

## Review

# The global food crisis: an Australian dairy industry perspective

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*An Australian based regional economist with a particular interest in the dairy industry.*

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This paper seeks to shed further light on the factors contributing to the emerging global food crisis by examining the reasons for an unusual downturn in dairy food production in Australia, from where 11% of the world trade in dairy foods originates.

**Key Words:** food, dairy, farming, drought, Australia

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## INTRODUCTION

The emerging global food crisis appears to be the product of a confluence of multiple trends including population growth, underinvestment in research and infrastructure, the corruption of global and local markets, climate change, depleting natural resources such as land and water, and international conflict. But how do we better understand the dynamics of the crisis? In the view of one analyst, Paul Roberts,<sup>1</sup> the food crisis is “fundamentally economic...in the sense that our food system can only be truly understood as an *economic* system, one that, like all economic systems, has winners and losers, suffers periodic and occasionally profound instability, and is plagued by the same inherent and irreducible gap between what we demand and what is actually supplied” Roberts goes on to argue that the discrepancy between the supply and demand of food in the world today is best understood in terms of a gap between “food as an economic proposition and food as a biological phenomenon.” In the end Roberts says, the coming crisis in the world food industry has its roots in a paradox. While the food system has evolved as an economic system, the production of food, and particularly healthy food, is not ultimately susceptible to the rigors of economic principles, and the systems of farming and mass production that they presuppose. While food is commonly classified as a commodity, it is not as responsive to economic management as is, say, the car or the microchip. The “biological” nature of food can mean that the rules of supply and demand do not always apply in the normal way. For example, an increase in the price of food will not necessarily lead to an increase in supply because drought, infestation, pests, soil degradation and other biological factors intervene. As a consequence, plants and livestock have to be re-engineered so that they conform to the technological requirements of harvesting and processing in a post industrial economy and significant “external” costs associated with the use of chemicals, fertilizers, water and other inputs in farming and processing do not get adequately factored into food production costs and prices, causing these inputs to be used at unsustainable

levels. Food production and supply shortages inevitably follow.

An examination of recent trends in the production of dairy foods in Australia provides further insight into some of the causes of food supply shortages. Milk production in Australia has declined over recent years, as it has in many parts of the world including Europe, Russia, the Ukraine, Norway, Switzerland, Japan, Korea and Taiwan. Indeed the global supply of milk has only been sustained over the past five years by a significant increase in production in China and India and slight increases in Turkey, Mexico, Brazil, Argentina and Chile. Although milk production in the US increased between 2005 and 2008, volumes have declined in 2009. No more milk is being produced in New Zealand in 2009 than in 2003.

The Australian dairy industry has long been heralded as one of the most efficient dairying industries in the world, at least in a conventional economic sense. International comparisons show that Australian dairy farms have significantly lower costs of production than their counterparts in Europe,<sup>2</sup> but not as low as dairy farms in New Zealand. The production of milk in Australia has been facilitated and encouraged by significant government and private investment in research and development, government funded farm “extension” (or development) programs, land conversion initiatives, significant downstream investment in milk processing, increasing demand for dairy products in developing Asian economies, in particular, and a public policy framework that has ensured that Australian dairy farmers and processing companies are fully exposed to international competition. How is it, then, that after many years of consistent growth in milk

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production in Australia, from 5.4 billion litres per year in 1980 to 10.8 billion litres per year in 2000, this growth trend has not continued beyond the turn of the century. Indeed in contrast to the growth trend between 1980 and 2000, the production of milk in Australia has steadily declined over the past eight years since 2000. Just 9.2 billion litres of milk was produced in Australia in 2008, almost 10% less than in 2000.<sup>2</sup> In attempting to answer this question, this paper aims to shed some more light on the causes and consequences of the global food crisis, including those suggested by Roberts and others.

### THE AUSTRALIAN DAIRY INDUSTRY

Food production is an integral feature of the Australian economy and of critical importance to sustainable economic activity in Australia. Food production is the second most important source of export earnings in the nation and the food industry is Australia's largest manufacturing industry. Farming and food processing is of particular importance to rural and regional Australia. Although only one-third of Australia's population lives outside capital cities, about half the total number of food and beverage firms are located in rural and regional areas, and often in small towns. There are approximately 100,000 enterprises engaged in agricultural food production. These are predominantly family farms, cooperatives and family based agribusinesses. Corporate activity is focused mainly in the processing sector, although it is increasing in the farm sector as well.

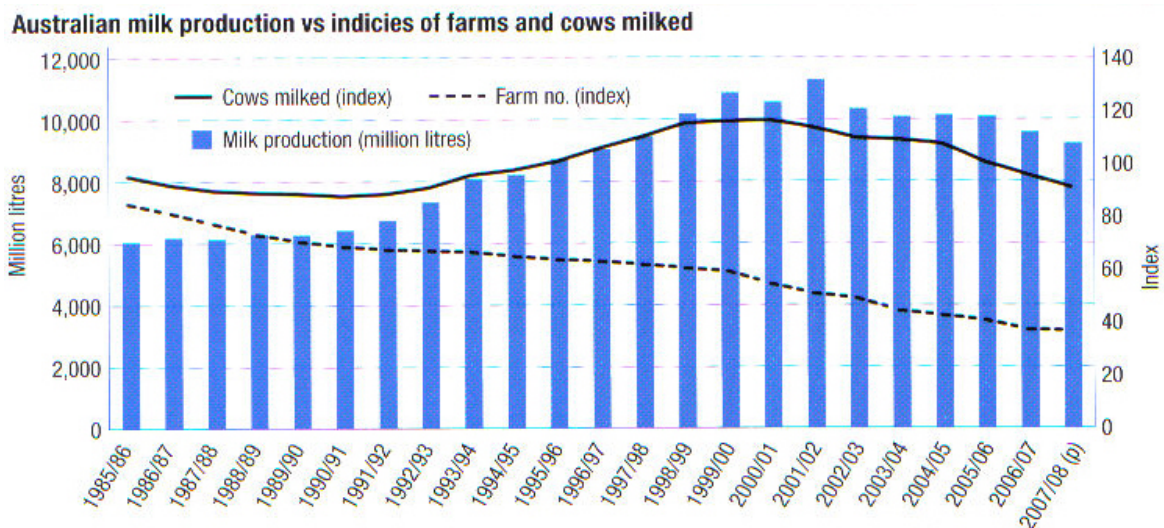
The Australian dairy industry is a key component of the food industry in Australia. The farmgate value of dairy production in 2007/08 was AUD \$4.6 billion, ranking it third behind the beef and wheat industry. Dairying and dairy food processing is a highly decentralized and regionally based. Most dairy production regions are located in coastal areas, where pasture growth is rainfall dependent. However, the inland irrigation schemes in the southern Murray Darling basin river system of northern Victoria and southern NSW account for about a quarter of national milk production. Feedlot-based dairying is un-

common, although the use of supplementary feed grains, fodder and silage is widespread. Over 90 dairy food processing plants operate close to farming areas and mainly in the south east corner of Australia. The value of ex-factory sales in 2008 was AUD \$ 11.5 billion litres. The major manufactured streams are: drinking milk – fresh and UHT long life; skim milk powder, buttermilk powder and butter; butter/casein; cheese; wholemilk powder; other consumer products, such as yogurts, custards and dairy desserts; and specialized ingredients, such as whey proteins and nutraceuticals. About 60% of manufactured dairy product (in milk equivalent terms) is exported to Japan, Asia and elsewhere. While only 2% of world dairy production occurs in Australia, Australian dairy exports accounted for 11% of world dairy trade in 2008.<sup>2</sup> Australia is the third largest exporter of dairy foods behind New Zealand and Europe.

Figure 1 shows the trend in milk production in Australia from 1985/86 to 2007/08.<sup>2</sup> It also shows trends in the number of critical units of milk production - cows and farms - over the same period.

### Drought

The single most important constraint on milk production in Australia over recent years has been the persistence of drought conditions across many dairying and grain growing regions over an extended period of time since 2000. These conditions not only entail reduced rainfall, but reduced surface and ground water flows leading to the loss of on farm irrigation capacity. As a consequence, milk production in the northern Victorian irrigation district of the dairy industry – a region which is serviced by Australia's most ambitious postwar irrigation system (the Snowy Mountain Irrigation Scheme) and which has traditionally produced approximately 20% of the annual national output of milk - has fallen substantially since 2000 and continues to decline. Although Australia is one of the driest countries in the world, water shortage is not restricted to this continent. The supply of water to farms is contracting



Source: Dairy manufacturers, ABS, State Authorities and Dairy Australia

Figure 1. Factors contributing to the decline in milk production in Australia since 2000.

in most parts of the world.<sup>3</sup> Not the least of the reasons for this is the growing urban demand for water, a phenomenon reflected in Australia by a highly contentious proposal to build a pipeline from the depleted Murray-Goulburn river system in northern Victoria, which services the northern Victorian dairy irrigation district, to Melbourne in order to increase Melbourne's water security.

#### ***Declining Farm and Cow Numbers***

As the chart above indicates, the total number of dairy farms in Australia has fallen by over 50% since 1985. This is unsurprising and consistent with worldwide trends. But while this trend, by itself, does not explain the recent decline in milk production in Australia (as farm consolidation and increased herd sizes have contributed substantially to the increase in the national output of milk produced between 1980 and 2000), it should be noted that the fall in dairy farm numbers since 2000 has increased in rate. This appears to be due to drier farming conditions, changing demographic patterns and significant land use changes. The average age of the Australian dairy farmer has increased to retirement age since 2000. Dairy farms are being converted to other uses as older dairy farmers retire off farm to nearby towns or change their farms to less demanding land uses such as beef or tree production because younger farmers within or beyond the family are not entering the industry at the same rate as their forebears. The subdivision of dairy farms for urban use, such as residential or resort development, has also reduced farm numbers, particularly in the highly productive dairying region of Gippsland in Victoria. The decline in cow numbers since 2000 is consistent with these trends. After rising from 1.9 million in 1980, to a peak of 2.2 million in 2000, the number of cows has now fallen to 1.7 million in 2008. The national herd size is now smaller than it was 30 years ago.<sup>2</sup>

#### ***Falling Milk Yield Growth Rates***

In the past the impacts of falling farm and cow numbers on milk production have been reduced by increased milk yield due to supplementary feeding, improved animal genetics and artificial insemination programs. Between 1980 and 2000, average annual milk production per cow increased dramatically from 2,848 litres to 5,000 litres. But this milk yield growth rate has slowed since 2000. Indeed there was no increase in average milk yields until 2008 when average annual milk production per cow increased only marginally to 5,231 litres.<sup>2</sup> Several factors influence milk yield including artificial breeding and genetic technologies, pasture and seed improvements and the use of supplementary feed such as grain. There is anecdotal evidence that many Australian dairy farmers are feeding less grain in the bail to cows and relying more heavily on pasture and seed improvement than previously. This is due largely to the rising cost of grain since 2000, a trend linked to drought in Australia and a significant decline in grain stocks worldwide since 2000 due, which, in part, is caused by increased interest in biofuel production. The number of days of grain stock supply in the world fell from over 100 days in 2000 to 53 days in 2006/7.<sup>4</sup> However, the extent to which farmers can reduce bail feed costs and rely on pasture improvement based on new

seed technologies, including transgenic technologies, to boost milk yield, is as yet far from clear. Roberts highlights the limitations of the productivity claims made by the companies like Monsanto that own seed technology and argues that "the famously high-yield growth of the Green Revolution is tapering off".<sup>1</sup>

#### ***Land and Soil Degradation***

Across many dairy regions, the land is under varying degrees of stress. Weed and pest invasion, reduced water supply, salinity and soil erosion are contributing to the declining health of the landscape and to reduced productivity. This too is a common phenomenon in other agricultural regions around the world. While the precise percentage of dairying land in Australia affected by serious degradation is unknown, it is likely to be similar to estimates of the loss of arable land worldwide, which is in the order of 10%.<sup>4</sup> An important aspect of landscape stress in many dairying areas is the presence of excess nitrogen in the soil (where it combines with oxygen to become nitrous oxide, a greenhouse gas more potent than carbon dioxide) and the loss of nutrients to waterways leading to the contamination of streams, rivers, lakes and bays.

#### ***Rapidly Escalating Cost of Farm Inputs***

Key milk production costs such as fertilizer, fuel and electricity have escalated since 2000. Fertilizer costs have increased fivefold due to worldwide shortages of phosphorus (for which there is no substitute) and nitrogen. The Australian dairy industry is in a similar position to agricultural pursuits in the US and elsewhere, in that it is heavily reliant on importing fertilizer and fuel from limited global supplies. In that sense, Australia, like the US (which imports half its synthetic nitrogen and from many of the same countries from which it imports oil) has a food security problem as well as an energy security problem. Fuel and electricity inputs are no longer incidental costs in dairy food production. The cost of transporting milk from farm to processing plants and storing it in silos until it is processed, has become substantial. This cost is picked up in a so called "volume charge" which is more or less uniformly imposed across the industry. At present it represents almost 10% of the gross return for milk produced on farm at 2009 opening milk prices. For many farmers it represents the difference between a profit and a loss or the viability or failure of their enterprise.

#### ***Diminishing Returns***

Relatively low operational returns are common place in agricultural production. It is part of what a Victorian Government Inquiry into Rural Economics once described as the "long term, worldwide farm problem."<sup>5</sup> This refers to a tendency everywhere for farm incomes to fall relative to other incomes, as a consequence of "economic growth". The introduction of labour-saving technologies on farm, the inelastic nature of the demand for food and the inflexible nature of farming with its high fixed costs are all factors which cause farm incomes to fall relative to other incomes. However, the globalization of the dairy food supply chain over more recent years appears to have further diminished returns to both farmers and processors by

exposing participants in the industry to price fluctuations and uncertainty in world commodity markets and to international influences such as the Global Financial Crisis. In February 2009, for example, the farmgate price for milk, which had been at an historical high, was suddenly reviewed and reduced by up to 50% to a price which was below the cost of production. Increased price volatility has now become a characteristic of dairy commodity prices. This has reduced the appeal of the dairy industry as an investment, particularly to young farmers who depend on borrowing to enter the industry.

#### ***Reduced Public Sector Investment in R&D***

While Australia was once a leader in the Green Revolution sciences, agricultural science and research receives significantly less government support than it did twenty five years ago. University enrolments in agricultural science have fallen by over 20%. R&D spending has decreased. Publicly funded national research bodies such as the CSIRO have substantially reduced their commitment to agriculture. R&D is increasingly dependent on the support of private company funds and support from industry-based, non-government agencies such as the Gardiner Foundation. A similar pattern has occurred around the world, causing the global stock of food production knowledge to run down at a time when it is most needed. As one Australian academic, who is currently writing a book entitled, "The Coming Famine", has put it: "There is an urgent need for international leadership to redouble the global scientific enterprise in food production."<sup>4</sup>

#### ***Deficiencies in Regional Infrastructure***

As a rural and regional industry, the dairy industry in Australia is impacted by deficiencies in the provision of telecommunications, transport, and energy infrastructure to regional areas. For example, the unreliability and poor quality of electricity supply in many regions can ad-

versely affect the efficiency of sensitive dairy food processing technologies such as milk powder dryers. Regional infrastructure deficiencies also impede the development of regional communities upon which the dairy industry depends.<sup>6</sup>

#### **SUMMARY AND CONCLUSION**

Australia produces over 10% of the internationally traded dairy foods. However, paradoxically, dairy food production in Australia is declining, as it is in many other parts of the world, at a time when the world's population is expected to increase from 6 billion to 9 billion over the next forty years and the global demand for food is forecast to double. The decline in dairy food production in Australia is explained by an unusual combination of influences and trends, each of them apparent in the emerging worldwide crisis in food production which has such significant consequences for the health and stability of the global community.

#### **AUTHOR DISCLOSURES**

The author co-owns three dairy farms in Australia

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### **全球糧食危機：澳洲乳品產業的觀點**

本文藉由檢視澳洲乳製品產量不尋常降低之原因，來探討導致日益嚴重的全球糧食危機的因素。而乳製品的全球貿易有 11% 來自於澳洲。

**關鍵字：糧食、乳品、農場經營、乾旱、澳洲**