

The anchor of life:

Triumphs and crises in the Australian wheat-growing, flour milling and bread industries from 1880 to 1939.

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If I ask the farmer what he considers the qualities of the best grain he will probably answer at once "The quality that brings the most money into my pocket." If wheats were sold at relative prices which were determined as they ought to be by their intrinsic value, then this would be a satisfactory answer. As things are, it is not, for practically the only quality of the grain which is of importance to the farmer is that of being produced abundantly.

The miller will answer that the qualities which he specially values are those of yielding flour (a) in large quantity (high percentage extraction), and (b) easily (without much grinding).

When the baker is asked he will say that his principal requirements are (a) that the flour shall be of good colour and capable of being made into white bread and (b) that it shall take up much water in being made into dough and so as to make much bread.

The consumers' wants in a wheat are that the flour be nutritious and strength sustaining and capable of being made into a loaf which is light, white and so attractive to the eye, agreeable to eat and easy to digest.

William Farrer, pioneer Australian wheat experimentalist, 1898¹

1 William Farrer, "The Making and Improvement of Wheats for Australian Conditions", *Agricultural Gazette of New South Wales* 9, no. 1 (1898): 131.

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Abstract:

The scope of this thesis is Australia from the late nineteenth century to 1939, viewed through the lens of three interrelated industries – wheat-growing, flour-milling and bread-baking. Authoritative literature on wheat-growing is abundant, but literature on bread-baking and flour-milling is scant, so this thesis aims to add to the literature by explicating the interconnectedness of these three kindred industries.

In the period covered, Australia achieved its sought-after wheat surplus, but as the title suggests, these industries lurched through cycles of triumph and crisis as breakthroughs were achieved only to suffer unforeseen setbacks, culminating in some of the industry coming to near collapse.

This thesis argues that Australia's shift from chronic under-production of wheat as an insular socio-economic outpost of Britain, to a sovereign nation-state operating in a global grain and flour market profoundly altered the production, supply, price and quality of flour-based staples to Australian and international customers and consumers. Starting in the last decades of the nineteenth century, this thesis examines three major historical turning points in the process.

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Introduction:

A chance defect turned the wild, self-sewing grain *Triticum boeoticum* into the forerunner of modern wheat - Einkorn wheat (*Triticum monococcum*). The species of grains that descended from *Triticum monococcum* possess a mutation that prevents the grains from breaking free of the stalk to be spread naturally as it does in the wild *Triticum boeoticum*. This means that human intervention is needed to sow the grain - and it also means that humans can harvest the grain and use it for food.¹

This serendipity enabled humans to shift from nomadic hunter-gatherer to sedentary farmer. Serendipity further intervened as humans domesticated wild animals to plough the fields, provide milk, meat, leather and fibres, to transport produce and to fertilise the soils.² Domestication of plants and animals meant sufficient and reliable nutrition, allowing communities to grow and civilisations to develop. The discovery of ferment and its relation with human nutrition added further good fortune for mankind, because ferment provided the leaven to turn flour into bread and alcohol in the beer and wine used to wash the bread down.³ It is arguably true that the cultivation of cereals and the development of bread is so tightly bound to the evolution of humans as to be responsible for Western civilisation.⁴

Desirous to claim that large part of the globe charted and mapped by Lieutenant James Cook in 1770, Imperial Britain dispatched Captain Arthur Phillip with a fleet of ships bearing colonists to New South Wales in April 1787; Phillip brought the First Fleet into Sydney harbour on 26 January 1788.⁵ Agriculture lay at

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- 1 Ian Stewart, "How To Grow A Planet - The Challenger," *How to Grow a Planet* (Glasgow: BBC Scotland, MMXII 2012), <http://www.bbc.co.uk/programmes/b01ckw5g> viewed 19 June 2012
 - 2 Joachim Radkau, *Nature and Power: a Global History of the Environment*, 1st English ed, Publications of the German Historical Institute (Washington, DC: Cambridge: New York: German Historical Institute; Cambridge University Press, 2008), 53 – 55.
 - 3 Elizabeth David, *English Bread and Yeast Cookery* (London: Allen Lane, 1977), 87 – 118.
 - 4 Fernand Braudel, *A History of Civilizations* (New York, N.Y: Penguin, 1995), 11.
 - 5 New South Wales in 1787 meant all of the east coast of contemporary Australia.

the heart of Phillip's Instructions (and for the first five Governors) because New South Wales was to be an agrarian society with land as the lynchpin and self-sufficiency in food an imperative.⁶ Sixteen days after the colonists came ashore, the first court convened in the new colony to hear cases centred on theft – theft of bread, flour and provisions.⁷ Eye witness Watkin Tench records the hanging of six marines on 24 March 1789 for stealing flour, meat and other articles.⁸ Security of food supply became the colony of New South Wales' most pressing need, and chronic food shortages were the norm until New South Wales achieved modest self sufficiency in grains around 1803 – 1804 and in meat around 1819.⁹ The now smaller colony of New South Wales (without Queensland and Victoria after colonial self-rule in the mid 1850s) only attained wheat self-sufficiency in 1898.¹⁰

Wheat is the basis of bread, and “bread” is a metaphor of cultural, social, economic and even religious significance in European and in other traditions. To *earn one's bread* means to earn a living, *bread* is a euphemism for money, Roman satirist Juvenal coined *bread and circuses* to describe governmental appeasement of disquiet among the masses.¹¹ In some cultures, telling a lie while eating bread is regarded as sacrilege.¹² Bread's importance in the life of Australians in history is exemplified by Geoffrey Blainey who called bread “the anchor of daily life”.¹³ Bread is the central element of this thesis because of its economic and social importance

6 Grace Karskens, “The Early Colonial Presence, 1788-1822” in *The Cambridge History of Australia: Volume 1, The Commonwealth of Australia.*, vol. 1 (Melbourne, Vic: Cambridge University Press, 2013), 91 – 92.

7 Peter Taylor, *Australia, the First Twelve Years* (Sydney: George Allen & Unwin, 1982), 46–47.

8 Watkin Tench, *A complete account of the settlement at Port Jackson, in New South Wales, including an accurate description of the situation of the colony; of the natives; and of its natural productions: taken on the spot, by Captain Watkin Tench, Of The Marines.*” (London: sold by G Nicol, Pall-Mall; and J. Sewell, Cornhill, 1793). 17.

9 Richard Waterhouse, *The Vision Splendid: a Social and Cultural History of Rural Australia* (Fremantle, W.A: Curtin University Books, 2005), 76.

10 C.J King, “An Outline of Closer Settlement in New South Wales”, *Review of Marketing and Agricultural Economics* Volume 25, no. 3 (September 1957): 116.

11 *Macquarie Dictionary*, 5th ed (Sydney: Macquarie Dictionary Publishers, 2009).

12 Ruth Ingram, “So Sacred, You Can't Even Lie While Eating It”, *The Guardian Weekly*, January 20, 2012, Vol. 186 No. 6 edition, sec. p. 31.

13 Geoffrey Blainey, *Black Kettle and Full Moon: Daily Life in a Vanished Australia* (Camberwell., Victoria: Penguin/Viking, 2003), 231.

and because it remains a basis for nutrition in Australia.¹⁴ The continued importance of bread is reflected in a number of facts: that 99.5% of all Woolworths' family customers buy bread, that bread prices were subject to government regulation as late as 1990, that bread remains a staple item in calculating the Australian Consumer Price Index, that bread quality remains the subject of legislation, and that bread is often used as a vehicle for delivery of nutrients deemed important for public health.¹⁵ The central idea developed in this thesis is how Australia shifted from chronic inability to produce enough bread to feed its people, to being an important global producer of high quality grains, and a major producer of flour and bread. This thesis rests on the proposition that baking bread, milling flour and growing grain collectively form a kindred triad of significant economic and social magnitude and value and thereby, are industries of national importance.

The scope is Australia from the late nineteenth century to 1939. Australia finally achieved its much sought-after wheat surplus during this time, but as the title suggests, the industry lurched through cycles of triumph and crisis as breakthroughs were achieved only to have the industry come to near collapse. In the last decades of the nineteenth century declining wheat yields went unrecognised. Science and technology arrested the decline only to have the industry struggle to survive the exigencies of World War One, global trade cycles and entrenched industrial dysfunction in the baking industry. By the end of the 1920s the wheat-growing, flour-milling and bread-baking industries came near to collapse, requiring Federal government intervention on the eve of World War Two. This thesis argues that Australia's shift from chronic under-production of wheat as an insular socio-economic outpost of Britain, to a sovereign nation-state operating in a global grain and flour market profoundly altered the production, supply, price and quality of flour-based staples to Australian and international consumers and customers. In

14 John Pearn, "Panis Populi--bread and Public Health in Australia", *Australian and New Zealand Journal of Public Health* 22, no. 2 (April 1998): 282.

15 Asa Wahlquist, "The Rise and Fall of Our Daily Bread", *The Australian*, April 27, 2010, <http://www.theaustralian.com.au/opinion/the-rise-and-fall-of-our-daily-bread/story-e6frg6zo-1225854419081>; Pearn, "Panis Populi--bread and Public Health in Australia," 282 – 285.

support of the premises of this argument, evidence of profound changes that altered the structure and economics of the wheat, flour and bread industries and thereby the economic, social and cultural development of Australia is presented and analysed. Starting in the last decades of the nineteenth century, three major historical turning points are examined with a chapter devoted to each. The method of enquiry used is to examine each of these three historically significant changes from the perspective – not just of the events – but also of the economic, social and political consequences of the events.

Chapter One covers the first turning point that occurred during the last two decades of the nineteenth century, a period bearing the hallmarks of agricultural expansion and technical innovation but declining wheat yields. The end of the gold rush, the expansion of the population through immigration, increasing farm mechanisation and the expansion of railways opened up more territory to agriculture.¹⁶ The introduction of roller milling technology in this period industrialised the production of flour and brought the price of the highly desired white flour within reach of all consumers.¹⁷ Large-scale industrialisation of milling also saw the aggregation of smaller, local mills into larger centralised mills, with greater automation and higher output from the fewer mills remaining.¹⁸ Despite many advances in late nineteenth century Australia, periods of sub-optimal rainfall, declining soil fertility, poor or indifferent agricultural techniques and the planting of low yielding wheat varieties in an effort to combat plant diseases resulted in average wheat yields declining from 16.1 bushels per acre in 1851 to 6.1 bushels per acre as the nineteenth century closed.¹⁹ Given that the New South Wales statistician estimated in 1901 that bread accounted for 14% of all food expenditure, and

16 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries: First Report*, Parliamentary Paper (Australian Parliament) 1932-33-34, no. 234 (Canberra: Commonwealth Government Printer, 1934), 9.

17 Pearn, "Panis Populi—bread and Public Health in Australia", 282.

18 W. Lewis Jones and Peggy Jones, *The Flour Mills of Victoria 1840-1990: An Historical Record* (Victoria: Flour Millers' Council of Victoria, 1990), 11 & 332 - 333.

19 Greg Whitwell and Diane Sydenham, *A Shared Harvest: The Australian Wheat Industry, 1939-1989* (South Melbourne: Macmillan Australia, 1991), 9 - 13 & 21.

constituted the main source of nutrition for the poor, such a decline in wheat yields gave cause for concern.²⁰

Chapter Two covers a second major turning point – the period from Federation to the 1920s – a period of great achievement, but a period when the exigencies of war and global trade cycles combined to negate improvements in agricultural techniques, improvements in tillage technology, improvements in milling technology, and improvements in wheat breeding. During this period, industrial dysfunction dogged the baking industry, reflecting a schism between the unionised operative bakers' wanting to end the age-old practice of working through the night, and bakery owners implacably opposed to the introduction of 'day-baking'. In the first decades of the twentieth century, Australia made spectacular progress improving the yield from the increased acreage sown to wheat during the last decades of the nineteenth century.²¹ Due largely to the new science of wheat breeding pioneered by wheat experimenter William Farrer, chemist Frederick Guthrie and others, the better use of machinery, fallowing and fertilisers, and the shift from monoculture to mixed farming, for the first time Australia grew a sufficient surplus of wheat to become a net exporter of grain and flour.²² The imperatives of World War One saw emergency expansion of acreage sown to wheat, but by the 1920s, the pricing dynamics of international market forces resulted in a short boom followed by falling wheat and flour prices and declining economic conditions for the wheat, flour and bread industries.²³ These industries had achieved stable production but in an era of unstable prices.²⁴ Profitability of the baking industry also became a recurring theme in this era as did the quality of bread and the price of bread which caused much public complaint.²⁵

20 R. B. Walker and Dave Roberts, *From Scarcity to Surfeit: a History of Food and Nutrition in New South Wales* (Kensington, N.S.W: New South Wales University Press, 1988), 82.

21 Edgars Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948* (Melbourne: University Press, 1956), 259.

22 Ibid.

23 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries*, 1934, 9.

24 Whitwell and Sydenham, *A Shared Harvest*, 27.

25 "Bake Your Own Bread" *The Advertiser*, March 17, 1915; "Our Daily Bread. Quality of the Flour", *The West Australian*, November 5, 1919.

The final major turning point, examined in Chapter Three, concerns the period from the 1920s to 1939 – a period of the Great Depression, intense international competition, marginal profitability in the wheat and bread industries, and government intervention to rescue these industries of national importance. Expansion of wheat plantings in Western Australia and in other states, many due to soldier-settlement schemes following World War One, resulted in the wheat belt increasing from 9 million acres in 1920 to 15 million acres in 1929.²⁶ Subsequent increases in marketable wheat in an international market of declining prices required the reintroduction of wheat pools and other centralised marketing.²⁷ Small wheat farmers tilling marginal land, dependent on family labour and denied access to operating capital left the industry – many selling their farms to their neighbours – resulting in fewer, larger farms.²⁸ A major overhaul of the industry ensued in 1934 after the *Royal Commission on the Wheat, Flour and Bread Industries* chaired by Sir Herbert Gepp (the Gepp Royal Commission) began delivering its findings.²⁹

The Gepp Royal Commission recommended major changes in the industry: a home consumption price for flour, financial assistance to wheat growers, and the centralised government control of wheat marketing.³⁰ For the first time, the Gepp Royal Commission quantified the considerable economic magnitude and importance of the wheat-growing, flour-milling and bread-baking industries, and also quantified their variable profitability.³¹ The Gepp Royal Commission found that inefficiency in the baking industry – especially in bread delivery – caused unsustainable costs that made many bakers unprofitable; the Commission also recommended the establishment of bread research and industry training schemes aimed at improving

26 Whitwell and Sydenham, *A Shared Harvest*, 14 – 16.

27 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 341 – 342.

28 *Ibid.*, 342.

29 “First Report of Royal Commission on Wheat Industry. Australian Farmers’ Plight. Financial Troubles Analysed. Summary of a Comprehensive Survey”, *Western Mail*, September 27, 1934.

30 Associated Bread Manufacturers of Australia and New Zealand, “The Bread Research Institute of Australia,” in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 158 – 162.

31 “Flour Milling Inquiry”, *Western Mail*, May 7, 1936.

skills and bread quality.³² Enquiries in other states coupled with Gepp Royal Commission findings led to the establishment of the Bread Research Institute in 1948.³³ On the eve of World War Two, the Australian Government formed a statutory authority for wheat disposal in 1939 which became the peacetime Australian Wheat Board in 1948.³⁴

My research indicates that academic historians have, by-and-large, ignored the topics of wheat-growing, flour-milling and bread-baking *qua* topics or have not dealt with these industries as a triad of interdependent endeavours. This thesis demonstrates the importance of these industries in the development of Australia's industry, economy and society and the role bread plays in nutrition in Australia, so this historiographical deficiency is puzzling.

A commercial baker needs five essential ingredients to make palatable, nutritious bread that consumers want to buy at a price they're prepared to pay and to do so at a profit. The baker needs high quality wheat flour that will yield the greatest number of loaves per unit of flour. The baker must then unite this flour with yeast, water, salt and heat in a process that enables the baked bread to be ready for sale in the shortest possible time using the least possible labour and indirect costs. An objective of this thesis is to take a step to remedy the noted historiographical deficiency and explicate the historical connections in this seemingly simple but highly complex and nuanced process, while adding to the scholarship of flour-milling and bread-baking. The historiography of the the three interconnected industries that put bread on the table is variable. Authoritative literature on wheat-growing and agriculture is quite extensive and I make no claims to add to this body of work, but simply to make the connections referred to. Authoritative

32 "THE BAKING INDUSTRY. 'General Inefficiency' Found", *The West Australian*, April 2, 1936.

33 Associated Bread Manufacturers of Australia and New Zealand, "The Bread Research Institute of Australia," 158.

34 Australian Bureau of Statistics, "Feature Article - The Australian Wheat Industry", *1301.0 - Year Book Australia, 2006*, January 20, 2006, <http://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/1301.0Feature%20Article212006opendocument&tabname=Summary&prodno=1301.0&issue=2006&num=&view=>. Accessed 16 April 2012.

literature on bread-baking and flour-milling, on the other hand, is scant and I do make a modest attempt in this thesis to add to the literature from primary source material.

Works by professional historians covering all three kindred industries could be described as patchy, with many of the most of authoritative sources being non-historians. The foundational work of history on the development of Australian agriculture from first settlement is Stephen H. Roberts *History of Australian land settlement 1788-1920* and is, perhaps, a little outdated.³⁵ More recent scholarship has added much to the history of Australian rural land tenure, where the discourse instances the 'yeoman' farmer ideal as one of many significant political influences on land settlement. A very useful work cited in this thesis comes from C.J. King, chief of the Division of Marketing and Agricultural Economics of the New South Wales Department of Agriculture, who provides a comprehensive coverage of the history of agriculture and land tenure in New South Wales is his *An outline of closer settlement in New South Wales*.³⁶

On the specifics of the history of wheat growing, two works stand out – Edgars Dunsdorfs' *The Australian wheat-growing industry, 1788-1948* and A.R. Callaghan's and A.J. Millington's *The Wheat Industry in Australia*.³⁷ Both are reference standards from authoritative sources. Dunsdorf was an economic historian at the University of Melbourne and Sir Allan Callaghan, Director of the South Australia's Department of Agriculture and Principal of Roseworthy Agricultural College. These authoritative works provide valuable historic, economic and scientific information on wheat production for the period under review. Other works by historians Richard Waterhouse, Marilyn Lake and Charles Fahey provide good background on

35 Stephen H. Roberts, *History of Australian Land Settlement 1788-1920* (Melbourne: Macmillan of Australia, 1968).

36 King, "An Outline of Closer Settlement in New South Wales"

37 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*; Allan R. Callaghan and A. J. Millington, *The Wheat Industry in Australia* (Sydney: Angus and Robertson, 1956).

rural life and industry.³⁸ Ernest Scott's *Australia During the War*, Volume 11 of the *Official history of Australia in the War of 1914-1918*, provides invaluable coverage of the history of bread, wheat and flour in Australia during World War One.³⁹ Scott's work is one of the few I could find in the literature that covers the kindred triad holistically.

With respect to bread and baking, Blainey gives some coverage in his *Black kettle and full moon: daily life in a vanished Australia*.⁴⁰ Robin Walker and Dave Roberts provide a very good history of the role of bread in society in their *From Scarcity to Surfeit: A History of Food and Nutrition in New South Wales* while medical Professor John Pearn's short paper *Panis Populi – bread and public health in Australia* is also instructive.⁴¹ English food writer Elizabeth David's *English Bread and Yeast Cookery* includes a well-researched and referenced section on the history of bread in the English tradition.⁴²

The literature on flour milling comes primarily from Keith Farrer and W. Lewis Jones. Farrer's *To feed a nation: a history of Australian food science and technology* and *A Settlement Amply Supplied: Food Technology in Nineteenth Century Australia* are two of few authoritative sources.⁴³ Cereal chemist W. Lewis Jones' *The flour mills of Victoria 1840-1990: an historical record* and *Where have all the flour mills gone?: a history of W.S. Kimpton and Sons - flour millers, 1875-1980* also provide well researched and

38 Waterhouse, *The Vision Splendid*; Marilyn Lake, *The Limits of Hope: Soldier Settlement in Victoria, 1915-38* (Melbourne: Oxford University Press, 1987); Charles Fahey, "Two Model Farmers: Ann and Joseph Day of Murchison", *Victorian Historical Journal* (1987) 71, no. 2 (September 2000): 102.

39 Ernest Scott, *Australia During the War*, ed. C. E. W. Bean, vol. 11, 7th ed., *Official History of Australia in the War of 1914-1918* (Sydney: Angus & Robertson, 1941).

40 Blainey, *Black Kettle and Full Moon*, 231 –243.

41 Walker and Roberts, *From Scarcity to Surfeit*; Pearn, "Panis Populi--bread and Public Health in Australia"

42 David, *English Bread and Yeast Cookery*.

43 K. T. H. Farrer, *To Feed a Nation: a History of Australian Food Science and Technology* (Collingwood, Victoria: CSIRO Publishing, 2005); K. T. H. Farrer, *A Settlement Amply Supplied: Food Technology in Nineteenth Century Australia* (Carlton, Vic: Melbourne University Press, 1980).

valuable resources.⁴⁴

My research of primary source material revealed the following. For bread and baking, a work commissioned by the Associated Bread Manufacturers of Australia and New Zealand entitled *The First Sixty Years* gives excellent primary source coverage on the baking industry in Australia over the period covered by Chapters Two and Three of this thesis.⁴⁵ Although this work was published in 1964, it is a compilation of excerpts from the *Australasian Baker and Millers' Journal* published between 1904 and 1964. Pioneer cereal chemist Frederick Guthrie provides authoritative primary source coverage of his and William Farrer's experimental wheat program of the late nineteenth and early twentieth centuries. The five volume report of the Gepp *Royal Commission on the Wheat, Flour and Bread Industries* of 1934 – 1936 provides a central and significant primary source of information gathered from wheat-growers, flour-millers and bread-bakers, as well as copious statistical and financial data.⁴⁶ Information on Australia's response to the Great Depression comes from the principal economist responsible for advising the Australian governments, Professor (Sir) Douglas Copland's Alfred Marshall lecture delivered at Cambridge in 1933.⁴⁷ Unpublished material from the Victorian Millowners Association meetings from 1916 to 1938 provide unique insights on matters of significance to flour-millers.⁴⁸ Newspaper articles across all periods covered provide good general information, situating the contemporary discourse

44 Jones and Jones, *The Flour Mills of Victoria 1840-1990*; W. Lewis Jones, *Where Have All the Flour Mills Gone?: a History of W.S. Kimpton and Sons - Flour Millers, 1875-1980* (Melbourne: Flourmillers' Council of Victoria, 1984).

45 Associated Bread Manufacturers of Australia and New Zealand, *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967).

46 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries*, 1934.

47 D. B. Copland, *Australia in the World Crisis, 1929-1933: The Alfred Marshall Lectures Delivered in the University of Cambridge, October and November 1933* (Cambridge: Cambridge University Press, 1934).

48 The Victorian Mill Owners Association, "Minutes of Meetings: 22 June 1916 to 7 December 1927" (The Victorian Mill Owners Association, June 22, 1916), Acc. No. 95/118. Box 17, University of Melbourne; The Victorian Mill Owners Association, "Minutes of Meetings: 12 December 1928 to 30 November 1938" (The Victorian Mill Owners Association, December 12, 1928), Acc. No. 95/118. Box 17, University of Melbourne.

and giving voice to matters of contemporary importance.

In the period reviewed, this thesis argues that Australia changed from a number of semi-autonomous colonies of Britain, barely able to feed themselves, to a sovereign Commonwealth of Australia selling significant quantities of food in the international marketplace. It demonstrates how the efforts of the wheat farmers, scientists, millers, bakers, politicians in Imperial Britain and in Australia, and state and Federal government instrumentalities persevered through cycles of triumph and crisis to eventually succeed in changing Australia into a major exporter and producer of high quality grains, flour and flour-based products on the eve of World War Two.

Chapter One. 1880 – 1900: Agricultural expansion, technical innovation, growing population but declining wheat yields.

In the Australia of the nineteenth century, bread was the anchor of daily life.¹ In most families a large loaf weighing two pounds stood on a bread board at the top of the table and the head of the family cut from the loaf – thick slices for working people and thin slices for the genteel.² The rich ate white bread and the poor ate bread with a high bran content known then as 'household wheaten bread'.³ The New South Wales Bread Act of 1835 regulated the weight of bread and its bran content, and also prohibited the widespread practice of adulterating bread with non-flour ingredients such as alum.⁴ Other Australian colonies possessed similar legislation and all such laws remained on the statutes until well into the twentieth century.⁵ City dwellers mostly bought their bread from the local baker and those who lived in the 'bush' baked their own bread if they could, or made damper or Johnny cakes if they could not.⁶ At the turn of the twentieth century, Australians consumed around 90 kg of bread per person per annum; a lot, but less than those in Britain who ate 162 kg of bread per capita.⁷ Most Australians made up the deficit by eating meat, but poor families still depended on bread for the bulk of their nutrition.⁸ For the average family living in Australia during the last two decades of the nineteenth century, bread made from wheat was an essential food, possessing a greater importance than it does today.⁹

1 Geoffrey Blainey, *Black Kettle and Full Moon: Daily Life in a Vanished Australia* (Camberwell., Victoria: Penguin/Viking, 2003), 231.

2 Ibid.

3 Ibid., 234.

4 R. B. Walker and Dave Roberts, *From Scarcity to Surfeit: a History of Food and Nutrition in New South Wales* (Kensington, N.S.W: New South Wales University Press, 1988), 49.

5 Ibid.

6 Barbara Santich, *Bold Palates* (Kent Town, South Aust: Wakefield Press, 2012), 218 – 220.

7 Walker and Roberts, *From Scarcity to Surfeit*, 82.

8 Ibid.

9 Blainey, *Black Kettle and Full Moon*, 232.

For one hundred years after first settlement, growing wheat to make bread remained a risky crop for most Australian farmers, and wool paid better and more reliably.¹⁰ Wheat farming did expand, slowly at first then more widely and rapidly, but in the last two decades of the nineteenth century a major problem affected bread supply when wheat yields started declining. This situation arose despite significant agricultural expansion and technical innovations in the wheat-growing and flour milling industries. In 1881, David Gibson became the first miller in Australia to fully equip his Carlton flour mill in Melbourne with the new roller milling technology, which was the first major innovation to flour-milling since the introduction of stone milling centuries earlier.¹¹ A new era in Australian rural land tenure occurred in 1884 when the colonies of Queensland, New South Wales and Victoria enacted entirely new legislation placing limitations on the free selection of crown land, and emphasising supervision on agricultural land; the other colonies of South Australia, Western Australia and Tasmania made similar changes to their land tenure laws.¹² During the 1880s Hugh Victor McKay demonstrated a harvester that went on to revolutionise grain cropping, Professor Custance at Roseworthy Agricultural College in Adelaide demonstrated the effectiveness of superphosphate fertiliser, and Custance's successor Professor Lowrie successfully demonstrated the use of fallowing to prepare for the wheat crop.¹³

Notwithstanding these potentially beneficial changes, at the close of 1889 Australia's wheat industry reached an all-time low and experienced the most calamitous wheat crop in its history, losing much of the crop to the fungus disease, rust.¹⁴ Despite a growing population demanding more bread and expansion in lands

10 C.J King, "An Outline of Closer Settlement in New South Wales", *Review of Marketing and Agricultural Economics* Volume 25, no. 3 (September 1957): 11.

11 W. Lewis Jones, *Where Have All the Flour Mills Gone?: a History of W.S. Kimpton and Sons - Flour Millers, 1875-1980* (Melbourne: Flourmillers' Council of Victoria, 1984), 16 – 17.

12 Stephen H. Roberts, *History of Australian Land Settlement 1788-1920* (Melbourne: Macmillan of Australia, 1968), 309.

13 Alan Robert Callaghan, "100 Years of Growing Wheat in S.A." (Dept of Agriculture South Australia, s 1970), 2 – 3, http://www.pir.sa.gov.au/__data/assets/pdf_file/0009/154359/100Years.pdf.

14 CW Wrigley, "W.J. Farrer and F.B. Guthrie: The Unique Breeder-Chemist Combination That

sown to wheat to make the bread, despite advances in science and technology, the closing years of the nineteenth century witnessed average wheat yields decline from 16.1 bushels per acre in 1851 to 6.1 bushels per acre as the century ended.¹⁵

This chapter explicates this major turning point in the triad of wheat-growing, flour-milling and bread-baking in Australia. It begins with an attempt to answer the apparent paradox; how and why did wheat yields decrease, when population and agriculture expanded and technology improved? Central to the argument offered in this chapter is that the decline in wheat yields was not recognised in a timely way because statistical analysis did not, at first, reveal other factors that obscured the realities of the declining harvests.¹⁶ The factors examined include: the growth and movement of the population that accompanied the gold rushes, increasing area given over to agriculture, changes in farm sizes and the move from monoculture to mixed farms, increased farm mechanisation, better farming techniques, and the expansion of railways that opened up more territory to agriculture.¹⁷ Seasonal fluctuations, pestilence and economic vicissitudes also helped mask the real decline in yields so these factors are briefly examined.¹⁸

Moving to the customer of the wheat farmer – the miller – the introduction of roller milling is examined, as is how this new technology up-scaled and

Pioneered Quality Wheats for Australia”, *Historical Records of Australian Science* 4, no. 1 (January 1, 1979): 7.

15 Greg Whitwell and Diane Sydenham, *A Shared Harvest: The Australian Wheat Industry, 1939-1989* (South Melbourne: Macmillan Australia, 1991), 9 – 13 & 21.

Note: Prior to adoption of the SI system, weights and measures used in these industries varied considerably. A bushel is a dry measure of volume of 8 gallons with a standard weight for wheat of 60 pounds avoirdupois. A sack (or bag) of wheat contains 4 bushels or 240 pounds, although some standard sacks contain 200 pounds. A short or US ton is 2,000 pounds weight (907.185 kg), a long or Imperial ton is 2,240 pounds weight (1,016.05 kg). See also *Macquarie Dictionary* Fifth Edition, 2012.

16 Edgars Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948* (Melbourne: University Press, 1956), 133.

17 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries: First Report*, Parliamentary Paper (Australian Parliament) 1932-33-34, no. 234 (Canberra: Commonwealth Government Printer, 1934), 9.

18 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 158 & 174.

industrialised the production of flour, bringing the price of the highly desired white flour and white bread within reach of all consumers.¹⁹ Also covered, are the demographic and social changes that followed the consequent large-scale industrialisation of milling where larger centralised mills replaced hundreds of local mills so central to regional communities.²⁰ Commercially manufactured yeast became available in the second half of the nineteenth century, and began to be used in Australia in the late 1890s.²¹ Use of these 'spontaneous yeasts' began to change baking considerably in the twentieth century, but baking bread in the 1880s remained much as it had for centuries, so a brief description of a typical baker's method of the late nineteenth is provided.²² Regardless of how it was made, the New South Wales statistician estimated in 1901 that bread accounted for 14% of all food expenditure, and constituted the main source of nutrition for low-income families.²³ Chapter One concludes with a case study that puts the material covered in this chapter in the social and economic context of a rural farming and milling family from Murchison, near Shepparton, Victoria.²⁴ The history of the Day's farm and their *Noorilim Flour Mills* crystallises much of the argument offered in this chapter because it represents a model case of the triad of wheat-growing, flour-milling and bread-baking and their social and economic significance.

In 1892, pioneer wheat experimentalist William Farrer and trailblazing chemist Frederick Guthrie formed a collaboration that would help arrest declining wheat yields, help Australia become a major producer and exporter of wheat and flour, and allow bakers to bake better bread.²⁵ This prospect for the revival of

19 John Pearn, "Panis Populi--bread and Public Health in Australia", *Australian and New Zealand Journal of Public Health* 22, no. 2 (April 1998): 282.

20 K. T. H. Farrer, *To Feed a Nation: a History of Australian Food Science and Technology* (Collingwood, Victoria: CSIRO Publishing, 2005), 20.

21 Associated Bread Manufacturers of Australia and New Zealand, "1909 - Greater Reciprocity with Flour Millers.," in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 22.

22 Elizabeth David, *English Bread and Yeast Cookery* (London: Allen Lane, 1977), 93 – 94.

23 Walker and Roberts, *From Scarcity to Surfeit*, 82.

24 Charles Fahey, "Two Model Farmers: Ann and Joseph Day of Murchison", *Victorian Historical Journal* (1987) 71, no. 2 (September 2000): 102 - 123.

25 Wrigley, "W.J. Farrer and F.B. Guthrie," 9.

fortunes for the wheat, milling and bread industries occurred in the turning point covered in Chapter Two, but to understand these developments it is first necessary to examine and analyse the reasons for declining wheat yields in late nineteenth century Australia.

Economic historian Edgars Dunsdorf carried out an extensive analysis of Australia's wheat-growing industry in the 1950s, identifying 1856 to 1896 as the period of declining wheat yield, which he calculated as a 62% decline in 1896 relative to the average yield per acre in 1856.²⁶ He argued that no single factor caused the decline in wheat yields, rather that the decline happened in a complex and multi-factorial environment, with factors such as increased areas sown to wheat masking the real decline.²⁷ Dunsdorf's analysis examined this decline in the framework of: expansion of the wheat growing area, changes in farm size and farm structure, the effect of changes to land tenure legislation, and changes in the structure of wheat farms.²⁸ Dunsdorf described this framework as a 'vicious cycle' where measures taken to arrest declining yields actually deepened the effect.²⁹ Within this framework, Dunsdorf's analysis concluded that the major causative factors of the declining yield were: periods of sub-optimal rainfall, declining soil fertility, poor or indifferent agricultural techniques and the planting of low yielding wheat varieties in an effort to combat plant diseases.³⁰ Because it offers a well structured and informed approach to the topic, Dunsdorf's wheat-growing framework will be used to examine the causes of declining wheat yields, starting with the expansion of the wheat-growing area.

In the 1870s, some Australian colonial farmers had grown enough wheat for self-sufficiency and those colonies began to export their surplus wheat for the first

26 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 114 – 186.

27 Ibid., 185.

28 Ibid., 114 – 186.

29 Ibid., 186.

30 Ibid., 185 – 186.

time. Most of the surplus for export came from South Australia, dubbed “the Farinaceous colony” due to its suitable wheat producing areas close to ports and due to the successful agricultural policies of the South Australian government that brought about rapid expansion of agriculture.³¹ Settled by entrepreneurial free settlers from its inception, South Australia's colonists were alive to the free market economy and their place in the chain of supply and demand.³² Influenced by the English colonisation theorist, E.G. Wakefield, official government policy promoted the initial establishment of pastoralism as a precursor to agriculture and used proceeds from the sale of crown land to induce immigrants and to assist settlers on the land.³³ The Strangeways Act of 1869 provided loans to small landholders to encourage them to shift from pastoralism to cultivation.³⁴ South Australia's wheat-growing areas moved north despite warnings from Surveyor-General George Goyder in the 1860s whose prognostication of a line of limited rainfall beyond which cultivation should not proceed ultimately proved true.³⁵

Victoria also began to produce a surplus of wheat for export, Tasmania and Western Australia were more-or-less self sufficient but New South Wales and Queensland relied on imported wheat until late in the nineteenth century.³⁶ Victoria and New South Wales expanded the area of pasture sown to wheat with the crossing of the Great Dividing Range, and the expansion of railways facilitated the shift of wheat-growing from the rust and flood prone coastal areas to the drier inland.³⁷ Victoria's expansion stalled due to a succession of dry seasons and the financial crisis in the 1890s.³⁸ However, with the greatest area sown to wheat, South Australia and

31 Beverley Kingston, *Glad, Confident Morning*, vol. 3, *The Oxford History of Australia* (Melbourne? Oxford: Oxford University Press, 1986), 20.

32 Whitwell and Sydenham, *A Shared Harvest*, 30 – 31.

33 W. Harcus, “CHAPTER XI. THE LAND,” in *South Australian Agriculture 1886, It's History, Resources and Productions*. (London: Low, Marston, Searle and Rivington, 188 Fleet Street, 1886), 55

34 John C. Radcliffe, “History of Agriculture in South Australia - Land Settlement in SA”, accessed August 1, 2013, http://www.pir.sa.gov.au/aghistorical/left_nav/land_settlement_in_sa.

35 Ibid.

36 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 114 – 117.

37 Whitwell and Sydenham, *A Shared Harvest*, 10 – 12.

38 Ibid., 13.

Victoria produced the bulk of the wheat and exported most of their surplus to the other Australian colonies, but increasing quantities went to markets in Britain, thereby causing local wheat prices to become subject to international market prices for the first time.³⁹ Before World War One, Britain controlled thirty percent of the world wheat trade and prices in the Liverpool corn exchange determined world prices.⁴⁰ Perhaps as importantly, the City of London at that time financed much of the major wheat plantings around the world, and financed and controlled much of the world's wheat shipping and insurance.⁴¹ These factors became major influences on the Australian wheat industry in the later periods covered in this thesis.

In summary, the area sown to wheat between 1860 and 1890 grew fivefold as illustrated in Table 1:

State	1860		1890	
	Acres sown to wheat.	Percent of Total.	Acres sown to wheat.	Percent of Total.
New South Wales	128,829	20.01	333,233	10.32
Victoria	161,252	25.03	1,145,163	35.47
Queensland	196	0.03	10,290	0.32
South Australia	273,672	42.50	1,673,573	51.84
Western Australia	13,584	2.11	33,820	1.05
Tasmania	66,450	10.32	32,452	1.00
	643,983	100.00	3,228,531	100.00

Table 1: Australian wheat acreage, 1860 to 1890.⁴²

The next part of Dunsdorf's framework for analysing declining wheat yields is the change in farm sizes that occurred during the period under review. As towns grew, smaller farms on their periphery also proliferated in order to supply townfolk

39 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 115.

40 Allan R. Callaghan and A. J. Millington, *The Wheat Industry in Australia* (Sydney: Angus and Robertson, 1956), 208 – 209.

41 A. H. Hurst, *The Bread of Britain*, (London: Oxford University Press, H. Milford, 1930), 10 – 14.

42 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries*, 1934, 10.

with the produce of gardens and orchards.⁴³ But these small farmers no longer grew wheat. With the shift from growing wheat on smaller farms on the coastal fringe to the inland areas across the Great Divide, and with many areas formerly occupied by huge freehold pastoral estates beginning tillage, the average farm size grew.⁴⁴ The clearest data comes from New South Wales where the average farm size increased from 315 acres in 1876 to 862 acres in 1890.⁴⁵ The net impact of these changes saw the number of small farms and large farms grow at the expense of medium size farms, the number of which decreased.⁴⁶ Note that these changes applied to all farms, not just wheat-growing farms. To understand these demographic changes, it is necessary to examine the effect of changes to land tenure legislation.

Some historians contend that the Imperial government in Britain intended to establish a class of yeoman farmer in the colony of New South Wales both to realise a cultural and political ideal, and as a means to self-sufficiency in food.⁴⁷ Marilyn Lake, for example, argues that the concept became enshrined in the Australian ideal in the 1850s and 1860s before becoming an anachronism by the 1920s.⁴⁸

Contemporary accounts from the late nineteenth century lend some support for the yeoman ideal proposition, for example: historian Charles Pearson refers to '... John Mill's yeoman proprietorship...', and historian of South Australia William H Marcus records that '... there is a class of independent yeomanry settling on their freehold lands, where they enjoy all the comforts of their independence and abundance'.⁴⁹ In addition, Imperial Britain's world view bound civilisation to agriculture, and regarded the herding of animals a hallmark of uncivilised cultures.⁵⁰ South Australian politician J. L. Parsons' evidence to the 1895 Northern Territory Royal

43 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 117.

44 *Ibid.*, 118.

45 *Ibid.*, 117.

46 *Ibid.*

47 Waterhouse, *The Vision Splendid: a Social and Cultural History of Rural Australia*, 18 – 20 & 33.

48 Marilyn Lake, *The Limits of Hope: Soldier Settlement in Victoria, 1915-38* (Melbourne: Oxford University Press, 1987), 11 – 18 & xvi.

49 Charles H. Pearson, *Reviews and Critical Essays* (London: Methuen & Co, 1896), 220; H Marcus, "CHAPTER XI. THE LAND," 61.

50 Waterhouse, *The Vision Splendid*, 23.

Commission illustrated the prevailing mindset when he remarked:

The importance of agriculture is obvious... as the parent of manufactures and commerce. Without agriculture there can be neither civilisation nor population.⁵¹

Other Australian colonies used the sale of Crown land to finance emigration but, as has been evidenced, South Australia was the only colony that systematically used pastoralism as a means of fostering agriculture and immigration, whereas early in the development of the other colonies, pastoralism quickly dominated the rural economy.⁵²

Orchards and gardens provided much of the fresh food in early Australia, but the cultivation of grains proved difficult to establish, because of lack of local knowledge, because of the difficulty of clearing the land of large trees and scrub, and because of floods, droughts and pestilence.⁵³ As a consequence, the colonies of New South Wales, Queensland, Victoria and Western Australia enacted systems of rural land grant and tenure that favoured pastoralists, self-made land grabbers on the make for the most part.⁵⁴ These 'squatters' constituted an established and entrenched conservative class, many of them in positions of great wealth and influence who – together with the banks and pastoral companies – held a virtual hegemony over commercial and political life.⁵⁵ Squatters continued to exercise power over time through their appointment to the colonial Legislative Councils (upper houses).⁵⁶ All the colonial Parliaments framed their constitutions to create Upper Houses not only to review laws but to empower the conservative elements of society, '... that portion of the community naturally indisposed to rash and hasty measures', so lasting land

51 Cynthia M Atherton, "The Northern Territory - South Australian White Elephant" (Occasional Papers at Northern Territory Library - Dept of Arts and Museums), 8, accessed August 10, 2013, http://www.artsandmuseums.nt.gov.au/northern-territory-library/collections/occasional_papers#.UgXsZbxHcyg.

52 Harcus, "CHAPTER XI. THE LAND," 55 – 59.

53 Grace Karskens, *The Colony: a History of Early Sydney* (Crows Nest, N.S.W: Allen & Unwin, 2009), 98 – 152.

54 Ibid., 137.

55 King, "An Outline of Closer Settlement in New South Wales", 91.

56 Waterhouse, *The Vision Splendid*, 20 – 25.

reform proved difficult.⁵⁷ The discovery of gold in New South Wales and Victoria (1851), Queensland (1870 and 1880) and Western Australia (1890) provided increased incentive and increased political pressure to reform land tenure.⁵⁸

The discovery of gold triggered external and internal migration that led to the growth of cities and towns, and brought economic diversity and prosperity.⁵⁹ In the rapidly changing economic, political and social environment created by the gold rushes and after the Eureka rebellion, the Victorian parliament typified the confrontation between the forces of liberalism and the forces of conservatism.⁶⁰ In 1896 historian and parliamentarian, Professor Charles Pearson, summed up Victoria's post gold-rush political achievement as:

the carrying out by Englishmen, Scotchmen and Irishmen, on virgin soil, of the reforms they had dreamed of at home. ...John Mill's yeoman proprietorship, have all become realities here, while they are for the most part still nothing more than aspirations for England.⁶¹

To achieve the socially and politically desired yeomanry, and in pursuit of the equal opportunity doctrine of *laissez-faire*, colonial legislatures began to enact a series of Selection Acts aimed at taking privileges away from the squatter class and to give all colonists a chance to acquire property and prosper from it.⁶²

Between 1860 and 1901 the Australian colonies all enacted a number of laws or amendments aimed at breaking up the large pastoral holdings and redistributing the land to promote small-scale agriculture.⁶³ These Closer Settlement Acts or their

57 John Waugh, *Deadlocks in State Parliaments*, SSRN Scholarly Paper (Rochester, NY: Social Science Research Network, January 7, 2009), 17, accessed 13 May 2013.

<http://papers.ssrn.com/abstract=1324049>.

58 Waterhouse, *The Vision Splendid*, 24.

59 Ibid.

60 Alfred Deakin, *The Crisis in Victorian Politics, 1879-1881: A PERSONAL RETROSPECT*, ed. John Andrew La Nauze and R. M. Crawford (Melbourne, Vic.: Melbourne University Press, 1957), 11 – 12.

61 Pearson, *Reviews and Critical Essays*, 220.

62 Waterhouse, *The Vision Splendid*, 25.

63 Ibid.

corollaries were introduced in all colonies and proliferated.⁶⁴ The reasons why these laws proliferated is complex but can be reduced to a few major causes: in the earlier years of Closer Settlement, squatters engaged in wide scale abuse, and in other cases, the minimum lot sizes for selection proved to be economically unviable or were located in areas inimical for agriculture, and in some cases sharp lending practices disadvantaged poorer selectors.⁶⁵ The many revisions and changes to Closer Settlement legislation aimed at closing the loopholes that allowed the intent of Closer Settlement to be subverted, and to redress the unintended consequences that disadvantaged some selectors. The efforts to establish a yeoman class of medium-sized agriculturalists cannot be regarded as an unreserved success.⁶⁶ However, the Closer Settlement Acts and the expansion of railways did result in expansion of wheat plantings and did set in train the shift to mixed farming that eventually prevailed in Australia during the first decades of the twentieth century.⁶⁷

Closer Settlement provided the opportunity for poorer, landless Australians to start farming, and banks, pastoral companies and financiers provided the wherewithal.⁶⁸ Selectors were required to pay annual licence and survey fees, and fence and clear their selection, often before the land provided any returns.⁶⁹ South Australia, Victoria and New South Wales all experienced cycles of depression and revival during the 1880s and 1890s that stressed both financial system and borrowers alike, and ended in financial crises and depression in all colonies during the 1890s.⁷⁰ In the period between 1881 and 1891, New South Wales Government Statistician, Sir T. A. Coghlan, at the time of the crisis, estimated that the colonial governments borrowed more than £100,000,000 and private capital added a further £82,000,000 to finance investment in land, mining, building and other projects.⁷¹ A speculative land

64 Ibid., 26 – 31.

65 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 123 – 126.

66 Ibid., 123.

67 Waterhouse, *The Vision Splendid*, 31 – 32.

68 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 124 – 127.

69 Ibid., 125.

70 Ibid., 174.

71 King, "An Outline of Closer Settlement in New South Wales", 112.

boom ensued, followed by a banking crisis that saw only seven of the twenty six banks survive.⁷² Rabbit plagues and drought conditions added to the financial woes of selectors, causing distress for all farmers from the 1890s through to the early twentieth century.⁷³

Australia at the end of the nineteenth century thus experienced a largely undetected decline in wheat yields. Increased land given over to farming, an increase in the area of land sown to wheat, a growing surplus of wheat for export, and an increase in farm size from medium-sized farms to large farms served to mask the decline in yields.⁷⁴ After the gold rushes, colonies enacted changes to land tenure legislation aimed at promoting agriculture over pastoralism. Financial crises, drought and rabbit plagues caused great distress to city and country alike, but despite these setbacks, wheat-growing became the predominant form of agriculture, which in turn brought about a change in the structure of wheat farms.

Before the period under review, small farms located on the coastal fringe and using family labour produced much of Australia's wheat.⁷⁵ With the demographic shift arising from gold discoveries and the crossing of the Great Dividing Range, medium sized farms found that growing wheat provided a better return than stock-raising, again without using hired labour.⁷⁶ Before the shift to larger farms, selectors had little option but to crop their holdings intensively, which in turn led to over-cropping, which further reduced yields.⁷⁷ Australian farmers in this period farmed with English techniques and English wheat varieties.⁷⁸ English wheat varieties matured late and were thus susceptible to fungus diseases such as rust, smut and 'take all'; the introduction of the early maturing variety Purple Straw

72 Ibid.

73 Ibid., 112 – 115.

74 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 133.

75 Ibid., 128.

76 Ibid.

77 Fahey, "Two Model Farmers," 116.

78 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 148.

helped resist rust but at the expense of lower yields.⁷⁹ Initially, farmers had poor understanding that Australian soils were low in nitrogen, phosphorus and other trace elements.⁸⁰ As yields declined in the areas near the gold-fields, Victorian farmers began to move north and took up holdings in the Wimmera and the northern plains.⁸¹

New wheat growing technologies provided economic encouragement for farmers to extend the size of their farms, and changes in land tenure provided a legal framework.⁸² On the legal framework, a consequence of Closer Settlement meant that more marginal land came under the plough, resulting in farmers with larger farms in the more marginal areas being better able to compensate for the consequent drop in productivity by sowing more acreage to wheat.⁸³ Technical developments provided two further incentives for farmers to increase the size of their farms; firstly, economies of scale favoured use of the newly developed harvesting machines, and secondly, the need for fallowing – resting cropped fields before re-sowing – was only possible where farmers had land to spare.⁸⁴ This need for fallowing also led to the introduction of mixed farming, where livestock grazed (and manured) the fallow fields.⁸⁵ Finally, during adverse seasons, small wheat farmers sold their farms to larger neighbours better able to ride out seasonal variation.⁸⁶

With the exception of over-cropping, no one factor outlined above actually caused the decline in wheat yields during the final decades of the nineteenth century, indeed – as has been argued – many of these factors served to mask the decline. As stated earlier, Dunsdorf's analysis concluded that the major causative

79 Ibid., 148 – 149.

80 Fahey, "Two Model Farmers," 116.

81 Ibid.

82 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 128.

83 Ibid., 129.

84 Ibid., 128 – 129.

85 Ibid., 130.

86 Ibid., 133.

factors of the declining yield were: periods of sub-optimal rainfall, declining soil fertility, poor or indifferent agricultural techniques and the planting of low yielding wheat varieties in an effort to combat plant diseases.⁸⁷

With respect to rainfall, studies by E.A. Cornish on South Australian data for the years 1896 to 1941 demonstrated a direct correlation not just to overall rainfall but to when in the growing season the rainfall occurs.⁸⁸ Cornish found that rainfall evenly spread over the year was less critical than rainfall during the winter period when germination occurred; data from Victorian studies correlated with the South Australian studies.⁸⁹ Another study by Cornish demonstrated the increase in South Australian wheat yields directly attributable to the boost in soil fertility after the first use of superphosphate fertiliser in 1896.⁹⁰ The head of Roseworthy Agricultural College in Adelaide, Professor J. D. Custance, advocated the use of phosphate fertilisers when he came to the College from England in 1881 and his successor Professor William Lowrie advocated the use of phosphate fertilisers combined with seed drilling (as opposed to broadcasting the seed) when he joined the College.⁹¹ The use of superphosphate and seed drilling subsequently became standard practice on Australian wheat farms.⁹² The reduced wheat yields due to low yielding wheat varieties used to combat fungus diseases will be covered more fully in Chapter Two but a brief discussion on changes in the agricultural techniques of the period and the growth in railways will serve to bring this section of Chapter One – the decline in wheat yields – to a close.

Although Australia's population grew as a result of natural increase, immigration schemes and gold seekers, economic expansion absorbed most of the

87 Ibid., 186.

88 EA Cornish, "The Influence of Rainfall on the Yield of Wheat in South Australia", *Australian Journal of Biological Sciences* 3, no. 2 (January 1, 1950): 193.

89 Ibid., 215 – 218.

90 Callaghan and Millington, *The Wheat Industry in Australia*, 141 – 143.

91 Ibid., 91 – 95.

92 Ibid., 329 – 331.

increase, causing long-standing shortage of labour in rural areas.⁹³ Wheat farmers responded by mechanising their farms. South Australia again led the way when the stripper – invented by J.W. Bull and commercialised by John Ridley – began to be used and the stump-jump plough developed by the Smith brothers of Arthurton in 1876 enabled exploitation of the Mallee region of South Australia and Victoria.⁹⁴ It is noteworthy that John Ridley was by profession a miller who imported, installed and operated the first steam-powered flour mill in Adelaide.⁹⁵ About 1874 a South Australian settler named Mullens developed the technique of 'rolling the Mallee'.⁹⁶ Horse teams dragged a heavy frame across the Mallee scrub to flatten it, after which the flattened residue was fired the following year, then wheat was sown in the ashes after deep ploughing using the stump-jump plough, a process that became known as 'Mullenising'.⁹⁷ These techniques that enabled wheat-growing in the Mallee opened up considerable area to wheat in South Australia and Victoria, and the semi-arid Mallee proved to be productive and rust free, provided adequate rain fell at the right time.⁹⁸ Although Ridley's stripper saved considerable labour in harvesting, it only operated optimally in the dry farming areas such as South Australia, but the advent of the combine harvester, invented by James Morrow and successfully commercialised by Hugh Victor McKay in 1894, enabled a revolutionary change in wheat harvest automation.⁹⁹ Although not as revolutionary at the time as the combine harvester – but equally important to the wheat, flour and bread industries – was the spread of railways.

New South Wales in 1850 possessed three roads in a reasonable state of repair, the remaining roads being in deplorable condition, making inter-colony and

93 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 154.

94 Radcliffe, "History of Agriculture in South Australia - Land Settlement in SA."

95 "The Southern Australian," *Southern Australian*, April 23, 1840, 3 – 4.

96 Callaghan, "100 Years of Growing Wheat in S.A.," 2.

97 Ibid.

98 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 159 – 160.

99 John Lack, "McKay, Hugh Victor (1865–1926)," in *Australian Dictionary of Biography* (Canberra: National Centre of Biography, Australian National University), accessed August 21, 2012, <http://adb.anu.edu.au/biography/mckay-hugh-victor-699>.

intra-colony movement of goods and people arduous, difficult and sometimes dangerous.¹⁰⁰ In the second half of the century, river transport provided a sometimes unreliable alternative to roads but it was the railway systems that became the main means of transport between the cities and the bush.¹⁰¹ By 1891 Victoria possessed 4,448 kilometres of rail, New South Wales had 3,351 kilometres, and South Australia 2,680 kilometres.¹⁰² In these colonies, the tracks radiated from the capitals to the hinterland in the direction of mining, industrial, pastoral and agricultural towns.¹⁰³ Queensland's great railway boom came in the 1890s, differing from other colonies in that many of the tracks connected the hinterland with the coastal ports.¹⁰⁴ In Western Australia the wheat frontier began to spread in the early twentieth century, following the Great Southern Railway south and then north-west with the expansion of that rail system.¹⁰⁵ The railways brought significant economic stimulus during their construction, and played a major role in converting farms to wheat production, especially in New South Wales.¹⁰⁶ Rail also fostered the establishment of a wide range of regional industries, such as: sugar mills, butter and cream factories, wool scouring works, abattoirs, freezing works, and flour mills.¹⁰⁷

Grain milling is the process that renders grain into flour. Approximately 85 - 87% of the wheat berry is endosperm, which is that part of the grain that provides white flour, and 13 - 15% of the wheat berry is bran, germ and other components that encapsulate the endosperm.¹⁰⁸ Up until the middle of the nineteenth century, most flour mills used rotating mill stones driven by animals, (including humans in colonial Australia), wind, water, steam or electric power. The grain to be milled -

100 Waterhouse, *The Vision Splendid*, 34. **Note:** One road led from Sydney to the Hunter region, another crossed the Blue Mountains, and the third headed south-west towards Yass.

101 *Ibid.*, 35.

102 *Ibid.*

103 *Ibid.*

104 *Ibid.*

105 Whitwell and Sydenham, *A Shared Harvest*, 15.

106 Waterhouse, *The Vision Splendid*, 35.

107 *Ibid.*

108 W. Lewis Jones and Peggy Jones, *The Flour Mills of Victoria 1840-1990: An Historical Record* (Victoria: Flour Millers' Council of Victoria, 1990), 2 - 3.

called 'grist' by the miller – was fed into an aperture between a stationary 'bed-stone' and a grooved, rotating 'runner-stone' which ruptured the berry capsule, rendering the grist into flour.¹⁰⁹ Stone mills served for centuries but suffered drawbacks, the most significant of which is that the stones pulverised the grist, making separation of white flour from the bran, germ and other components difficult.¹¹⁰ Using rollers to replace stones was mooted as early as the 1820s but it took until the 1860s for the technology to be perfected.¹¹¹

Although originally developed by Müller and Sulzberger in Switzerland during the 1830s, F. Naef in Budapest, Hungary, perfected milling grain using steel rollers on a reliable, industrial scale, from the 1860s and the technique was readily adopted as steam and electric power became available.¹¹² Roller milling quickly supplanted stone mills because it provided high throughput and higher extraction rates than stones.¹¹³ Roller milling also enabled economies of scale and continuous flow more amenable to automation.¹¹⁴ Mills transitioned from highly localised plant on a village scale to highly centralised plant on an industrial scale.¹¹⁵ Modern roller milling is a 'gradual reduction' process where, unlike stone milling, the grain is more gently opened and then progressively refined.¹¹⁶ Perhaps because British millers were slow to take up roller milling, it took until 1879 for the first roller milling equipment to reach Australia, when W. Duffield and Company installed some rollers in their Gawler, South Australia, mill.¹¹⁷

109 Ibid., 9.

110 Callaghan and Millington, *The Wheat Industry in Australia*, 208 – 209.

111 Farrer, *To Feed a Nation*, 77 – 78.

112 Jones and Jones, *The Flour Mills of Victoria 1840-1990*, 13.

113 Ibid., 3.

Note: Millers measure their output in terms of extraction rates, which is the quantity of flour extracted from 100 units of grain input to the mill, where; 100% extraction flour means 100% wholegrain flour with all the bran, germ and capsule mixed in with the white endosperm; 76% extraction flour – the aim achieved by most Australian mills – means white flour with most traces of the bran and germ capsule removed. The best stone mills achieved around 65% extraction.

114 Ibid., 10 – 20.

115 Ibid., 10 – 11.

116 Ibid., 3.

117 Farrer, *To Feed a Nation*, 78.

Duffield's mill was a mixed mill using stones and rollers.¹¹⁸ In 1881 David Gibson became the first miller in Australia to fully equip his Carlton mill in Melbourne with the new roller milling technology.¹¹⁹ The *Australian Town and Country Journal* of 3 March 1888 began a detailed description of the opening of Brunton & Co's new roller mill at Clyde, a suburb of Sydney:

On Thursday, February 23, a special train left Redfern for Granville, the passengers in which were the guests by invitation of Messrs. Brunton and Co., who on that day celebrated the opening of their new Australian Roller Flour Mills at Clyde, near Granville.¹²⁰

Such an event obviously attracted much public attention because this report goes on to provide a comprehensive description of the facility and considerable detail on the latest Hungarian roller mill technology, Swiss silk sifting screens, power systems and so on which are too lengthy to be repeated here. It also highlights the paradox central to this chapter, that declining wheat yields went largely unnoticed. It is reasonable to infer that the somewhat mundane matter of declining wheat yields could not compete for the attention of public and politicians alike with matters of more immediate interest, such as triumphs of agricultural expansion, technical innovation and industrial development. It is also clear from this report how the Industrial Revolution brought steam to power not just the railways but also the flour mills in two ways; firstly, steam trains brought the grist to the mills, bypassing the local mill, and steam powered the mills themselves.¹²¹ Few regional mills – often powered by wind, water and animals – could compete with the scale and capability of the new technology powered by steam and electricity.¹²²

In the one hundred years following European settlement in Australia, poor transport and traditional equipment and methods caused flour mills to be co-located with the communities they served.¹²³ The miller was a valued member of the

118 Ibid.

119 Ibid.

120 "New Australian Roller Mills", *Australian Town and Country Journal*, March 3, 1888, 17.

121 Farrer, *To Feed a Nation*, 20.

122 Ibid., 78.

123 Ibid., 20.

community and often baked bread as well.¹²⁴ The new roller mills not only rendered the old village mills obsolete, but the nature of the new technology meant a highly capital intensive industry where economies of scale prevailed. The impact of roller milling on regional communities – and in cities – was profound. Two hundred mills in New South Wales in 1860 reduced to around eighty by 1900, and one hundred country mills in Victoria closed between 1880 and 1900.¹²⁵ Thirty one metropolitan Melbourne mills reduced to eighteen in the same period with greater automation and higher output from the fewer remaining mills.¹²⁶ Within twenty five years the new roller technology had replaced all but a few stone mills and transformed the flour milling industry.¹²⁷ For the consumer, this new technology brought with it better flour to make better bread, and for the first time, white bread became cheaper than brown bread.¹²⁸

Although roller milling revolutionised the production of flour, the actual baking of bread in the 1880s remained a heavy manual task that had continued basically unchanged for centuries, as master baker J.T. Kelly recalled to a meeting of bakers in 1909:

He said the system in force when he entered the trade in 1880 was to set ferments with boiled potatoes, a little flour, three or four buckets of water, 1¼ lb to 1½ lb of yeast per 100 loaves being added. This rose some inches in the ferment tub, and fell again, in about two and a half to three hours. A sponge was next set with a quarter to half the amount of water it was intended to make the dough. This sponge would rise in the trough in from three to four hours, and when it was about to drop, the salt for the dough and the balance of the water were added to it. If the baker was ready to make the dough, he would break the sponge into pieces in the salt and water. Those doughs were ready in about two and a half to three hours, and provided the yeast was in good order, no better bread, in Mr Kelly's opinion, could be wished for.¹²⁹

124 Ibid.

125 Ibid., 18 & 78.

126 Jones and Jones, *The Flour Mills of Victoria 1840-1990*, 333.

127 Farrer, *To Feed a Nation*, 78 – 79.

128 Pearn, "Panis Populi—bread and Public Health in Australia," 283.

129 Associated Bread Manufacturers of Australia and New Zealand, "1909 - Greater Reciprocity with Flour Millers.," 22.

As will be demonstrated in Chapter Two, in the twentieth century, the forces of mechanisation, cost reduction and industrial pressure would combine to force bakers to reduce the eight to ten hours to prepare a batch of dough for baking as described by baker Kelly.

Chapter One of this thesis will now close with a case study that illustrates much of the material presented in this chapter. This case study also crystallises many of the arguments presented here, of a paradox that saw declining wheat yields occur during a time of growth and expansion in agriculture and a simultaneous contraction in pastoralism. Further, it shows that this was not recognised in a timely way because these and other factors obscured the realities of the declining harvests. It is the case of the *Noorilim Flour Mills* and farm that the Day family ran on their property near Murchison in Victoria.

William Day and his wife Ann (Smith) emigrated from their native England to Victoria in 1853.¹³⁰ Instead of heading to the gold fields, William found employment as a pastoral labourer on David Webster's Noorilim Run, in the Warring district of Victoria's Goulburn Valley, and in 1860 purchased 256 acres at auction.¹³¹ Squatters held most of the land in the shire, but William and Ann took advantage of the first Grant Act of 1865 to select ninety-six acres to add to their freehold.¹³² After the discovery of gold at nearby Whroo and Rushworth, the enterprising Days profited by operating a punt across the Goulburn River, growing fresh vegetables for the miners, and selling provision from their store; William also operated a carrying business and agisted horses.¹³³ A master tradesman and miller in England, William Day built and operated the *Noorilim Flour Mills* on his property in the late 1860s.¹³⁴ The three storey brick and shingle building housed a sixteen horsepower Lancaster Steam Engine that drove three sets of mill-stones and also

130 Fahey, "Two Model Farmers", 103 – 103.

131 Ibid., 102 – 103.

132 Ibid., 103.

133 Jones and Jones, *The Flour Mills of Victoria 1840-1990*, 192.

134 Ibid.

operated a saw-mill.¹³⁵ The mill employed six men and three six-horse teams to pick up wheat and deliver flour, cleaned wheat, oats, bran, pollard and chaff throughout the district.¹³⁶

Profits from their enterprise enabled the Days to acquire a further 653 acres from struggling selector neighbours.¹³⁷ William Day died in 1872, leaving an extensive estate to his wife Ann and her five sons and two daughters.¹³⁸ Ann Day sold the punt but continued to operate the mill, the store and a large farm, but profits were precarious, in large part because her impecunious selector neighbours struggled to pay their bills just as they struggled to meet the conditions of their selection to clear and fence their land.¹³⁹ Ann employed failed selectors as farm and mill workers, but she too struggled to run a viable enterprise.¹⁴⁰ With the opening of the rail link to Melbourne, Ann Day sold flour and produce to merchants in Melbourne.¹⁴¹ Ann and her daughters also baked bread from their flour and churned butter for sale to the local community as well.¹⁴² As time passed, competition from nearby flour mills in Rochester, Nagambie, Shepparton and Tatura made milling a poor business for Ann Day and her family but the final blow came in the form of new roller mills in Melbourne supplying the district with cheaper flour by rail.¹⁴³

With the mill unprofitable, Ann Day decided to experiment with the new agricultural techniques and equipment all aimed at increasing the farm's productivity. She purchased an Osborne reaper and binder in 1879, and two years later a Eureka double-furrow plough, and in March 1881 ordered Purple Straw seed wheat.¹⁴⁴ By November 1883 she ordered three reapers and three binders.¹⁴⁵ She not

135 Ibid.

136 Ibid.

137 Fahey, "Two Model Farmers", 105.

138 Ibid.

139 Ibid., 105 – 109.

140 Ibid.

141 Ibid., 110.

142 Jones and Jones, *The Flour Mills of Victoria 1840-1990*, 194.

143 Ibid., 192.

144 Fahey, "Two Model Farmers", 111 – 112.

145 Ibid.

only experimented with tillage equipment and new varieties of wheat, she also diversified into sheep and pigs.¹⁴⁶ In 1891 Ann sold the farm to her two eldest sons, Joseph and Henry.¹⁴⁷ Joseph immediately built a dairy herd and bred working horses.¹⁴⁸ In the late 1890s Joseph further innovated with the purchase of a seed drill, a four-furrow plough and five tons of superphosphate fertiliser.¹⁴⁹ The successful results required Joseph Day to purchase a McKay *Sunshine* harvester in 1904.¹⁵⁰ By the early twentieth century, Day owned a diverse mixed farming enterprise that could count on income from wheat, wool, dairying, pigs, cattle and horses.¹⁵¹ The Day family operated the farm until the Victorian government purchased it in the mid 1980s, where it is now preserved as a living example of a late nineteenth century rural enterprise.¹⁵²

The *Noorilim Flour Mills* and Day farm case study illustrates the main premises to the arguments presented in this chapter. It is a story of enterprising immigrants who derived benefit from the gold rush, worked hard, and purchased or selected land in the post gold-rush environment of Closer Settlement. The Days experienced the paradox of declining wheat yields even though their overall enterprise expanded. Like many other farmers, they planted Purple Straw wheat to overcome the rust virus but their wheat yield declined as a consequence. They shared the financial difficulties of their selector neighbours, hiring them when they vacated their selections. They added to their holdings when their neighbours failed, mechanised, and diversified and experimented with new agricultural techniques of farrowing and fertilisation. These innovations enabled the Days to increase their grain yields while they grazed animals in a successful mixed farming enterprise. Their enterprise also established a bakery, dairy and stone flour-milling operation, that served the district well before the mill was rendered obsolete by new technology

146 Ibid., 113.

147 Ibid., 114.

148 Ibid., 115.

149 Ibid., 116.

150 Ibid., 117.

151 Ibid., 119.

152 Ibid., 120 – 121.

and rail transportation.

Chapter Two. 1896 – 1920: Increasing wheat yields and quality amid pestilence, war, and collapsing prices.

After the calamitous harvest of 1889, Australia's wheat yields began to increase at a linear 0.15 bushels per year; an average yield of 7.79 bushels per acre in 1896 became over 11 bushels per acre by 1920.¹ Wheat-production laggard, New South Wales, produced its first wheat surplus in 1897 and exported half a million bushels in 1898.² In 1892 pioneer wheat experimentalist William Farrer collaborated with trailblazing chemist Frederick Guthrie to breed new varieties of wheat that helped Australia become a major producer and exporter of high quality wheat and flour, and held out the promise for the milling of better flour for bakers to bake better bread.³ The twin triumphs of turning declining wheat yields into surpluses, and increasing flour quality arising from Farrer's and Guthrie's work, together with the introduction of roller milling, came just at the right time in the twentieth century. When Britain and her allies entered into a deadly and protracted conflict with Germany and the Axis in 1914, the need for Australian soldiers, sailors, minerals and foodstuffs became strategically important to victory.

The First World War conflict caused a shortfall of wheat production in Allied countries of six hundred million bushels, wheat that the Allies badly needed to feed their population and for their war effort – a critical and pressing shortage.⁴ Australia produced a record harvest in the 1915 – 1916 season but a wartime shipping capacity shortfall in excess of one million tons meant that millions of bushels of badly needed wheat accumulated in vast stacks of sacks that fed mice and insects rather than the

1 Edgars Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948* (Melbourne: University Press, 1956), 187 – 188.

2 C.J King, "An Outline of Closer Settlement in New South Wales", *Review of Marketing and Agricultural Economics* Volume 25, no. 3 (September 1957): 116.

3 CW Wrigley, "W.J. Farrer and F.B. Guthrie: The Unique Breeder-Chemist Combination That Pioneered Quality Wheats for Australia", *Historical Records of Australian Science* 4, no. 1 (January 1, 1979): 9.

4 Ernest Scott, *Australia During the War*, ed. C. E. W. Bean, vol. 11, 7th ed., Official History of Australia in the War of 1914-1918 (Sydney: Angus & Robertson, 1941), 530.

Allies' citizenry.⁵ As a consequence of the war, the Australian Commonwealth Wartime Precautions Act of 1914 ushered in provisions to control the price of flour and bread which ultimately adversely impacted the milling and baking industries.⁶ Wartime economics caused the price of foodstuffs to rise at home, and the Commonwealth Government established the first wartime pools to control the marketing of wheat and to control all shipping.⁷ Early in the twentieth century, the Federated Operative Baker's Union engaged in industrial action for improved conditions, especially an end to the long hours of overnight work that were common practice in the baking industry.⁸ The issue of 'day baking' became a matter of pressing importance during and after the war as bakers struggled to remain in business, facing rising costs and declining prices.⁹

Chapter Two argues that the triumphs achieved in the last decades of the nineteenth century ended in a Pyrrhic victory of sorts in the first decades of the twentieth century. It contends that the exigencies of war, global trade cycles and entrenched industrial dysfunction in the baking industry combined to negate improvements in agricultural techniques, improvements in tillage technology, improvements in milling technology, and improvements in wheat breeding. Furthermore, this chapter contends that these exigencies caused lasting and profound consequences to the wheat-growing, flour-milling and bread-baking industries, leaving them structurally weakened – some by excessive debt, some by inefficiency, and some by both – to the degree that these industries could not survive the Great Depression of the 1930s without government intervention. This chapter begins with an examination of the work of Farrer, Guthrie and other innovators, their success at purposeful, scientific wheat breeding, and the consequent positive impact on wheat yields. It will then briefly assess the impact of the agrarian

5 Ibid., 11:558.

6 Ibid., 11:633 - 649.

7 Ibid., 11:633 – 643.

8 Associated Bread Manufacturers of Australia and New Zealand, *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 15 – 31.

9 Ibid., 30 – 32.

breakthroughs achieved in the last decades of the nineteenth century as their use proliferated in the twentieth century. Australia's response to World War One will then be analysed, especially the emergency expansion of wheat cultivation resulting from the War and the impact of the Wartime Precautions Act of 1914 on the flour milling and bread baking industries. The importance of bread in early twentieth century Australian nutrition will then be examined along with the structural changes in baking that began to impact that conservative industry. This chapter will close with an examination of the complexities and consequences of industrial strife in the baking industry, its recalcitrance, and impact on the economics of the industry. My research for this chapter leads to the inevitable conclusion that the triumphs achieved in the last decades of the nineteenth century did not translate into long-term prosperity and financial security in the wheat-growing, flour-milling and bread-baking industries in the first half of the twentieth century.

The 25 August 1899 edition of *The Sydney Morning Herald* covered the Annual Report of the New South Wales Department of Agriculture, quoting Under-Secretary Mr D.C. McLachlan's comments on recent experience with wheat:

Excellent work is being done by Mr. Guthrie in determination of the milling qualities of wheat. In connection with the improvement in our wheats as regards milling qualities, the department has secured the services, as wheat experimentalist, of Mr. W. Farrer, who for many years has devoted himself entirely to cross-breeding and hybridising wheats with the object of producing varieties that will not only withstand disease and drought but at the same time yield a flour of high milling quality and attractive appearance.¹⁰

Farrer's name is well known in Australia, with his face on the reverse of the now-defunct two dollar bank note. Although he was as instrumental as Farrer in the success of his purposeful, science-based, wheat breeding program, Guthrie's name is less familiar. Breeding plants for their desirable properties existed before Farrer and Guthrie, but it tended to be opportunistic variety improvement through selection by

¹⁰ "Department of Agriculture. Work of the Agricultural College. Combating Insect Pests", *The Sydney Morning Herald*, August 25, 1899, 4.

humans.¹¹ For example: in 1881, James Ward selected a relatively rust-resistant variety of wheat that became Ward's Prolific, the high yielding Steinwedel variety was selected from some wheat plants on Mr. Steinwedel's farm at Dalkey in South Australia, and the drought resistant Early Gluyas variety was selected from an off-type of Ward's Prolific by H.J. Gluyas in 1894 at Port Germein in South Australia.¹²

Born in England in 1845 and educated at Christ's Hospital School, London and Pembroke College, Cambridge, William Farrer emigrated to Australia in 1870 in the hope that the warmer climate would help alleviate a chronic lung condition.¹³ For the first few years he worked as a tutor before qualifying as a land surveyor and joining the New South Wales Department of Lands where he worked for eleven years.¹⁴ Farrer's real wish on coming to Australia was to farm, but fulfilling his desire had to wait until 1886 when he left the Department of Lands to devote himself to breeding new varieties of wheat on his and his wife's small property *Lambrigg* at Tharwa near Queanbeyan in New South Wales.¹⁵ My research located a monograph by Guthrie written sixteen years after Farrer's death recording his first *entrée* into wheat breeding:

Farrer himself, in subsequent publications, stated that the idea of systematic crossing for rust-resistance was first suggested to him in the course of a controversy on this subject between himself and the *Australasian* newspaper in 1882, the *Australasian* having maintained that such a course was not practicable. Newspaper or epistolary controversy was always one of Farrer's strong points, and he delighted in literary conflicts, in which his clear and ordered brain and ready pen made him a redoubtable opponent.

He commenced, as we have seen, experimental work on his farm at Lambrigg in 1886.¹⁶

11 Allan R. Callaghan and A. J. Millington, *The Wheat Industry in Australia* (Sydney: Angus and Robertson, 1956), 255 – 263.

12 *Ibid.*, 260 – 261.

13 Wrigley, "W.J. Farrer and F.B. Guthrie", 22.

14 *Ibid.*

15 *Ibid.*

16 F. B. Guthrie, "William J. Farrer, and the Results of His Work", *Science Bulletin* no. 22 Dept. of Agriculture, 1922, 11.

A reading of newspapers of the day reveals Guthrie's comments on Farrer's 'Newspaper and epistolary controversy' to be apt, because it seems Farrer kept the Letters editors busy.¹⁷

Unlike opportunistic selective breeding of plants for desirable characteristics, Farrer set about the systematic improvement of wheat by cross-breeding and selection, particularly aimed at producing types which should resist the two principal scourges, rust and drought, and produce strong-flour wheats with good milling characteristics.¹⁸ The decline in wheat yield caused by rust motivated the convening of a series of Inter-colonial Rust-in-Wheat Conferences attended by officers from the agriculture departments of the wheat-growing colonies.¹⁹ Farrer was a regular contributor to these conferences, and in constant touch with the New South Wales Department of Agriculture from 1890, which led him, in 1898, to accept an offer to join the Department as 'Wheat Experimentalist' for what Guthrie describes as a 'modest' salary of £350 per annum.²⁰ This move enabled Farrer to extend his work considerably by using the resources of Government Farms and Colleges at Wagga Wagga, Hawkesbury, Bathurst and Cowra.²¹ Farrer knew that a wheat's quality-for-purpose – milling and bread baking – was a key attribute for his breeding program, and his plea for assistance in establishing wheat quality was taken up by F. B. Guthrie in 1892.²²

Frederick Bickel Guthrie was born in Mauritius in 1861 and educated at University College London, and at the University of Marburg, Germany.²³ Emigrating to Australia in 1890 to take up a teaching position at the University of

17 Some examples: "Rust in Wheat. To the Editor of the Herald.," *The Sydney Morning Herald*, March 27, 1890; "The Agricultural Department. To The Editor of the Herald.," *The Sydney Morning Herald*, February 21, 1893; "Crossbread Wheats.," *South Australian Chronicle*, January 19, 1895.

18 Guthrie, "William J. Farrer, and the Results of His Work", 7.

19 *Ibid.*, 10.

20 *Ibid.*, 8.

21 *Ibid.*

22 Wrigley, "W.J. Farrer and F.B. Guthrie," 9.

23 *Ibid.*, 22 – 23.

Sydney, Guthrie also had a long career with the New South Wales Department of Agriculture, returning to the University of Sydney on three occasions over the years.²⁴ Guthrie's contribution to Farrer's work is best expressed in his own words:

It became, therefore a matter of the first importance to devise a means of obtaining reliable information concerning the milling quality of the small samples of wheat (often not more than a few ounces) which often constituted the entire harvest of Farrer's new wheats after two or three seasons.

I was fortunate enough to obtain a couple of small rolls, such as were used for grinding small quantities of whole meal, and to succeed, with the cordial help of Mr. R.W. Harris, head miller, Gillespie Bros., Sydney, in devising a method whereby the operations of a large mill could be fairly well imitated.

Although with this machine we could not hope to obtain a flour of the high-class texture and bloom of millers' flour, we were, nevertheless, able to determine with some degree of accuracy the important points of flour strength, gluten-content, and colour of the flour, as well as the proportion of bran, pollard, and flour obtainable, to bake the flour into loaves and to compare new varieties in these respects.²⁵

Guthrie and his assistant E.H. Gurney devised an exacting procedure that enabled the scientific assay of flour yield, colour, gluten content and strength, ash content, water absorption, total protein content and actual baking quality from very small samples of around 100 grams of wheat.²⁶ Guthrie's pioneering work enabled Farrer to fast-track his wheat experimentation such that he could quickly discard varieties with less desirable characteristics, to concentrate on varieties with favourable characteristics.²⁷

Farrer communicated and collaborated with experts in Australia and overseas, for example: Bancroft, McAlpine and Cobb in Australia, Professors Blount and Carleton in America, and Professor Erikssen in Sweden.²⁸ However, much of Farrer's work was original research, coincidentally based on Mendelian principles, although Farrer was ignorant of Gregor Mendel's work until 1905, shortly before

24 Ibid., 23.

25 Guthrie, "William J. Farrer, and the Results of His Work", 12.

26 Wrigley, "W.J. Farrer and F.B. Guthrie," 9.

27 Ibid., 11.

28 Guthrie, "William J. Farrer, and the Results of His Work", 10.

Farrer died of heart disease in 1906.²⁹ Some of Farrer's breakthroughs came as a result of cross-breeding imported North American Fife-type hard wheats supplied by Professor Blount of Colorado.³⁰ Traditionally, English (and hence Australian) millers preferred grain from soft wheat because that was the type of grist produced by English wheat varieties and it was most easily milled by stone mills.³¹ Commercially successful roller milling technology developed in Hungary during the mid-nineteenth century partly as a consequence of the need to mill hard Hungarian winter wheats.³² English millers were slow to adopt roller milling, but when they did, they began to mill harder wheats.³³ English bakers recognised the superior baking quality of high protein hard wheat flour, so English millers began blending North American hard wheats with the soft English wheats to confer the desired baking quality.³⁴ Prime grades of Canadian Manitoba wheat were generally regarded as the nonpareil wheat quality standard.³⁵ As Farrer wheats began to be cultivated, Australian flour millers resisted their use, however, millers were finally forced to overcome their opposition to the harder wheats in 1896 when shortage of locally produced grain that season necessitated the import of American and Canadian hard wheats to provide flour for home consumption.³⁶

Evidence from the literature and my research confirms 1896 as the point at which Australia's wheat-growing industry entered a period of rapid expansion, thanks in large part to new wheat varieties produced by Farrer's and Guthrie's

29 Ibid., 17 – 23.

30 Wrigley, "W.J. Farrer and F.B. Guthrie," 11 – 13.

31 Callaghan and Millington, *The Wheat Industry in Australia*, 208.

Note: Wheat varieties fall into two broad classifications – hard wheats and soft wheats: soft wheats tend to be used in the baking of cakes and biscuits, while hard wheats are used for bread baking and noodle and pasta manufacture. The prime distinction for bakers is that hard wheats possess high levels of protein in the form of gluten which is strong and elastic, allowing maximum water absorption and leaven aeration, giving the bread maximum rise. See: "Wheat Classification Council Guidelines," August 2012, Accessed 4 July 2012. <http://www.wheatquality.com.au/content/images/documents/WQAWheatClassificationGuidelinesAUGUST2012.pdf>.

32 W. Lewis Jones and Peggy Jones, *The Flour Mills of Victoria 1840-1990: An Historical Record* (Victoria: Flour Millers' Council of Victoria, 1990), 13.

33 Ibid.

34 Callaghan and Millington, *The Wheat Industry in Australia*, 208.

35 Ibid., 405 – 407.

36 Guthrie, "William J. Farrer, and the Results of His Work", 13.

experimental wheat breeding program.³⁷ The Farrer variety Federation released in 1902 became Australia's most popular wheat variety for more than twenty years.³⁸ Farrer aimed to breed wheats with the characteristics of: drought resistance, rust-resistance, high yielding, early ripening, suitable for mechanical harvesting, and of suitable milling and baking quality (as opposed to just high gluten content).³⁹ Although Farrer wheats achieved most of those aims, rust-resistance proved only partly successful and had to await more cross-breeding after Farrer's death.⁴⁰ It is perhaps incongruous that the Farrer varieties most popular with farmers were the high yielding varieties, not the wheats with properties most sought by Farrer and Guthrie – those with the best milling and baking qualities.⁴¹ As a result, Australia's f.a.q. (Fair Average Quality) wheat grading system consequently acted as a restraint to growing high quality, high yielding wheat varieties for many decades.⁴² The f.a.q. system's impact on Australian wheat-growing will be discussed later in this thesis.

After Farrer's death in 1906, Frederick Guthrie did not do any more significant work on experimental wheat breeding, although his association with Farrer continued in his role of a Trustee of the Farrer Memorial Fund, established in 1911.⁴³ The New South Wales Department of Agriculture filled Farrer's position after his death, but major programs of breeding for wheat quality did not reappear for over thirty years.⁴⁴ The work of Farrer, Guthrie and their fellow wheat experimentalists complemented and enhanced many of the advances in agriculture developed over the last two decades of the nineteenth century, so the impact of these developments as they were rolled out in the twentieth century will now be examined.

37 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 188 – 190.

38 Wrigley, "W.J. Farrer and F.B. Guthrie," 16.

39 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 190 – 195.

40 Ibid., 194.

41 Callaghan and Millington, *The Wheat Industry in Australia*, 221 – 225.

42 Ibid.

43 Guthrie, "William J. Farrer, and the Results of His Work", 21.

44 Wrigley, "W.J. Farrer and F.B. Guthrie," 19.

Between 1896 and 1915, acreage sown to wheat in Australia grew from four million acres to twelve million acres followed by a war-time decline to six million acres in 1919 with a new peak of eighteen million acres by 1930.⁴⁵ Over the same period, average annual wheat yields for all states grew at a linear 0.15 bushels per acre, and the two combined – increased acreage and higher yields – meant wheat production increased at 5.7% per year, much faster than the population which grew at 1.9% per annum.⁴⁶ This suggests a considerable surplus of wheat for export which was indeed the case.⁴⁷ New wheat varieties contributed to increased production and reduction in production costs. Reduced production costs arose primarily from the suitability of the new wheat varieties for machine harvesting, and increased production from their early maturation (which also helped rust resistance), and their drought tolerance which enabled more dry-land to be farmed.⁴⁸ The other reasons for increased production arose from the wide-scale use of farrowing and fertilisers.

Fertilisation of the soil using animal manure and other compounds is a long-standing practice well understood by gardeners and farmers alike, but the real breakthrough in Australia came with the realisation that Australian soils were deficient in phosphate and nitrogen.⁴⁹ The widespread use of fertilising, especially with superphosphate and bone dust, is illustrated by Table 1:

State	1900 – 1901	1910 – 1911	1920 – 1921	1930 - 1931
South Australia	27.4	80.7	86.1	90.7
Victoria	11.8	68.6	-	-
New South Wales	-	30.5	44.8	44.4

Table 1. Percentage of fertilised area to total area cropped in selected years.⁵⁰

A companion technique to fertilisation, fallowing is a simple concept but with

45 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 187.

46 Ibid.

47 Ibid.

48 Ibid., 189 – 195.

49 Callaghan and Millington, *The Wheat Industry in Australia*, 91 – 100.

50 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 199.

complex application and results, the success of which varies dependent on unpredictable factors such as weather. In principle, farmers and agronomists have found that resting fields between planting the main crop together with planting companion crops and grazing the fallow fields confers benefits.⁵¹ Depending on seasonality, benefits include: easier and more timely ploughing, and increased yields due to better moisture retention and nutrient retention and development in the soil.⁵² A case study from a South Australian farm with records kept over fifty years by the same owner is explicative. In 1897, a three-course rotation of fallow – wheat – pasture was followed until 1925, at which time oats for forage and green manure, and pea crops to fix nitrogen in the soil were included in the rotation along with sheep and cattle grazing the fallow resulting in a sequence of; fallow – wheat – peas – wheat – oats – pasture.⁵³ During this period of fifty years, wheat yields on this farm increased from twelve bushels per acre in 1897 to twenty six bushels per acre in 1914 and reached thirty six bushels per acre in 1948.⁵⁴ This case study also illustrates the fact that mono-culture of either wheat or wool had become a thing of the past by 1911 as the large majority of farmers shifted to mixed farming.⁵⁵

The first premise of this chapter's argument holds that the four agricultural innovations just outlined – new wheat varieties, the widespread use of superphosphate fertilisers, fallowing, and the shift to mixed farming – brought about a great triumph in increased wheat production in Australia after 1896. This triumph, coupled to the new wheat varieties' better suitability for the new roller milling technology, in their turn held out the promise of better quality and cheaper bread that was the basis of nutrition for most Australians at the time. Before the baking industry could take full advantage of this promise, however, the outbreak of World War One caused significant changes in the wheat-growing, flour milling and

51 Ibid., 195 – 198.

52 Ibid., 193 – 195.

53 Callaghan and Millington, *The Wheat Industry in Australia*, 147.

54 Ibid.

55 Greg Whitwell and Diane Sydenham, *A Shared Harvest: The Australian Wheat Industry, 1939-1989* (South Melbourne: Macmillan Australia, 1991), 32.

bread-baking industries, some of it positive, much of it negative. This chapter will now examine the second premise of the argument – that the exigencies of war, global trade cycles and entrenched industrial dysfunction in the baking industry combined both to negate these triumphs and to cause lasting and profound changes to the wheat-growing, flour-milling and bread-baking triad.

Along with Farrer's death in 1906, my research indicates that the outbreak of World War One in August 1914 marks the end of the early phase of experimental wheat development.⁵⁶ By 1911 the Australian wheat-growing enterprises had settled into a definite wheat belt where the most favourable conditions prevailed.⁵⁷ New South Wales wheat acreage had eclipsed Victoria and South Australia, and Western Australia recorded the fastest expansion of wheat planting where it rose to 1.7 million acres between 1896 and 1915.⁵⁸ From the outbreak of war, wheat acreage underwent sudden expansion and equally sudden contraction as Table 2 illustrates:

Year	Total Acreage (,000 Acres)	Total Production (,000 Bushels)
1914 - 1915	9,651	24,892
1915 – 1916	12,485	179,066
1916 - 1917	11,533	152,420
1917 - 1918	9,775	114,734
1918 - 1920	7,990	75,638
1920 - 1921	6,419	45,975

*Table 2. Wheat Area and Production – 1914 to 1921.*⁵⁹

My examination of this data indicates the effect of a war-time 'Grow More Wheat' campaign, and later, the effect of adverse seasons and labour shortages due to war-time redistribution of manpower to the armed services and to manufacturing

56 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. First Report.*, Parliamentary Paper (Australian Parliament) 1932-33-34, no. 234 (Canberra: Commonwealth Government Printer, 1934), 11.

57 Ibid.

58 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 205.

59 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries*, 1934, 11.

industries.⁶⁰ Farmers shifting from wheat production to wool production owing to the high prices for wool during the war is another factor in the contraction of wheat acreage.⁶¹

At the outset of the war, hostilities in Europe caused widespread disturbance to wheat production in all the Western Allied nations with the exception of Russia, whose wheat production was barely sufficient to feed her own people.⁶² The Allies, therefore, had to rely totally on wheat imported from the United States, Canada, Argentina, India and Australia.⁶³ Nearly all the 1913 – 1914 wheat surplus had been shipped from Australia, and unfavourable conditions caused the 1914 – 1915 crop to be one tenth of the prior season.⁶⁴ As Table 2 shows, however, the Australian 1915 – 1916 crop broke all records, after a good season and appeals by the government for farmers to plant more wheat.⁶⁵ In the second half of 1916, the North American wheat crop yield fell far short of projections and drought and locusts caused Argentina also to experience a poor wheat crop.⁶⁶ As a result of these factors, Australia's bumper crop of 1915 – 1916 and crops from later seasons took on great importance for Allied provender. Authorities in Australia calculated that two million tons of shipping capacity would be needed to transport the wheat to Europe, but a combination of demand for ships exceeding supply and depredations on Allied shipping by the German Navy – especially by the new U-Boat weapon – resulted in a chronic shortage of ships available to the Allied war effort.⁶⁷

Facing a pressing twofold issue of marketing Australia's surplus wheat and shipping the grain during a chronic shortage of shipping capacity, the Australian

60 Ibid.

61 Ibid.

62 Scott, *Australia During the War*, 11:529 – 530.

63 Ibid., 11:530.

64 Ibid.

65 Ibid.

66 Ibid., 11:582.

67 Ibid., 11:584.

government responded by establishing two pooling schemes under government control, aimed at achieving desired outcomes while eliminating potentially wasteful competition for scarce resources.⁶⁸ In August 1915 the Federal Government agreed with the wheat exporting states to establish a shipping pool to be jointly operated by Elder Smith and Company and Antony Gibbs and Sons under the aegis of the Commonwealth and State governments.⁶⁹ Shortly after establishment of the freight pool, on 10 November 1915 the Commonwealth and the States agreed on the establishment of the first Australian Wheat Pooling Scheme to be controlled by an Australian Wheat Board consisting of the Prime Minister or his deputy, the Ministers of Agriculture for the four wheat exporting states and an advisory Board from the wheat-exporting industry.⁷⁰ First as Attorney-General and later as Prime Minister, William Morris Hughes led Australian negotiations with Britain that resulted, in 1916, in the sale of three million tons of Australian wheat to Britain F.O.B (Free On Board) meaning, in this case, that the Australian Wheat Pool had only to get the wheat to ships provided by the British Government to carry the grain from Australia to Britain.⁷¹

The Australian Wheat Pool of 1916 received in excess of four million tons of wheat for export which led to vast stacks of grain in sacks accumulating throughout the wheat-exporting states.⁷² For example, at Brooklyn in Victoria thirteen million sacks of grain in two stacks accumulated that would have required two hundred ships to carry it to its destination.⁷³ As late as 1908, much of Australia's wheat exports used sailing ships which required the ubiquitous corn-sack for stowage, but by 1911 - 1912 the almost complete change to steam ships meant that bulk handling of wheat became possible.⁷⁴ Sailing ships were actually used in 1917 to ship Australian wheat to the Pacific coast of the United States of America, freeing an

68 Ibid., 11:531.

69 Ibid., 11:585.

70 Ibid., 11:586.

71 Ibid., 11:532 – 540.

72 Ibid., 11:588.

73 Ibid.

74 Callaghan and Millington, *The Wheat Industry in Australia*, 370 – 372.

equivalent tonnage of American wheat to be shipped across the Atlantic.⁷⁵ Not unsurprisingly, without bulk storage, mice and insects infested the bagged wheat in plague proportions. These infestations caused extensive damage and degradation to the wheat, some of which was mitigated by mouse prevention barriers and sterilisation techniques.⁷⁶

Australian wheat growers received the low (by world terms) price of four shillings and nine-pence per bushel F.O.B., but in the scheme of things they benefited substantially from the first Australian Wheat Pool because they received the money due to them promptly, without having any regard to the more usual peacetime C.I.F. (Cost, Insurance, Freight) terms of sale, whereby the seller is responsible for arranging transport to the buyer's port of choice.⁷⁷ The tenure of the first Australian Wheat Pool (and the first Australian Wheat Board) was extended until 1922 but the principle of single-desk marketing of wheat became a feature of the Australian Wheat Industry after the industry's near collapse during the Great Depression of the 1930s and continued until 1999.⁷⁸ After the contamination of bagged wheat by rodents, insects and weather during the first Australian Wheat Pool, the industry-wide shift to bulk storage and handling of grains began its long, slow progress to entirely replace bagged wheat handling after World War Two.⁷⁹ Single-desk marketing of wheat and bulk-handling will be touched on in Chapter Three, but another consequence of First World War emergency regulations was price rises and price control.

Owing to the double calamity of drought and war, bread in Melbourne in 1915 was 50 percent more expensive and flour 86.9 percent than a year earlier; across

75 Scott, *Australia During the War*, 11:539.

76 *Ibid.*, 11:588 – 592.

77 *Ibid.*, 11:596.

78 Wheat Exports Australia, "A History of Wheat Industry Regulation in Australia," *Wheat Exports Australia*, accessed January 8, 2013, <http://www.wea.gov.au/PDF/media/WheatregulationinAustralia.pdf>.

79 Callaghan and Millington, *The Wheat Industry in Australia*, 370 – 376.

all food stuffs and all states, prices rose during World War One by an average 71 percent.⁸⁰ The average price of bread did not increase because of profiteering by avaricious millers and bakers, but rather because of the fall in the purchasing power of money during that period.⁸¹ Wheat rose in price from 3s.9d. per bushel in 1913 to 5s.1¼d. by 1919, and the price of flour rose from 173s.9d. per ton to 221s.9½d.⁸² Bakers' wages ranged from 84s.9d. in 1915 to 92s.9d. in 1919. Government's response initially was a Royal Commission constituted under the War Precautions Act of 29 October 1914, chaired by ex-Prime Minister Alfred Deakin to inquire into internal food supply needs, export availability, prices and anything else to do with trade, industry and the war effort.⁸³

Because the Deakin Royal Commission lacked the powers to do anything about prices, the Government decided to disband the Royal Commission and replace it with the War Precautions Prices Adjustment Act proclaimed in March 1916 and a five-member Commonwealth Prices Adjustment Board.⁸⁴ Given that the Australian Constitution prevents Commonwealth control of intra-state trade, and thereby fix prices in the States, companion uniform prices legislation was requested by the Commonwealth.⁸⁵ Tasmania opted not to enact any price regulation legislation, and the states that did, did not pursue the matter vigorously for a number of reasons, resulting in the legislation in those states becoming moribund.⁸⁶ The Commonwealth Prices Adjustment Board was 'Ruthlessly booted out of its existence' to be replaced by the Necessary Commodities Commission in July 1916, with the power to fix the prices of 'food-stuffs, necessary commodities and services'.⁸⁷ After the High Court dismissed an appeal against a Victorian Petty Sessions decision on the

80 Scott, *Australia During the War*, 11:633 – 634.

81 *Ibid.*, 11:635.

82 *Ibid.*, 11:365.

83 *Ibid.*, 11:519.

84 *Ibid.*, 11:635 – 638.

85 T. R. Bavin and H. V. Evatt, "Price-Fixing in Australia During the War," *Journal of Comparative Legislation and International Law* 3, no. 4 (January 1, 1921): 202 – 203, doi:10.2307/753287.

86 Scott, *Australia During the War*, 11:639.

87 *Ibid.*, 11:640 – 643.

Commonwealth's power to fix State prices on 8 June 1916 (*Farey v Burdett*) the Necessary Commodities Commission confidently began work.⁸⁸

My research indicates that price fixing introduced by the Prices Adjustment Board and their successor, the Necessary Commodities Commission caused considerable angst amongst mill owners and bakers alike. In 1916, the price of flour had been fixed at £11.5s. per ton, and a 4 pound loaf of bread at 6½d.⁸⁹ At their annual conference in September 1916, the Associated Bread Manufacturers of Australia and New Zealand unanimously carried a resolution:

That this conference places on record the indisputable fact that price fixing, as far as wheat, flour and bread are concerned, has caused chaos in business; has deprived the baker of his legitimate profit; and has caused loss financially to the purchasing public without in any way benefiting the producer.⁹⁰

Victorian mill owners likewise recorded their great concerns that 'Government proclaimed prices were very unsatisfactory to Millers generally, and especially adverse to Country Millers'.⁹¹ They also considered a proposal to form a co-operative milling company to 'take decisive action in order to provide a fair rate of profit to Millowners on their business, and believing this only possible by a closer union of all the firms connected with the Milling Industry in Victoria'.

One year later in 1917, Victorian baker Frank Gearan proposed another scheme whereby bakers and millers form a cartel, not to sell outside the prices fixed by the Commonwealth, but to prevent price-cutting by millers and bakers outside

88 *Farey v Burdett* (High Court of Australia 1916).

89 Associated Bread Manufacturers of Australia and New Zealand, "1915 - The Shadow of War over Tenth Conference.," in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 36.

90 Associated Bread Manufacturers of Australia and New Zealand, "1916 - State Associations Submit Reports.," in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 37.

91 The Victorian Mill Owners Association, "Minutes of Meetings: 22 June 1916 to 7 December 1927" (The Victorian Mill Owners Association, June 22, 1916), 13 July 1916, Acc. No. 95/118. Box 17, University of Melbourne.

the cartel.⁹² This 'Car-Gear' scheme – so called because it originated in Cardiff, Wales and was proposed for Australia by Frank Gearan – received a lukewarm reception from the Associated Bread Manufacturers of Australia and New Zealand at their annual conference for 1917 on the grounds of its possible illegality and administrative complexity.⁹³ Gearan's proposal was considered at a Special General Meeting of the Victorian Mill Owners Association on 26 June 1917 where the meeting resolved to form a sub-committee to work with bakers.⁹⁴ The 'Car-Gear' system did operate in Victoria until 1920, when a Royal Commission on Bread Prices in that State found that the scheme should be brought under State control.⁹⁵ Almost as a footnote, the Commonwealth Interstate Commission enquiry into bread found in 1918 that Car-Gear 'would be open to the severest condemnation were it not for the fact that the objective of the combine was to secure for bakers what the law regarded as a just price'.⁹⁶ These reactions from the industry serve to demonstrate that price fixing caused great disquiet in an industry struggling with industrial strife and low profitability since the turn of the century.⁹⁷ My research has also shown that industry groups created to minimise the impact of price fixing on their members did have a darker side, and one case concerns a mill that burnt down on 6 March 1919.⁹⁸

At a special meeting of the Victorian Millowners' Association on 14 May 1918, the Association's Executive resolved 'That this meeting recommend to a Special General Meeting to be called that steps be taken by the Association to stop all sales

92 Associated Bread Manufacturers of Australia and New Zealand, "1917 - Voluntary Prices Pact Division of Opinion," in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 39 – 40.

93 Ibid.

94 The Victorian Mill Owners Association, "Minutes of Meetings: 22 June 1916 to 7 December 1927."

95 Associated Bread Manufacturers of Australia and New Zealand, "1920 - Repeal of Wartime Controls Sought," in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 43 – 44.

96 Associated Bread Manufacturers of Australia and New Zealand, "1918 - Interstate Commission Vindicates the Bakers," in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 41.

97 Associated Bread Manufacturers of Australia and New Zealand, "1904 - Sydney Was Setting for Federation," in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 13.

98 "Fire at Wedderburn. Co-operative Flour Mills Destroyed," *The Argus*, March 7, 1919.

to members of the Wedderburn Co-Operative Flour Mills Pty. Ltd', because the Wedderburn mill was under-cutting the Victorian Millowners' Association members' flour prices.⁹⁹ The meeting resolved to seek Counsel's opinion and 'That the matter be dealt with by the Executive as soon as possible, and the names of the Co-Operative Co's Shareholders be sent to each Members'.¹⁰⁰ The Wedderburn Mill was owned by the Burnley Co-Operative Milling Company, many of the shareholders of which were bakers.¹⁰¹ The minutes of the Victorian Millowners Association were hereafter silent on this matter, however, Mr Frank Tudor, Federal Member for the seat of Yarra in the House of Representatives mentions in a Ministerial Statement read in the House that the Wedderburn Mill burnt down in suspicious circumstances, causing him to write to the Acting Prime Minister (Mr Watt):

He tells me that they are being prevented from obtaining supplies of flour apparently by the "Car-gear" Committee. I understand that this is a committee comprising the Millers and Master Bakers Association.¹⁰²

The Acting Prime Minister replied that the Chief Prices Commissioner had carried out an investigation into Car-Gear but had been unable to take any action due to lack of satisfactory evidence, and that the matter of the alleged arson had been put in the hands of the Crown Law authorities.¹⁰³ The literature sheds no more light on this matter.

Ultimately, price-fixing mechanisms did not achieve their intended goal, because the root cause of price rises was economics – currency devaluation and global trade cycles for the most part – not industry profiteering, or cartels, and because financially healthy essential industries were essential for the war effort.¹⁰⁴

99 The Victorian Mill Owners Association, "Minutes of Meetings: 22 June 1916 to 7 December 1927," 14 May 1918.

100 Ibid.

101 Jones and Jones, *The Flour Mills of Victoria 1840-1990*, 266.

102 Parliament of Australia, House of Representatives, "Hansard – Ministerial Statement: Cost of Manufacture, Marketing, and Selling," July 9, 1919, 6 – 7.

103 Ibid., 7.

104 Scott, *Australia During the War*, 11:653 – 657.

However, prices of food staples like flour and basic essentials like heating and lighting were of vital importance to low-income families.

After it began on 7th October 1913, Mr Justice Heydon's Inquiry into the Cost of Living and Living Wage found that the cost of food staples was indeed paramount in the lives of working class people.¹⁰⁵ Mrs Annie Fairs of the inner Sydney suburb of Glebe, giving evidence to Justice Heydon's enquiry, said her husband worked as a carter, and brought home £3 per week to Mrs Fairs and their four sons.¹⁰⁶ She told Justice Heydon that they lived mainly on bread and butter, and that her husband ate a pound of bread per day in his two sandwich packs.¹⁰⁷ The children ate toast for breakfast, bread, butter and jam for lunch, and a meat dinner at night with more bread, butter and jam afterwards; Mrs Fairs used butter when she could afford it or beef dripping when they could not.¹⁰⁸ In 1920 Commonwealth Commissioner A.B. Piddington found that the cost of fuel for cooking and lighting caused working class people to prefer bread over oatmeal porridge because it did not require long cooking.¹⁰⁹ With rudimentary refrigeration in this era, and the fact that the bread of the day was white, doughy and did not keep well, fresh daily bread was not only appreciated but expected.¹¹⁰ Surveys in 1913 reveal that large low-income families spent 85.7% more on bread than smaller middle-income families and that their spend on fruit was 11.1% less and meat about the same.¹¹¹ While bread was a critical staple in the nutrition of low-income families, bakers struggled to stay in business.

105 "Cost of Living. Mr Justice Heydon's Inquiry. Difficulties in the Way.," *The Sydney Morning Herald*, October 8, 1913, 9.

106 New South Wales Court of Industrial Arbitration, "Inquiry into the Cost of Living and Living Wage". (New South Wales Department of Industrial Relations, 1914 1913), 632.

107 Ibid.

108 Ibid.

109 Robin Walker, "Aspects of Working-Class Life in Industrial Sydney in 1913," *Labour History* no. 58 (May 1, 1990): 41, doi:10.2307/27508981.

110 Ibid., 43.

111 R. B. Walker and Dave Roberts, *From Scarcity to Surfeit: a History of Food and Nutrition in New South Wales* (Kensington, N.S.W: New South Wales University Press, 1988), 66.

After Federation in 1901, bakers established their federal Associated Bread Manufacturers of Australia and New Zealand in 1904. As the proceedings of their annual conferences faithfully record, a persistent theme from 1909 through to 1920 concerned the ongoing industrial pressure being brought to bear by the Federated Operative Bakers' Union of Australasia for the introduction of 'day baking', and an end to the long-standing practice of bakers starting work any time between 1 PM and 8 PM and working through the night, often in shifts exceeding twelve hours.¹¹² Counsel for the union before Mr Justice Rich of the Federal Arbitration Court in 1914, instanced the case of operative baker Joseph Pye's belief that the whole of his twenty five years as a baker had meant nothing but misery:

He had to leave his home at 8 o'clock, sometimes 6 o'clock on Friday evening and other 'double nights', not returning until 6, 7 and 8 o'clock the next morning. He found it impossible to see his children and give them the care necessary in their upbringing. He left his wife in a state that she had been under medical advice, and was using drugs ever since on account of the condition her nerves were in.¹¹³

The problem was a logistical one. In the first half of the twentieth century fresh bread was customarily delivered to most consumers' doors, which meant that bread needed to be out of the ovens by 6.30 AM so that bread carters could load up and start their delivery rounds by 7 or 8 AM.¹¹⁴ High potency, commercially made, compressed yeast had become available in 1910, but most bakers still used the traditional 'long-dough' system which required 8 to 10 hours to prepare a batch of dough for baking (see p. 38).¹¹⁵ If day-baking were to be introduced, it would prove impossible to continue using the long-dough system and have bread ready for delivery by 6.30 AM. Day-baking had been trialled in Broken Hill on two occasions and had proved unsatisfactory, so on the strength of the evidence before him and the

112 Associated Bread Manufacturers of Australia and New Zealand, "1914 - The Day Baking Day in Court," in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 30.

113 Ibid.

114 Ibid., 31.

115 Ibid., 33.

Broken Hill experience, Justice Rich dismissed the case.¹¹⁶ Day-baking did not go away however. By 1920, day-baking was introduced in New South Wales, Queensland, South Australia and Western Australia, and the bakers' conference of that year recorded a unanimous opinion that day-baking had resulted '... in a serious increase in manufacturing and delivery costs to the baker, and as a result the people are paying more for bread today than under the old system of night baking'.¹¹⁷

The end of war-time price controls and the reintroduction of free trading of wheat in December 1921 gave some relief to millers and bakers on both the cost and price side of their ledgers, but the structural problems in the wheat-growing, flour-milling and bread-baking industries outlined in this chapter would make it difficult for this triad to survive the looming global depression of the 1930s.¹¹⁸ This next turning point will be covered in Chapter Three, but this chapter has provided evidence to support the argument that the triumphs achieved in the last decades of the nineteenth century did not translate into long-term prosperity and financial security in the wheat-growing, flour-milling and bread-baking industries. It has shown that the exigencies of war, global trade cycles and entrenched industrial dysfunction in the baking industry combined to negate the agricultural breakthroughs of the late nineteenth century and the work of Farrer, Guthrie and other innovators. Chapter Three, will now discuss the period from the 1920s to 1939 – a period of the Great Depression, intense international competition, marginal profitability in the wheat and bread industries and government intervention to rescue these industries of national importance.

116 Ibid., 34.

117 Associated Bread Manufacturers of Australia and New Zealand, "1920 – Repeal of Wartime Controls Sought.," in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967) 43 – 44.

118 Associated Bread Manufacturers of Australia and New Zealand, "1921 - Emphasis on the Accountancy Side.," in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 45 – 46.

Chapter Three. 1921 - 1939: Expansion of the wheat belt, depression and near collapse of the industry.

In an address to the annual conference of The Victorian Wheatgrowers' Association on 12 March 1936, Sir Herbert Gepp had this to say about the indebtedness of the Australian wheat-growing industry in 1934:

Some farmers had used the savings of the super-abundant years from 1916 to 1928 to pay off their debts, and to add to their reserves, to improve their farms – whilst other brave and courageous souls had come into the industry and undertaken the responsibility of payment for their farms on the basis of wheat prices of anything from 15 shillings to 20 shillings per bag.¹

Every action has a re-action: every up-swing must sooner or later, be counterbalanced by a down-swing; the exceedingly high prices for wheat, particularly in the years following the war, were the cause of a considerable portion of the troubles of the wheat industry over the period of 1929 – 1934.²

The 'brave and courageous souls' Herbert Gepp referred to were – for the most part – soldier-settlers who took the opportunity offered by the Federal Government to join the steady expansion of wheat farms between 1921 and 1930.³ In his capacity as chair of the *Royal Commission on the Wheat, Flour and Bread Industries* of 1934 - 1936 (the Gepp Royal Commission) Herbert Gepp made these statements in a position of some authority. The boom that occurred in the wheat-growing industry after World War One was followed by an almost total collapse of the industry when the Great Depression hit Australia in 1929, and the Government's adoption of many recommendations of the Gepp Royal Commission helped rescue Australia's second largest primary industry.⁴

1 Herbert Gepp, *A Review of the Work of the Royal Commission on the Industries of Wheat, Flour and Bread: An Address to the Annual Conference of the Victorian Wheatgrowers' Association at Charlton, March 12th, 1936* ([Melbourne: Victorian Wheatgrowers' Association, 1936), 6.

2 Ibid., 8.

3 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. First Report.*, Parliamentary Paper (Australian Parliament) 1932-33-34, no. 234 (Canberra: Commonwealth Government Printer, 1934), 11.

4 E. J. Donath, "Marketing of Australian Wheat," *The Australian Quarterly* 26, no. 2 (June 1, 1954): 36, doi:10.2307/20633438.

A few years after Herbert Gepp's address, a fellow Commissioner on the Gepp Royal Commission – Dean of the Faculty of Agriculture at the University of Melbourne, Professor S. M. Wadham – opened a lecture in July 1938 on 'Bread Problems in Melbourne' by posing the question 'Why do we eat bread – and if bread, why wheaten bread?'.⁵ He answered his rhetorical question by saying that a country's choice of its main carbohydrate was determined by the type of foodstuff the land would most easily produce, and that the popularity of wheaten bread arose because no other cereal protein could withstand the special treatment or respond to the fermentation action of yeast in the same degree as wheat flour.⁶ Professor Wadham then went on to articulate the dilemmas of Australia's bread bakers, primarily: the variable cost and protein content of flour arising from global market forces, and climatic and varietal variations, and; restrictions of hours and times of work dictated by the logistics of bread baking chemistry and industrial considerations.⁷ These factors, in concert with the costs of the then-ubiquitous home delivery of bread, combined to place bakers of bread in the precarious position of attempting to operate at a profit while charging prices for bread that people were willing to pay or able to afford.⁸

These two anecdotes serve to illustrate the Pyhrric victory achieved by the wheat-growing, flour-milling and bread-baking triad in the first two decades of the twentieth century, as the previous chapter argued. Expansion in wheat planting and yields did indeed occur as did a return to some level of profitability in wheat-growing and flour-milling arising from buoyant international demand for wheat and the lifting of First World War price controls in 1922, but these gains proved insufficient for the industry to survive the Depression without Government intervention. Marginal profitability dogged the bread-baking industry due to the factors referred to by Professor Wadham.

5 "Bread - Its Quality and Cost," *The Argus*, July 29, 1938, 4.

6 Ibid.

7 Ibid.

8 Ibid.

This final chapter argues that Australia between 1925 and 1929 enjoyed a brief boom due to expanding exports and higher prices for wheat and wool, but that these factors hid structural weaknesses in the wheat industry (and in the economy) that brought both the wheat industry and the whole economy to near collapse when the Wall Street crash precipitated the Great Depression in November 1929. I argue further that the Gepp Royal Commission created to investigate the plight of the flour-milling and bread baking industries in 1934 quantified for the first time the scale and scope of these nationally important industries. The Commission acted as a catalyst to stave off the collapse of the wheat-growing industry and consequences arising from the Commission's recommendations enabled outcomes that prevailed in these industries well into the 1950s and beyond.

In order to give the reader some idea of their scale and national importance, Chapter Three begins with a brief definition of the economic and social mass of the wheat-growing, flour-milling and bread-baking triad together with the financial position of these industries in 1934. It then precises the expansion of wheat plantings in Western Australia, which, together with the soldier settlement schemes, resulted in the wheat belt increasing from 9 million acres in 1920 to 15 million acres in 1929.⁹ The exodus from the wheat industry of small wheat farmers tilling marginal land, dependent on family labour and denied access to operating capital is briefly covered followed by an examination of Australia's economy in the period 1929 to 1933. A Government sponsored 'grow more wheat' debacle that placed considerable quantities of marketable wheat in an international market of declining prices is then discussed as is the reintroduction of wartime wheat pools and other centralised marketing.¹⁰ A major overhaul of the industry ensued in 1934 after the Gepp Royal Commission began delivering its findings, so the Gepp Royal Commission's findings and recommendations for the wheat-growing, flour-milling and bread-baking

9 Greg Whitwell and Diane Sydenham, *A Shared Harvest: The Australian Wheat Industry, 1939-1989* (South Melbourne: Macmillan Australia, 1991), 14 – 16.

10 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries*, 1934, 12.

industries are examined. Because of its vital long term influence on bread quality and exports of Australian wheat and flour, the f.a.q. (Fair Average Quality) system of wheat grading is examined. Chapter Three concludes that the Gepp Royal Commission led to significant reform in the bread-baking industry, the establishment of the Bread Research Institute in 1948, and the formation by the Australian Government of a statutory authority for wheat disposal which became the Australian Wheat Board in 1939.

One of the main reasons why the Australian Government established the Gepp Royal Commission in 1934 was to carry out a careful survey of the wheat-growing, flour-milling and bread-baking industries.¹¹ Prices for wheat had been so low in the years leading up to 1934 that the Government had rendered aid to wheat-growers amounting to £8,000,000, with a notable absence of reliable information upon which the Parliament could base its decisions.¹² Herbert Gepp and his fellow commissioners filled the information void in great and careful detail, with their findings having profound influence on subsequent enquiries and on the state of knowledge of these vital industries generally.¹³ The Gepp Royal Commission's five reports provide extensive detail of the wheat-growing, flour-milling and bread-baking industries; the following is a highly summarised statistical analysis provided to demonstrate the scale and national importance of the breadstuffs industries.

In 1928 - 1929, Australia's total exports were valued at £140 million, of which wheat represented the second most valuable, worth £37.5 million, in contrast to Australia's most valuable export, wool with an export value of £71.9 million.¹⁴ To put

11 Gepp, *A Review of the Work of the Royal Commission on the Industries of Wheat, Flour and Bread*, 4.

12 Ibid.

13 Allan R. Callaghan and A. J. Millington, *The Wheat Industry in Australia* (Sydney: Angus and Robertson, 1956), 437.

14 D. B. Copland, *Australia in the World Crisis, 1929-1933: The Alfred Marshall Lectures Delivered in the University of Cambridge, October and November 1933* (Cambridge: Cambridge University Press, 1934), 14.

Note: Unless specified otherwise, all currency amounts in this chapter are Australian pounds (£).

these numbers in perspective, Australia's estimated national income in 1928 – 1929 totalled around £680 million.¹⁵ Responding to the economic crisis of 1929, the Commonwealth Government urged wheat farmers to increase their acreage, which they did, and production rose to 213.594 million bushels in 1930 – 1931.¹⁶ In 1933, 78,693 persons were engaged in wheat farming as shown in Table 1:

Occupation	Total
Employers	21,131
Working on own account.	23,047
Wage or salary earners.	27,940
Unpaid workers	6,566
Miscellaneous	9
Total	78,693

Table 1: Occupants of wheat farms in Australia, 1933.¹⁷

These farmers sowed 14.992 million acres with wheat, up from 10.201 million acres in 1925; they also owed in excess of £151 million.¹⁸ In order to establish a cost base, the Gepp Royal Commission attributed a notional income of £125 per annum to these farmers, a modest amount considering that the average basic wage for the six capital cities in 1934 was £169 per annum.¹⁹

With respect to flour mills, the Gepp Royal Commission recorded a total of 160 operational mills in 1932 -1933, although not all were in production or costed by the Commission; the costed mills represented 91% of the total mill production.²⁰

¹⁵ Ibid., 11.

¹⁶ Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries*, 1934, 12.

¹⁷ Edgars Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948* (Melbourne: University Press, 1956), 242.

¹⁸ Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries*, 1934, 12; *Royal Commission on the Wheat, Flour and Bread Industries. Second Report.*, Parliamentary Paper (Australia. Parliament) 1932-33-34, no. 234 (Canberra: Commonwealth Government Printer, 1935), 251.

¹⁹ Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries*, 1934, 23; Australian Bureau of Statistics, "Feature Article - Basic Wage Inquiry, 1934 and 1937 (Feature Article)," 564, accessed September 10, 2013, <http://www.abs.gov.au/ausstats/abs@.nsf/featurearticlesbytitle/A1C64B659EF75B7CCA2575BC0019D042?OpenDocument>.

²⁰ Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. Fourth Report.*, Parliamentary Paper (Australia. Parliament) 1932-33-34, no. 234 (Canberra:

These mills engaged 3,375 employees to mill approximately 60 million bushels of wheat annually.²¹ The milling of grain yields two components, flour of varying purity that is mostly endosperm, and 'offal', the milling term for the non-flour residue of the wheat berry that comprises bran and pollard for the most part (see page 31).²² Flour has the greatest economic value but bran and pollard are an important by-product, especially for stock feed. Output from the mills costed in 1932 – 1933 is shown in Table 2:²³

	Quantities - (short tons)	Percent
Flour:		
For domestic use	687,800	52.14
For export	631,500	47.86
Total	1,319,300	
Bran and Pollard:		
For domestic use	516,300	93.06
For Export	38,500	6.94
Total	554,800	
Grand total:	1,874,100	

Table 2: Total Australian Flour Mill Production, 1932 - 1933

Some of the flour produced by flour mills is used for starch and other industrial purposes, and some is used for pasta, biscuits and cakes but most of the flour produced by flour-mills is purchased by bakers for making bread.

For the bread-baking industry, the average production and consumption of bread and flour for the five-years up to 1934 is shown in Table 3:

Commonwealth Government Printer, 1936), 39 - 40.

21 Ibid., 42.

22 Elizabeth David, *English Bread and Yeast Cookery* (London: Allen Lane, 1977), 44 – 88.

23 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. Fourth Report.*, 46.

	Quantities per year	Percent
Production of flour (tons)	1,228,919	
Less exports (tons)	554,909	
Balance for domestic use (tons)	674,010	100
Less industrial and biscuit flour (tons)	167,819	24.9
Flour available for bread (tons)	506,191	75.1
Bread produced from this flour (pounds)	1,346,468,592	
Bread (2 lb. Loaves)	673,234,296	
Mean population	6,548,784	
Consumption of bread per head (2 lb loaves)	102.80	

Table 3: Australian production and consumption of bread and flour 1929 – 1934 average per year.²⁴

Gepp's Royal Commission found estimating the total numbers for bakeries a difficult proposition because loaves yielded per ton of flour varies due to flour quality, water content, baker skills, scale economies and so on, and bakeries varied widely from high levels of automation to no automation. Also, different State Government statistical services supplying the base data had varying criteria for classifying and counting bake houses, for example, a bakery using a machine and two bakers may have been counted as a factory with 0 to 4 employees, while a fully manual bakery employing 5 bakers may have been omitted from counting.²⁵ Using an average production of 1.479 tons of flour per week per operative baker, and the data from Table 3, the average number of operative bakers in Australia in 1934 comes to around 6,984 assuming three weeks annual leave per baker. This total does not include bread deliverers or other staff.²⁶

The Gepp Royal Commission provided Government administrators with comprehensive and rigorously validated base data that established the considerable magnitude and importance of the wheat-growing, flour-milling and bread-baking

²⁴ Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. Third Report.*, Parliamentary Paper (Australia. Parliament) 1932-33-34, no. 234 (Canberra: Commonwealth Government Printer, 1936), 137.

²⁵ *Ibid.*, 19.

²⁶ *Ibid.*, 63.

industries in Australia in 1934. Little wonder that the Government of the day established the Gepp Royal Commission in the first instance, and then implemented its most important recommendations, given that the Gepp findings revealed that Australia's second largest export industry, which directly employed well in excess of 80,000 people while providing essential nutrition to every man, woman and child in the country, was in trouble. It should be noted that the forgoing statistics do not include the total capitalisation of the triad industries, nor their total indebtedness, both of which – particularly in the case of the wheat-growing industry – was considerable. The Gepp Royal Commission findings and recommendations will be dealt with in more detail, but before then it is necessary to establish the economic and physical status of the wheat-growing industry in the years prior to the Great Depression.

As has been argued in Chapter Two, Australia's wheat belt grew to a peak of 12.5 million acres in 1915 – 1916, mostly in the Eastern States, often in response to wartime 'grow more wheat' campaigns.²⁷ After World War One, further expansion continued with the greatest growth in Western Australia which rapidly increased its wheat belt to reach nearly four million acres by 1930.²⁸ Western Australia's rapid wheat expansion is due primarily to two factors – 'agricultural rail' infrastructure construction and Government assistance.²⁹ Railways were deliberately constructed to open new areas for wheat growing, with an Advisory Board for Construction of Railways formed to facilitate the program with agricultural expansion its special objective.³⁰ Direct government assistance played a considerable role in Western Australia's wheat-growing expansion.³¹ The Agricultural Bank abandoned its cautious loans policy and an Industries Assistance Act was established in 1914 with a Board to oversee assistance and approve payment of sustenance.³² The assistance provided to settlers had a significant impact on Western Australian wheat

27 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries*, 1934, 11.

28 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 206.

29 *Ibid.*, 260.

30 *Ibid.*, 213.

31 *Ibid.*, 210.

32 *Ibid.*

production up to 1929 – 1930 when the program was limited to soldier-settlers.³³

As servicemen began to return to Australia from the hostilities of World War One, the Federal Government in conjunction with State Governments set up schemes aimed at assisting returned service personnel to begin farming.³⁴ These soldier-settlement schemes generally operated under the aegis of Closer Settlement programs, and by 1924, 23,367 soldiers had taken up 23,275,380 acres at a cost to the Government of £28,465,766.³⁵ Much of the land allocated to soldier-settler wheat farmers was Crown land, often in marginal areas such as Victoria's Mallee and often on blocks too small to be viable.³⁶ Marilyn Lake instances the case of William Bellamy in her *The Limits of Hope*. After his return from the war in 1919 Bellamy gave up his secure job with McKay's Sunshine Harvester company in 1921 and set off to Ouyen in Victoria's Mallee with his wife and daughter to farm an unimproved 720 acre block.³⁷ Bellamy had little capital to start with and borrowed against future crops when his £1,000 state-provided credit was spent to buy housing, horses, equipment, water, hay and so on.³⁸ By dint of hard work and perseverance William Bellamy and his wife and daughter managed to clear enough land to harvest some wheat, but selling into a market where a bushel of wheat only brought 1s 6d – down from 5s 8d in early 1920 – left him further in debt.³⁹ Bellamy did not have the financial wherewithal to succeed against drought and Depression prices so he walked off his block in 1934 commenting 'After eleven years of struggle, I went out

33 Ibid.

34 Australian Bureau of Statistics, "Feature Article - Settlement of Returned Soldiers and Sailors 1914-18 (Feature Article)," accessed September 10, 2013, <http://www.abs.gov.au/AUSSTATS/abs@.nsf/featurearticlesbyCatalogue/72BB159FA215052FCA2569DE0020331D?OpenDocument>.

Note: Marilyn Lake experienced great difficulty arriving at accurate statistics of soldier settler numbers. See *The Limits of Hope: Soldier Settlement in Victoria 1915 – 1938*, (Melbourne: Oxford University Press, 1987) Appendix A. The numbers quoted here should, therefore, be taken as indicative only.

35 Ibid.

36 Richard Waterhouse, *The Vision Splendid: a Social and Cultural History of Rural Australia* (Fremantle, W.A: Curtin University Books, 2005), 202.

37 Marilyn Lake, *The Limits of Hope: Soldier Settlement in Victoria, 1915-38* (Melbourne: Oxford University Press, 1987), xiii – xviii.

38 Ibid.

39 Ibid.

with nothing'.⁴⁰ Bellamy's case was typical, and in Victoria alone 6,677 soldier-settlers had walked off their land by 1938.⁴¹ Not all soldier-settlers failed, but the majority did not succeed, forcing authorities to acknowledge the schemes' failure.⁴²

Soldier-settlers were over-represented amongst the most indebted wheat farmers as grouped by the Gepp Royal Commission (Group 3 in Table 4).⁴³

1	Those who can pay their working expenses and meet their present interest charges when wheat is 3s per bushel.	40%
2	Those who can pay their working expenses and meet some of their interest charges.	26%
3	Those who are unable to produce wheat at 3s per bushel even if they were free from all interest.	34%

Table 4: Indebtedness of Australian Wheat Farmers, 1934

Total debt in the wheat-growing industry amounted to around £151.5 million, and only 40% of those engaged in the industry could meet their interest charges, so the industry was clearly living beyond its means and critically dependent on loans and export prices for wheat in excess of the average minimum cost of production, 3 shillings per bushel.⁴⁴ The wheat industry found itself in the same position as the whole country when the Great Depression hit in 1929.

In his Marshall lectures given at Cambridge University in 1933, co-architect of Australia's fiscal response to the Great Depression, the University of Melbourne Professor of Commerce, (Sir) Douglas Copland, noted that 'Australia had worshipped false economic gods for many years' and was over-reliant on a regular

40 Ibid., xiii.

41 Ibid., 137.

42 Waterhouse, *The Vision Splendid*, 201 – 204.

43 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. Second Report.*, 251.

44 Ibid.

Note: Dunsdorf subsequently recalculated this debt amount using different costing methods and arrived at a figure of £153.539 million. See Dunsdorf, *The Australian Wheat Growing Industry*, 255.

but rather excessive inflow of overseas capital.⁴⁵ He expanded by giving the following four factors for Australia's precarious fiscal position in 1929: the rising ratio of interest payments to export revenues, the increasing levels of tariff assistance, the disparity between Australian and foreign price levels, and persistent State and Federal Government deficits.⁴⁶ Copland saw Australia as a 'dependent economy' exposed to global influences, for example: Export prices suddenly falling in 1930, reduced the value of exports by £40 million and the abrupt cessation of overseas borrowing caused a further loss of income from abroad of £30 million, the total exceeding 10% of the national income; flow-on effects such as the reduced spending power of export producers, added a further £140 million loss.⁴⁷

The Bank of England sent Sir Otto Niemeyer to advise the Australian governments, and Niemeyer subsequently advocated a severely deflationary program to the Premiers Conference of July – August 1930:

Australia cannot remain forever under a regime of emergency tariffs and rationed exchange. She has to emerge from that position and show signs of progressing towards emergence. To achieve this end she depends inevitably to a large extent on the primary producer, and the power of the primary producer selling in the world market to assist depends very largely on the general costs in Australia, which govern what he has to pay for his supplies and services. I assume that everybody in this room is in agreement that costs must come down.⁴⁸

Niemeyer's was a notoriously controversial visit, welcomed by the staunch advocates of financial responsibility but earning him the condemnation by many, including New South Wales Premier Jack Lang, who saw him as a representative of 'money power'.⁴⁹ Research suggests Australian economists had a much better grasp of Australia's fiscal situation and offered a superior counter to Niemeyer's bitter

45 Copland, *Australia in the World Crisis, 1929-1933*, 11 - 13.

46 Ibid., 9 – 27.

47 Ibid., 23 & 37.

48 Otto Niemeyer, "Sir Otto Niemeyer's Statement to the Melbourne Conference, July and August 1930.," in *The Crisis in Australian Finance, 1929 to 1931; Documentson Budgetary and Economic Policy*, ed. E. O. G. Shann and D. B. Copland (Sydney, Australia: Angus & Robertson limited, 1931), 28.

49 Frank Bongiorno, "Search for a Solution, 1923-39", in *The Cambridge History of Australia: Volume 2, The Commonwealth of Australia.*, vol. 2 (Melbourne, Vic: Cambridge University Press, 2013), 75 – 76.

medicine.⁵⁰ A committee of four Australian economists and five treasurers chaired by Professor Copland put a counter-proposal to the assembled heads of Australian government in the May – June 1931 Premier's Conference advocating a more moderate balance of deflationary and inflationary measures.⁵¹ Their counter to Niemeyer earned J. M. Keynes's public assessment in 1932 that 'the Premiers' Plan last year saved the economic structure of Australia'.⁵²

The Great Depression hit Australia hard. Unemployment rose to around a quarter to a third of the workforce and wages fell.⁵³ Many Australians suffered, but the community banded together for support, many adopting a plainer diet of which Government subsidised 'dole bread' formed a large part.⁵⁴ Bread prices varied from State to State but in New South Wales in 1931 for example, dole bread sold for 3d instead of the official 5½d for a two pound loaf.⁵⁵ The Government did heed some of Niemeyer's advice, and called upon Australia's primary producers to help the country recover from the Great Depression, but the response fuelled the country's problems rather than the reverse.

Much indebtedness amongst Australia's wheat-growers arose from borrowings to fund operations, and another major reason was the rise in land values during the 1920s.⁵⁶ As Herbert Gepp said in his address to the annual conference of The Victorian Wheatgrowers' Association on 12 March 1936 'Some farmers had used the savings of the super-abundant years from 1916 to 1928 to pay off their debts, and to add to their reserves, to improve their farms...'.⁵⁷ High prices and good yields

50 Alex Millmow, "Niemeyer, Scullin and the Australian Economists", *Australian Economic History Review* 44, no. 2 (2004): 158 – 159, doi:10.1111/j.1467-8446.2004.00114.x.

51 Copland, *Australia in the World Crisis, 1929-1933*, 130 - 136.

52 Marjorie Harper, "Copland, Sir Douglas Berry (1894–1971)", in *Australian Dictionary of Biography* (Canberra: National Centre of Biography, Australian National University), accessed September 7, 2013, <http://adb.anu.edu.au/biography/copland-sir-douglas-berry-247>.

53 Bongiorno, "Search for a Solution, 1923-39", 77.

54 *Ibid.*, 77 – 78.

55 Associated Bread Manufacturers of Australia and New Zealand, "1931 - Federal Concern Over Victorian Trade Chaos," in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 62.

56 Whitwell and Sydenham, *A Shared Harvest*, 34 – 35.

57 Gepp, *A Review of the Work of the Royal Commission on the Industries of Wheat, Flour and Bread*, 6.

strengthened the demand for land in the post-war years, causing land values to rise.⁵⁸ Yet another cause of indebtedness arose from a Government sponsored 'grow more wheat' campaign that the Gepp Royal Commission called a 'debacle'.⁵⁹ This campaign sprang from the Federal Government's urgent need for additional export revenue to shore up the rapidly deteriorating balance of payments.⁶⁰ The Commonwealth Compulsory Wheat Pool scheme promised a price of four shillings per bushel at railway sidings, and provided incentive to farmers to go further into debt and expand wheat plantings by three million acres, and production consequently rose to 213 million bushels.⁶¹ Bumper crops in North America meant that Australia's record 1930 – 1931 harvest landed on a world market already oversupplied with wheat.⁶² The Commonwealth Compulsory Wheat Pool scheme failed to receive Senate approval, did not pay the promised four shillings per bushel, and F.O.B. prices for Australian wheat fell to 2s 5d per bushel, some 7 pence below the minimum average cost of production.⁶³ This episode also underscores just how important international wheat markets had become to Australia.

Thus ends the first of my arguments in this chapter – a short boom period after World War One followed by the near collapse of the large and important wheat-growing industry that was unable to withstand endogenous economic forces due to chronic structural weakness. The wheat-growing and kindred industries employed tens of thousands, and contributed a very large proportion of Australia's national income, but shared the structural deficiencies of the Australian economy that proved unable to withstand the global financial collapse of 1929 without major financial adjustment. Such a parlous situation necessitated at least two imperatives for the wheat-growing industry: financial relief to wheat farmers and disposal of the mountains of wheat. The former will be covered in the discussion of the Gepp Royal Commission findings and recommendations, but first a precis of wheat marketing

58 Whitwell and Sydenham, *A Shared Harvest*, 35.

59 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries*, 1934, 12.

60 Whitwell and Sydenham, *A Shared Harvest*, 35.

61 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries*, 1934, 12.

62 Whitwell and Sydenham, *A Shared Harvest*, 36.

63 Ibid.

and the disposal of the record crop.

The Gepp Royal Commission suggested that Australia was in part responsible for depressing the world wheat market and also found that – had a centralised wheat marketing authority existed – this situation may have been avoided.⁶⁴

Australian wheat producers marketed their product through various arrangements summarised in Table 5:

Pre -1914	Open marketing.
1914	First compulsory Government controlled pool (in New South Wales).
1915 – 1922	Compulsory pooling. First Australian Wheat Board.
1920	Compulsory pool in Queensland
1922 – 1939	Open marketing, plus voluntary and compulsory pools
1930	Commonwealth Compulsory Wheat Pool scheme (failed to receive Senate approval).
1939	Compulsory pooling through the second Australian Wheat Board

*Table 5: Australian Wheat Marketing Arrangements to 1939.*⁶⁵

Open marketing of wheat mainly occurred in railway sidings or flour mills that acted as wheat agents.⁶⁶ Here, wheat-growers attempted to sell their produce to wheat buyers and agents of shippers or millers, but this arrangement was unsatisfactory for a number of reasons. In the era before bulk storage, wheat in corn sacks arrived en masse after harvest and attracted storage charges if storage was available or was open to the weather or vermin infestation if it could not be properly stored.⁶⁷ Also, f.a.q. prices with attendant standard weights were usually not fixed until some time after harvest, putting further pressure on storage. Buyers played off these factors – some even forming cartels – to offer desperate farmers who could not

64 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. Second Report.*, 171 – 172.

65 Donath, “Marketing of Australian Wheat”, 41.

66 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 221 – 222.

67 *Ibid.*, 221 – 260.

adequately store their wheat, lower prices.⁶⁸ Voluntary farmer co-operatives enjoyed more success than other marketing arrangements between the wars.⁶⁹ A grain elevator at Gilgandra, New South Wales, became the first facility in Australia to receive bulk wheat and bulk wheat was first exported from a grain terminal in Sydney in March 1921, but until after World War Two the 240 pound corn-sack humped by men remained the principle unit of handling.⁷⁰

In the case of the record crop from the 'grow more wheat' debacle, a combination of factors resulted in much of the wheat being sold on international markets. The Gepp Royal Commission found that devaluation of the Australian pound against Sterling, new markets in Japan and China, and very low prices enabled the 1930 – 1931 crop to be sold eventually.⁷¹ Dunsdorf also holds that low shipping rates arising from the Depression helped Australia dispose of its surplus wheat.⁷² As will be seen, the Gepp Royal Commission made many recommendations including the f.a.q. system, bulk handling of wheat, and controlled marketing. Before elaborating on the main recommendations of the Gepp Royal Commission, a brief discussion of the f.a.q. system of wheat grading is in order because it was a major issue affecting wheat-growers, flour-millers and bread-bakers alike.

When Australia began to develop export markets for wheat, a system evolved for grading Australian wheat known as the standard sample.⁷³ This system later became known as the 'Fair Average Quality' or f.a.q. system.⁷⁴ The primary aim of the f.a.q. system was to establish not the baking quality of the resultant flour, but rather the wheat's general cleanliness and milling quality, especially its suitability for blending with wheat from other sources.⁷⁵ English millers in this era blended

68 Ibid., 260.

69 Donath, "Marketing of Australian Wheat", 37.

70 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 229.

71 *Royal Commission on the Wheat, Flour and Bread Industries. Second Report.*, 161 – 172.

72 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 279.

73 Callaghan and Millington, *The Wheat Industry in Australia*, 349 – 369.

74 Ibid.

75 Ibid.

cheaper Australian white f.a.q. wheat with more costly and protein rich North American 'red' wheats to yield an economical flour with acceptable baking qualities.⁷⁶ Wheat crops vary according to the varieties grown, geographic location, seasonal variations and so on, and establishing the f.a.q. standard for each harvest is a complex business that will not be elaborated on here.⁷⁷ However, once the f.a.q. standard has been set for each harvest, samples were sent to buyers which then established the quality and weight benchmark for that harvest that in turn influenced market prices.⁷⁸ Since its inception, f.a.q. has been controversial with many arguments for and against. A reading of the proceedings of the annual conferences of the Australasian Bread Manufacturers of Australia and New Zealand between 1920 and 1950 reveals a recurring thread decrying the f.a.q. system for the unsatisfactory baking quality of Australian flour, and calling for its reform.⁷⁹ One master baker confided to the author that, in the industry, f.a.q. was taken to mean 'fucking awful quality'.⁸⁰

In his 1971 Farrer Lecture, Director of the Bread Research Institute Eric Bond, stated that:

There is little doubt that the marketing of Australian wheat on an f.a.q. basis is largely responsible for the fact that we have not capitalised as well as we might on the foundations laid by Farrer. The f.a.q. system is a misleading description because it in no way relates to quality and has encouraged a lack of quality consciousness that has persisted until the last decade or so.⁸¹

Bond went on to admit that f.a.q. had advantages to marketing wheat because it was a simple and uncomplicated procedure that minimised handling problems, but that it had resulted in high yielding wheat varieties being grown at the expense of high

76 Ibid.

77 Ibid., 349 – 360.

78 Ibid.

79 Associated Bread Manufacturers of Australia and New Zealand, *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 61, 64, 67, 75 – 76, 93 – 94, 98, 100.

80 Ron Chambers and MacLennan Martin, "Private Communication", November 23, 2012.

81 Eric E. Bond and Bread Research Institute of Australia, *Wheat Quality, Yesterday, Today and Tomorrow*, Farrer Memorial Oration 1971 (North Ryde, N.S.W: Bread Research Institute of Australia, 1971), 4.

quality wheat varieties which severely handicapped the entire industry.⁸² The Gepp Royal Commission suggested that the disadvantages of f.a.q. outweighed its advantages but cautioned that a departure from f.a.q. to some other grading system was something to be undertaken only after very careful consideration especially with regard to gluten content or strength of resultant flour.⁸³ The overall findings of the Gepp Royal Commission will now be summarised, beginning with the wheat-growing industry, followed by flour-milling and bread-baking industries.

After its formation in February 1934, the Gepp Royal Commission managed to present its preliminary findings on the wheat industry to the Government in August that year – a truly remarkable effort considering the scope and scale of their enquiry. The Commissioners subsequently issued a supplement to their first report in November 1934, a second and detailed report in 1935, a third report on the bread-baking industry, a fourth report on the flour-milling industry and a fifth report that summarised the history of their enquiry and precised the then current situation in April 1936.

The Gepp Royal Commission found that the wheat-growing industry was in a serious financial position, that State and Federal Government financial assistance rendered in 1930 had helped farmers reduce their losses, but this had not addressed the industry's structural problems.⁸⁴ Fifty percent of wheat farmers could produce wheat for 3 shillings per bushel or less but this represented a barely break-even return and most could only produce at this cost due to the unpaid labour of their families.⁸⁵ Many wheat farmers could not make their interest payments or fund depreciation of their assets.⁸⁶ The industry probably provided more direct employment than any other single industry in Australia, plus 20% of the freight

82 Ibid., 4 – 6.

83 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. Second Report.*, 168 & 187.

84 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. First Report*, 35 – 37.

85 Ibid.

86 Ibid.

earnings of the railways and significant employment in the towns and cities of the four main wheat producing states.⁸⁷ The wheat industry accounted for 13.622 million of the 27.978 million tons shipped from Australia in the period 1927 to 1932.⁸⁸

The Commission made five initial recommendations in 1934 which are too lengthy to be detailed here but boil down to £4 million in immediate relief and further measures to provide lasting rehabilitation to the industry, and this relief was to be funded in the first instance by a flour tax and excise.⁸⁹ Their sixth recommendation was that the Government appoint an expert committee to consider and report on maintaining a home price for wheat in excess of the world price as a means of rendering ongoing assistance to the primary industries.⁹⁰ The Wheat and Wheat Products Act of 1935 was enacted to establish a home consumption price but did not survive because the Privy Council ruled that it infringed the Australian Constitution provisions for free interstate trade (the *James* case).⁹¹ A Wheat Growers' Relief Act of 1936 did enable relief to be paid to wheat-growers despite further constitutional challenges.⁹² A flour tax of £4.5s. per ton that had been imposed in December 1933 ceased to operate in May 1936 and a lower tax of £2.12s.6d. per ton was reimposed in December 1934 and extended in January 1936 to cover the 1935 – 1936 harvest.⁹³

With respect to the bread-baking industry, the Gepp Royal Commission found that stabilisation of the industry was necessary and urgent because of the role played by bread in the health of the community as a low cost staple food.⁹⁴ The

87 Ibid.

88 Ibid.

89 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. Supplement to First Report.*, Parliamentary Paper (Australian Parliament) 1932-33-34, no. 234 (Canberra: Commonwealth Government Printer, 1934), 4 – 8.

90 Ibid., 9.

91 Dunsdorfs, *The Australian Wheat-growing Industry, 1788-1948*, 284.

92 Ibid., 285.

93 Australian Bureau of Statistics, "Feature Article - Financial Crises (1929)", *Yearbook Australia 1937*, January 1937, accessed 22 Aug 2013.

<http://www.abs.gov.au/ausstats/abs@.nsf/featurearticlesbytitle/244554793484CD12CA2569DE00296988?OpenDocument>.

94 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. Third*

Commission initially found it difficult to get accurate data due to poor accounting practices in some of this industry.⁹⁵ Nevertheless, sufficiently reliable information led the Commission to conclude that the industry had been profitable before 1929 but that intense competition within the industry had reduced margins to very low levels.⁹⁶ Due to the low cost of entry, small, opportunistic start-up bakers entered the industry during the Depression, and the resultant price-cutting reduced profitability in the industry to a great degree.⁹⁷ On the basis of flour at £11 per ton, baking costs ranged from 3.961d. per loaf to 4.562d., and distribution costs ranged from 1.248d per loaf to 1.667d.⁹⁸ Wasteful duplication through overlapping delivery runs meant that distribution costs representing approximately 33% of the cost of loaf of bread were unsustainably high.⁹⁹ Manual mixing of dough and hand delivery – often by horse and cart – meant hygiene standards in the bread-baking industry were poor.¹⁰⁰ The industry was generally under-capitalised and considerable funding would be needed to raise standards in the industry.¹⁰¹ Overall, the Commission found that the quality of bread was low partly because of faulty technique or equipment but primarily because of the poor baking quality of f.a.q. wheat.¹⁰² The baking-industry also suffered from lack of training and lack of research.¹⁰³

The Gepp Royal Commission recommended that external assistance was necessary to permanently remedy the defects it noted in the bread-baking industry.¹⁰⁴ They recommended the minimum of government intervention consistent with bringing about reform.¹⁰⁵ Specifically, the Commission recommended the establishment of State bread boards to rationalise delivery runs, register bakeries

Report., 162.

95 *Ibid.*, 155 – 165.

96 *Ibid.*

97 *Ibid.*

98 *Ibid.*

99 *Ibid.*

100 *Ibid.*

101 *Ibid.*

102 *Ibid.*

103 *Ibid.*

104 *Ibid.*, 160 – 165.

105 *Ibid.*

and establish and oversee industry standards.¹⁰⁶ The standards ought to include a system of standard bread weights, probably based on dry weight of ingredients, that overcame the persistent complaint from bakers that they could not be responsible for the natural laws of evaporation (a reference to the extant statutes requiring standard minimum weights for baked bread).¹⁰⁷ Recommendations were also made to overcome the technical challenge of wrapping bread for sale and also to commence technical training for apprentice bakers.¹⁰⁸

On the flour-milling industry, the Gepp Royal Commission found that the industry had made considerable advances in the fifty years before 1934, and mill capacity did not need to be increased.¹⁰⁹ Mills were largely family owned and there was little evidence of over-capitalisation.¹¹⁰ Average profit in the industry was 6 shillings per ton of flour produced, resulting in an average return on capital invested of 11.239% with the more efficient operations able to earn 20%.¹¹¹ Exports of flour accounted for around 45% of mill business.¹¹² Millers had provided financial assistance to bakers from time-to-time.¹¹³ The commission recommended that standing committees be formed in each wheat-producing state to monitor prices and costs in the flour-milling industry, and report their findings to State and Federal Governments.¹¹⁴ The standing committee should also ensure the sharing of knowledge and information between the wheat-growing, flour-milling and bread-baking industries.¹¹⁵ Due to the importance of flour exports, governments ought to ensure trade support is provided if exports began to suffer.¹¹⁶ My research

106 Ibid.

107 Ibid. ;The Associated Bread Manufacturers of Australia and New Zealand“1922 - Conference Invitation Form New Zealand” in *The First Sixty Years, 1904-1964*, ed. W.R. Clarkson (Adelaide, SA: The Associated Bread Manufacturers of Australia and New Zealand, 1967), 47.

108 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. Third Report.*, 160 – 165.

109 Commonwealth of Australia, *Royal Commission on the Wheat, Flour and Bread Industries. Fourth Report.*, 129 – 132.

110 Ibid.

111 Ibid.

112 Ibid.

113 Ibid.

114 Ibid., 133.

115 Ibid.

116 Ibid.

has revealed that, by 1985, exports of Australian flour had fallen to less than 5% of total flour production mostly due to construction of mills in Asia after World War Two.¹¹⁷

This brings the second argument of this chapter to conclusion. The Gepp Royal Commission did not bring about reform in the wheat-growing, flour-milling and bread baking industries overnight, but for the first time in Australia's history the scale and scope of these nationally important industries had been defined in detail as had their plight in 1929. The Commission did act as a catalyst to help stave off the collapse of the wheat-growing industry and consequences arising from the Commission's recommendations precipitated outcomes that prevailed in these industries well into the 1950s and beyond. While the impact of the Gepp Royal Commission on the kindred industries has been covered to some degree by historians of the wheat industry such as Dunsdorf, my research suggests it has not received wide coverage elsewhere in Australian historiography. The onset of World War Two caused the Federal Government to establish a controlled wheat marketing entity recommended by the Gepp Royal Commission when it created the second Australian Wheat Board in 1939.¹¹⁸ World War Two accelerated some reforms and slowed others, but after the war the Bread Research Institute was established in 1948, bulk handling of grain replaced the ubiquitous corn-sack, the f.a.q. system was abolished in 1974, and home delivery of bread became history.

117 Flour Miller's Council of Australia, "Flour Exports as a Percentage of Flour Production (YTD June)." (Flour Miller's Council of Australia, February 1985), Ron Chambers.

118 Donath, "Marketing of Australian Wheat", 38 – 39.

Conclusion:

Bread was the anchor of life in Australia up until World War Two. Captain Arthur Phillip's Instructions for the founding of Australia in 1787 were based on a vision of an agrarian society with land as the lynchpin and self-sufficiency in food the mandate.¹ Contemporary Australians are probably only peripherally aware of their agrarian roots, and agriculture is no longer as dominant in the Australian *Zeitgeist* as it was. However, this thesis has demonstrated how the wheat-growing, flour-milling and bread-baking industries provided staple food for the growing Australian population, how wheat and flour became the country's second largest export, and how the kindred breadstuffs industries constituted a very major part of Australia's domestic economy, touching every Australian in some significant way.

Australia finally achieved its much sought-after food self-sufficiency during the period 1880 to 1939 but it was not a smooth journey. This thesis has shown that the breadstuffs industries lurched through cycles of triumph and crisis as breakthroughs were achieved only to have the industry come to near collapse on several occasions. In the last decades of the nineteenth century declining wheat yields went unrecognised. Science and technology arrested the decline only to have the industry struggle to survive the exigencies of World War One, global trade cycles and entrenched industrial dysfunction in the baking industry. By the end of the 1920s the wheat-growing, flour-milling and bread-baking industries came near to collapse, requiring government financial support and marketing intervention on the eve of World War Two.

This thesis has argued that Australia's shift from chronic under-production of wheat as an insular socio-economic outpost of Britain, to a sovereign nation-state operating in a global grain and flour market profoundly altered the production, supply, price and quality of flour-based staples to Australian and international

¹ Karskens, "The Early Colonial Presence, 1788-1822", 91 – 92.

customers and consumers. In supporting this argument, I have added to the literature by providing evidence of profound changes that altered the economics of the wheat, flour and bread industries and the economic, social and cultural development of Australia.

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