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Food Policy 31 (2006) 458–468
FOOD POLICY
www.elsevier.com/locate/foodpol

Can the small dairy farm remain competitive in US agriculture?

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Accepted 6 December 2005

Abstract

Smaller dairy farms in the US are observed to have higher costs than larger farms, and whether those higher costs are due to technology or inefficiency has implications for policy to address the small farm. If high cost of production on smaller farms is due to a higher cost frontier, then to make small farms competitive would require research to devise and design technology that is suitable for small farms. If instead high cost is due to inefficiency, then educational approaches are needed to ensure small dairy farms use technology efficiently. To determine the cause of higher costs on small farms, the cost of milk production by farm size was decomposed into frontier and efficiency components with a stochastic cost curve using data on USA dairy farms. Although the frontier cost of production decreases with farm size, that cost reduction is not as pronounced as a cost curve that includes inefficiency. The higher cost of production on many smaller farms is caused by inefficiency rather than technology.

Keywords: Cost curve; Dairy farms; Farm efficiency; Farm size; Stochastic frontier function

Introduction

A common topic of conversation heard in rural coffee shops, agricultural colleges, and on Capitol Hill in Washington, DC, involves the future of the small dairy farm in the

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doi:10.1016/j.foodpol.2005.12.005

United States (US Department of Agriculture, 1998). A large number of small dairy farms have ceased operation in traditional dairy areas, and many wonder how many more small dairy farms will be lost. These discussions center on whether and how the small dairy farm can survive. Some believe there is no future for the small dairy farm in US agriculture since its cost of production per unit of milk produced is thought to be higher than the cost of production per unit of milk on larger farms. Indeed, engineering cost studies of dairy production have shown lower unit costs with larger production units (Matulich, 1980). In a competitive market like milk, the survival of the small dairy farm hinges upon whether those farms are competitive with larger dairy farms, and their long-run survival depends upon having low cost of production. A discussion of the continued existence of the small farm is not limited to dairy or to the US, but is a world-wide issue in both developed and developing countries.

That there has been a reduction in the number of small dairy farms and remaining dairy farms have become larger is undeniable. During the decade of the 1990s, the number of dairy farms in the United States decreased by 42%, from 180,640 farms in 1991 to 105,250 farms in 2000. This reduction came almost exclusively from a decline in the number of small dairy farms. Farms with fewer than 100 cows decreased from 159,866 operations in 1991 to 84,410 operations in 2000, while the number of farms with over 100 cows increased slightly over that period, from 20,774 to 20,840 operations (Blayney, 2002).

Since low cost of production is critical for dairy farm survival in a competitive market, our research estimates the cost of milk production by farm size using individual farm production data from the year 2000 National USDA Dairy Production Practices and Costs and Returns Survey. However, there are two components to the cost of production for an individual farm. The first is the lowest cost for the specific technology and practices that a farmer can use at a given farm size. This can be referred to as the best practice or frontier cost curve. The second component of cost is how efficient an individual farm is in using the techniques available for a given farm size. Costs greater than the best practice cost can occur if a farmer is inefficient in using best practice techniques. In this research both of these cost components were modeled and estimated as a function of the number of cows. The modeling procedure allows both frontier and efficiency cost components to vary by farm size.

There may be a number of social and political reasons to support the small farm. Whether high cost of production is due to inefficiency or a higher cost frontier has significant implications for policy. If high cost of production on smaller farms is due to a higher cost frontier, then to make small farms competitive would require research to devise and design technology that is suitable for small farms. If instead high cost is due to inefficiency, and not a high cost frontier, then current technology exists that would allow small farms to be competitive with larger farms. Educational programs would be necessary to ensure that small farms use more efficiently the technology currently available to them at their respective size.

Review of literature

Cost of production studies have a long tradition in the agricultural economics literature. Through the years the cost of production by farm size has been estimated for various commodities and regions of the US (Madden, 1967; Stefanou and Madden, 1988). Recent cost studies of dairy production have found lower unit costs with larger production units