Analyzing antibiotic use in Dutch livestock sectors using panel data

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Antibiotic use in livestock production has come under increasing public scrutiny due to its potential contribution to antimicrobial resistance both in livestock as in human health. For policy makers, it remains unclear whether antibiotic use can be drastically reduced and what economic consequences this will entail. In this paper we explored antibiotic use data in combination with microeconomic data on Dutch livestock production farms. The objective of our study was to provide quantitative insight into the extent and pattern of antibiotic use and its relationship with farm-specific indicators. We analyzed the use of antibiotics in four types of livestock sectors (broilers, dairy cows, fattening pig and sow farms) using panel data over the period 2004-2010. In the data analysis both cross-sectional and temporal variations were examined. Antibiotic use was expressed as the number of daily doses (ADD) in which an animal with year-round presence would be treated with antibiotics according to standard dosages. ADD in the period 2004-2010 averaged about 31.7, 6.2, 16.1 and 26.8 in the broiler, dairy, fattening pig, and sow farms respectively. The antibiotic use data showed substantial cross-sectional variations in each livestock sector for all years analyzed. The coefficients of variation (CV), calculated as the ratio of the standard deviation to the mean, were above 40% for all years analyzed. At the same time, the relative level of antibiotic use on the same farm showed a considerable level of stability across the years. On average, the probability that farms have approximately the same level of antibiotic use as in the previous year was estimated to be higher than 70%, which suggested the persistent role of farm-specific factors. While there seemed to be no clear relationships between antibiotic use and farm performance indicators, farm structure indicators such as herd size and up-to-datedness of the farm, affected antibiotic use significantly in each livestock sector.