

## **Testing for Returns to Scale in Dairy Farms in Saudi Arabia**

**Mohammad H. Al. Qunaibet, Mohamed M.T. Limam,  
and Badr El-din E. Sofian**

*Department of Agricultural Economics, College of Agriculture, Riyadh  
King Saud University, Saudi Arabia*

**Abstract.** Recent literature suggest that dairy production functions exhibit increasing returns to scale. In this paper we test the degree of returns to scale for dairy farms in Saudi Arabia. Two testing procedures are discussed under the assumption of homogeneous production functions. Results show the existence of an increasing returns to scale in dairy farm production functions. This raises the question: is it increasing returns to scale or different farm technology? We conclude that we have a constant returns to scale, and we have to consider farm specific efficiency when estimating production functions from cross section data.

### **Introduction**

Farm size is one of the most important factors in studying the structure of the dairy farm industry. In a competitive market for farm inputs and output the existence of constant returns to scale, under the profit maximization assumption, allows farm size to increase to make better use of economies of size for the new dairy farm technology. Mukhtar and Dawson [1] showed that technological change in the England and Wales dairy sector is biased towards larger herds. Weersink and Tauer [2] explored the causality between dairy farm size and productivity. They argue, whether productivity increases lead to larger dairy farms or whether larger dairy farms allow greater productivity. Their empirical results, only partially support the view that productivity change has caused changes in average herd size. Thijssen [3] pointed out that there are slightly increasing returns to scale in the case of Dutch dairy farms.

Testing the degree of returns to scale could be done by examining the dairy farm technology as described by its production function. Generally, agricultural economists use cross section data to estimate production or response functions. A response function is a functional relationship between inputs and an output estimated by means of regression analysis. But, these response functions are partial, since they rely on a limited number of data points on a production surface, instead of a greater number of levels for each input as in a controlled experiment (Heady and Shashanka [4, pp. 3-6]). However, this situation leads to some problems.