



BRIEFING

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AMR AND CHICKENS IN ASIA

The use of antimicrobial drugs on chicken farms in South and Southeast Asia is contributing to a diminishing array of life-saving drugs available for people in the UK and worldwide. The GCRF One Health Poultry Hub is exploring ways to address this urgent challenge for global health.

CONTEXT

More than 1.3 trillion hen eggs and more than 100 million tonnes of chicken meat are produced worldwide each year. Global chicken production is forecast to grow 48% between 2017 and 2050, with more than 70% of that growth expected to come from Asian countries. Population growth, urbanisation and increasing wealth is driving a massive increase in animal protein consumption in the region.

Chickens are well suited to high intensity farming. But rapidly intensifying chicken production is associated with major local, regional and global public health risks. Key among them is the development of antimicrobial resistance (AMR) as a result of the often uncontrolled use of antimicrobial drugs (AMD) in farming.

THREAT

The increase in consumption of AMD globally is projected to be 52% by 2030 – and much higher in many Asian countries. In Bangladesh the figure is 69%, in India 82%, in Sri Lan-

KEY FACTS

- 48%** – forecast growth in chicken production globally, 2017-2050.
- 71%** – proportion of that growth expected to come from Asia.
- 67%** – global increase in antimicrobial drug consumption by food animals expected 2010-2030
- 10m** – number of deaths expected annually from AMR unless urgent action is taken.



ka 86% and in Vietnam 215%. Much antimicrobial use in these countries is driven by their use in livestock. Massive rises in the numbers of farmed livestock in the world mean the risk of bacteria generating or acquiring AMD resistance and then moving between animals, or from animals to people, is also increasing. The sheer numbers and relatively short production cycles of chickens makes this risk particularly high in chicken production. It is therefore critical to achieve responsible, regulated use of AMD in chicken production to stem spill-

over of AMR from chickens to people, and reduce risk to people's health globally. An estimated 700,000 people worldwide die annually as a result of AMR now, a figure predicted to reach 10 million by 2050 without urgent action. But to be effective, interventions to ensure responsible AMD use must be affordable, sustainable and tailored to local contexts.

Research is essential to identify where, when and how these interventions should take place.

RESEARCH FOR IMPACT

The GCRF One Health Poultry Hub is working in Bangladesh, India, Sri Lanka and Vietnam to help meet Asia's growing demand for low-cost chicken meat and eggs while minimising the risks to public health. A major focus of our work is assessing the use of AMD in chicken farming with a view to affecting change.

AMD use in chickens for disease treatment or in advance of an expected outbreak of disease (metaphylaxis) is legitimate, albeit reduction should be a goal. However, AMD use in chickens for growth promotion or to prevent disease (prophylaxis) is highly undesirable and hugely increases the likelihood of selecting resistant organisms, especially when sub-optimal levels of AMD are used. The licensed AMD market in Asian countries is dominated by numerous local companies and legislation is very different in the four countries in which we are working. Hub re-



Image: Guillaume Fournié

searchers are identifying the AMD formulations approved or sold for use in chickens in these countries. However, even a thorough review will not tell a full story as medicated animal feeds and raw (unlicensed) antimicrobial powders can be purchased via unregulated, informal markets.

This makes assessing the actual use of AMD at farm level critical. Hub researchers are using a 'belt-and-braces' approach. First, using semi-structured questionnaires, they are gaining a qualitative insight into AMD use on farms by asking, for example, the nature of AMD kept in stock, the intended rationale for AMD administration and the dosages administered. As the accuracy of questionnaires can be uncertain – for example, farmers may simply be unaware of what is in the food they give their flocks – questionnaire results are being compared with AMD residue detection in chicken muscles and feathers. This latter 'forensic approach' is similar to that used to detect medication and doping in other veterinary industries.

Live and dead birds are being sampled from farms of varying production intensifications across the four countries, from backyard flocks to birds in large intensive facilities. Samples are being taken on farms and at slaughterhouses and from chickens sold to consumers in markets, shops and restaurants. Pathogen genome analysis is providing critical transmission tracking and quantitative data on the genetic changes that influence AMR, combined with residue tracking using sophisticated liquid chromatography and mass spectrometry. We are also undertaking mathematical modelling to enhance our understanding of how AMDs leads to AMR in chickens – essential to develop sustainable therapies and interventions to reduce the AMR burden.

These findings are being integrated with further Hub evidence, in particular from our research exploring the social, economic, cultural and regulatory factors shaping chicken production in different settings. Our evidence will inform policymakers and others in positions to influence change at local, national

BANGLADESH: 98% OF FARMERS ASKED USE ANTIBIOTICS IN THEIR FLOCKS

Hub researchers' findings from an earlier project in Bangladesh show very high levels of resistance in Bangladeshi chicken flocks against common infections for most tested antibiotics, including for vital antibiotics used in human healthcare. Even drugs of last resort, such as colistin, used to treat drug-resistant infections such as some types of pneumonia, are now in danger of developing resistance.

Researchers took samples from 140 chicken farms in Chittagong districts. All but three farmers said they used

antibiotics on their flocks for disease control and prophylaxis. Antibiotics from the WHO 'Reserve' group of drugs of last resort, to be used only in people with

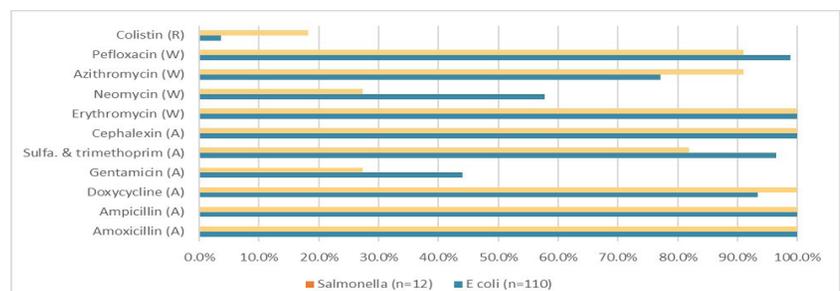
multi-drug resistant infections, and from the WHO 'Watch' group, determined as 'critically important' in human medicine and with a higher potential for developing resistance, were used by two-thirds of farmers surveyed.

Colistin was the most frequent antimicrobial used on broiler farms, used by more than half of them. Antibiotic resis-

"The widespread use in chicken farming of strategic antibiotics for human health, such as colistin, could render some diseases incurable in the near future" – Professor Meerjady Flora, Chair of the Coordination Committee for the One Health Secretariat in Bangladesh and Hub co-Investigator

tance in *E. coli* and *Salmonella* bacteria, both common causes of diarrhoeal disease, were found to range from 3.6% to 100% (see table).

Percentage of commercial broiler and layer farms with AMR for 110 *E.coli* and 12 *Salmonella* cultured from chicken faecal and environmental samples



A = WHO Access antibiotic group, W = Watch group, R = Reserve group

and regional levels with the objective of reducing the risk of AMR – both now and as chicken production continues to escalate across Asia.

Other positive impacts we expect will come from community engagement and working closely with our stakeholders, including the private sector, farmer and trader organisations, and regulators. Our Hub is also building much-needed capacity, leaving our case countries better placed for setting up sustainable AMD residue monitoring schemes for their internal markets to protect consumers. In-country capacity for microbiology and pathogen detec-

tion will be strengthened, essential for AMR risk reduction.

Finally, we will be working with others, locally and globally, to implement interventions and pilots that make a difference. Already we are working with the UK's Fleming Fund and Newton Fund and the International Veterinary Vaccinology Network. We welcome approaches from those wanting to work with us.

FIND OUT MORE

Further information

No Time to Wait: Securing the Future from Drug-Resistant Infections (IACG on Antimicrobial Resistance, 2019).

The FAO-OIE-WHO Collaboration: A Tripartite Concept Note (FAO, OIE and WHO, 2010).

The OIE Strategy on Antimicrobial Resistance and the Prudent Use of Antimicrobials (OIE, 2016).

Global Action Plan on Antimicrobial

Resistance (WHO, 2015).

Tackling Drug-Resistant Infections Globally: Final Report and Recommendations. The report on antimicrobial resistance chaired by Jim O'Neill (Wellcome Trust and HM Government, 2016).

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ABOUT US

The GCRF One Health Poultry Hub is an impact-driven research and development programme working to help meet Asia's growing demand for chicken meat and eggs without risk to local and global public health. It is funded by UK Research and Innovation through the Global Challenges Research Fund, a key component in delivering the UK AID strategy.

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