

## **Title**

Evaluating economic performance and antimicrobial consumption in French broiler production: improved healthcare management as a win-win strategy.

## **Authors**

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## **Introduction**

Supervising antimicrobial consumption is of paramount importance in both animal and human health sectors because of the public health and economic burden due to antimicrobial resistance for various reasons. Yet, antimicrobials are used in farms as they enable to curb economic damages generated by infectious diseases, and they have proved beneficial for farmers. To better orient towards sustainable antibiotic prescribing practices, it is important to assess the impact of the consumption of antimicrobials on the profitability of farmers. The main objective of this paper is to evaluate the relationships between the economic performance of farms, and the management of animal health.

## **Material and methods**

We collected an original dataset covering 1,086 lots of broilers raised and harvested in France between 2017 and 2019. The dataset consists of technical and economic information, as well as drug consumption at the flock level. We perform different estimation strategies in order to (i) analyze the determinants of economic performance of farms, (ii) quantify the impact of veterinary practices on farmer's income. To alleviate endogeneity, we carry out an instrumental variables (IV) method.

## **Results**

Estimation results show that the profitability of farms is highly correlated with the intrinsic characteristics of the farms, such as the density of the broilers, the average daily gain, and the feed consumption index. This suggests that the possibilities of increasing the income of farmers are very limited. However, when looking at the consumption of antimicrobials and vaccines, we observe that (i) the farmers not using antimicrobials have fairly similar gross revenue than the farmers using antimicrobials at low levels; and (ii) the more farmers use antimicrobials, the more their marginal revenue decrease. Specifically, the point estimates for antibiotic uses variables exhibit both positive and negative signs, indicating a non-monotonic relationship between antibiotic consumption and economic performance. The increasing phase may be related to an insurance effect provided by antimicrobials. Indeed, antimicrobials may buffer potential damages due to fair management practices. Afterwards, the economic performance of farms decreases due to the various reasons e.g., severity of diseases, negative side effects of antimicrobials on digestive commensal.

Additionally, we also find that the use of high priority critically important antimicrobials, as defined by the World Health Organization, have negative and significant effects on the

profitability of farms. Finally, we show that farmers having a higher consumption of medical prevention, such as vaccine, also use less antimicrobials.

### **Conclusion**

Overall, our results highlight the importance of a judicious veterinary management for improving the profitability of farms. Globally, this study suggests that encouraging farmers to better prevent diseases, by using medical prevention and veterinary counseling, is a win-win strategy as this enables curbing antimicrobial use while improving revenue. Hence, moving towards rationed and reasoned uses of antibiotics is crucial both for animal welfare and farmer's portfolio.

**Keywords:** Animal agriculture, Antimicrobial use, Vaccine Economic performance, Public policy

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Judicious antimicrobial stewardship improves farmers' profit  
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