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Food System Changes in One Health: Options for Reducing Antimicrobial Use

Inhalt

Background: Inappropriate use of antimicrobials has been linked to resistance to antibiotics in both humans and animals. About three quarters of total antimicrobial use (AMU) originates in agriculture, but a comprehensive understanding of options for reducing agricultural AMU is lacking. Here we estimate the effectiveness of mitigation options across the food system at global, regional, and national levels, including improvements in biosecurity, reductions in food loss and waste, and dietary changes towards healthier and more sustainable diets.

Methods: For our analysis, we first estimate agricultural AMU attributable to both livestock production and seafood production from aquaculture. To estimate AMU per product, we used region and commodity-specific AMU application rates and paired them with animal numbers corrected for their weight at treatment. We used a global food-system model with country-level detail to estimate the impacts of changes in food loss and waste, dietary changes to a set of healthy and sustainable diets (flexitarian, pescatarian, vegetarian, and vegan), and improvements in biosecurity measures on food production in 2030. We then paired the changes in food production across the different options and between 2020 and 2030 with the estimates of AMU per product.

Findings: We estimated agricultural AMU to be 102 kt in 2020, increasing by 18% to 120 kt in 2030, driven by population growth and dietary changes in middle-income countries. Improvements in biosecurity reduced AMU by 22% compared to no intervention in 2030, with greatest improvements in regions with high pork production such as Europe. Halving food loss and waste reduced AMU by 7%, with greatest reductions in regions with aquacultural production such as East Asia. Dietary changes to flexitarian or pescatarian diets reduced AMU by 42-44%, whereas adoption of vegetarian or vegan diets led to reductions of 88-99%, with greatest reductions in regions with high intake of animal source foods such as North America. Combining all measures increased the individual mitigation potentials (e.g., to 57% for combinations with flexitarian diets).

Interpretation: Achieving meaningful reductions in agricultural AMU will benefit most from a combination of measures, including improvements in biosecurity, reductions in food loss and waste, and dietary changes towards healthier and more sustainable diets with lower amounts of animal source foods. Dietary changes are not often considered One Health interventions, but their substantial mitigation potential warrants to be taken into account for effectively addressing the rapid emergence of antimicrobial resistant organisms.

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