campbell, *Australian Sheep Husbandry*, Melbourne, 1882, p. 231.

⁷⁶ *Parliamentary Debates, New South Wales*, August 3, 1881, p. 438.

clover, perennial rye, and other good grasses were said to spring up "spontaneously" on the good soils.⁷⁷ In 1872 it was observed that prairie grass was thriving in the most unexpected places near Armidale "while it is but a few years since the first parcel of seed of this grass was brought to Armidale".⁷⁸ Four years later white clover was reported to be spreading.⁷⁹ More recently white clover and *paspalum dilatatum* have been described as naturalized on some fertile alluvial flats and along some creek banks in New England.⁸⁰ Thus what man attempts, nature achieves.

⁷⁷ *Agricultural Gazette of New South Wales*, 1894, p. 37.

⁷⁸ *A.E.*, November 2, 1872.

⁷⁹ G. H. Reid, *An Essay on New South Wales*, Sydney, 1876, p. 157.

⁸⁰ R. Roe, *Preliminary Survey of the Natural Pastures of New England*, *CSIRO Bulletin* No. 210, p. 19.

BOOK NOTES

The Economic Background to Agricultural Policy. Edith H. Whetham. Cambridge: The University Press, 1960, pp. xii, 147. 22s. 6d., paperback edition 13s. 6d. (Stg.).

This book provides a very concise yet thorough coverage of many economic principles of relevance to agriculture and one would expect it to be immediately adopted as a textbook. Miss Whetham has undoubtedly succeeded in her objective of providing "an analysis of agricultural policies in a form suitable for students of agriculture, for practitioners in farming and for other persons interested in agricultural planning". Although the book will probably be appreciated most by students, it is to be hoped that it will be studied by others associated with agriculture who have had little or no training in economics, especially if they are extension workers or persons concerned with agricultural policy.

By providing a clear analysis of the working of economic forces in a market economy Miss Whetham has made the economic implications of alternative agricultural policies seem almost self evident. A good example of this is a reference to milk prices in a small section on the pricing of products with variable supply.

"Milk is an interesting case of a perishable product with a variable supply, the markets for which have been brought increasingly under control, for a number of reasons. Governments have been concerned to ensure for consumers a regular supply of a food which has both a high nutritional value and a high risk of contamination with a variety of dangerous germs. The output must therefore come from producers with approved equipment and it has to be channelled through approved processes, pasteurisation and refrigerated transport, into bottles or waxed