

Whether enhancing animal welfare and biosecurity improves the technical efficiency of egg-producing farms: An empirical investigation in Taiwan

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Abstract: Eggs are an irreplaceable feature of the Taiwanese diet. In 2020, the average Taiwanese citizen consumed 333 eggs over the year, and over 90% of the eggs in Taiwan are obtained from conventional cage systems, or battery cages. The stocking density of laying hens in Taiwan has continuously grown since the 1960s, two issues have been frequently discussed in the egg industry. First, the stability of egg supply is at risk due to the strike of infectious diseases; how to improve the biosecurity in the egg farms became a great challenge. Second, the adoption of the laying hens rearing systems which fit higher standards of farm animal welfare (FAW) arouses various perspectives in the society: consumers' demand for products which respect animal welfare is increasing but the egg producers' attitudes diverge.

This study attempts to fulfill the gap in the biosecurity research and examine the technical efficiency (TE) of egg producers under no mandate to phase out battery cage systems and farmers are autonomous to adjust their feeding strategies. The stochastic frontier analysis (SFA) framework is employed to analyse a set of farm level data obtained from a national survey of egg industry conducted by the Council of Agriculture of Taiwan in 2020. We have evaluated the economic performance of 538 commercial egg production farms in Taiwan, 513 of them remain in the battery cages system and 25 farms have transited into alternative systems to fit higher FAW standards. We have also examined the relationship between the level of TE and different management practices.

Two outputs, namely the hen-housed egg production rate (HHEP) and the number of eggs produced per month (NEPM), are assigned as dependent variables to measure the economic performance of each farm. When we use HHEP as the dependent variable, the results indicate that the egg farmers who pay more attention to improve biosecurity can reach higher TE. Also, when the rearing systems are taken into consideration, the egg production rate has no significant difference between conventional systems and alternative systems.

On the other hand, when we use NEPM as the dependent variable, the conventional systems are more efficient with respect to total output, for the battery cages can bring in high stocking density. In other words, increasing FAW standards would not influence the productivity of laying hens; the farms applied conventional systems achieve greater output due to the higher stocking density. Thus, with the support from the consumers who are willing to pay the price premium to protect farm animals, raising the price of egg products from high FAW standard farms can compensate for the farmers' loss due to lower total output.

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