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Review

Disease control tools to secure animal and public health in a densely populated world

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Animal health is a prerequisite for global health, economic development, food security, food quality, and poverty reduction, while mitigating against climate change and biodiversity loss. We did a qualitative review of 53 infectious diseases in terrestrial animals with data from DISCONTOOLS, a specialist database and prioritisation model focusing on research gaps for improving infectious disease control in animals. Many diseases do not have any appropriate control tools, but the prioritisation model suggests that we should focus international efforts on Nipah virus infection, African swine fever, contagious bovine pleuropneumonia, peste des petits ruminants, sheeppox and goatpox, avian influenza, Rift Valley fever, foot and mouth disease, and bovine tuberculosis, for the greatest impact on the UN's Sustainable Development Goals. Easy to use and accurate diagnostics are available for many animal diseases. However, there is an urgent need for the development of stable and durable diagnostics that can differentiate infected animals from vaccinated animals, to exploit rapid technological advances, and to make diagnostics widely available and affordable. Veterinary vaccines are important for dealing with endemic, new, and emerging diseases. However, fundamental research is needed to improve the convenience of use and duration of immunity, and to establish performant marker vaccines. The largest gap in animal pharmaceuticals is the threat of pathogens developing resistance to available drugs, in particular for bacterial and parasitic (protozoal, helminth, and arthropod) pathogens. We propose and discuss five research priorities for animal health that will help to deliver a sustainable and healthy planet: vaccinology, antimicrobial resistance, climate mitigation and adaptation, digital health, and epidemic preparedness.

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