

Plenary session - interactions between intensifying livestock and aquaculture production for food and nutrition security, and: a) increased vulnerability to antimicrobial resistance and zoonoses; b) land use change

Overview of the session

Protein from animal sources is a key means of improving dietary diversity and nutrition, but overconsumption of some animal-based proteins (particularly processed meat) has been associated with increases in non-communicable diseases (NCDs) e.g. bowel cancer. Intensifying livestock production systems to cater to the changing dietary preferences of a progressively affluent and urbanized population entails risks and can enhance human vulnerability to diseases through zoonoses as well as increased anti-microbial resistance (AMR). This session will focus on improving both human and animal health and welfare while sustainably improving farm productivity. Improving land use management while sustainably meeting the increased demand for animal source foods, and the implications for the international agricultural research agenda will also be discussed.

Two background papers were commissioned to guide the discussions in this session, and their findings are summarized below. Both papers submit that the increased availability and accessibility of ASF has had positive impacts on food security and nutrition. That said, and cognisant of substantial regional variation, there are also important externalities related to intensifying livestock systems in terms of resource use, the environment, welfare, zoonotic diseases and AMR. Optimizing food supplies and minimizing externalities will require strong institutional and technical responses through the combined action from public, private and civil society. Thus far, such responses and the ability to make informed decisions has proved variable, and also been restricted by a continuing paucity of data on livestock systems.

1. Interactions between intensifying livestock production for food and nutrition security, and increased vulnerability to AMR and zoonoses. Rushton et al.

This paper examines the context of intensifying livestock systems with reference to the zoonotic pathogens present in the associated value chains, and provides information on the increased risk of anti-microbial resistance (AMR) development and zoonoses transmission from these systems.

The authors highlight that data from OECD countries suggests the use of antimicrobials is highest in intensive systems. Although limited, information collected on anti-microbial use (AMU) in low and middle income countries (LMICs) suggests that the lack of regulation, or enforcement of regulation in these countries, combined with rapid economic, demographic and population changes, is creating particularly high-risk environments for the development of resistance and the spread of zoonotic disease. Urbanization and demand for ASFs have brought livestock and large human populations into close proximity, resulting in numerous pathways to the risk of zoonotic disease transmission and the spread of antimicrobial-resistant bacteria. The paper proposes that in light of the fundamental linkages between zoonotic disease risks, changing livestock systems, economic development and antimicrobial use, the AMU/AMR complex in livestock is an area that requires additional attention. Moreover, there should be more emphasis on tying this into an overall strategy of intensifying livestock systems to feed growing urban-based populations.

The analysis indicates the following areas requiring research where CGIAR would be particularly well placed to make a contribution:

- *Zoonoses and food borne diseases*: Understanding the dynamics of the food systems and how these change,
- *AMU/AMR in livestock*: Guidance to new investments in surveillance on AMU and AMR in livestock that are being led by the Fleming Fund, OIE and FAO;
- *Pig, Poultry, and dairy sectors*: Engagement with the private sector in a symbiotic sharing of state of the art surveillance and diagnostics in exchange for privately-held data on animal health and disease (including AMU/AMR and zoonotic diseases); and
- *Small ruminant sector*: Risks on brucellosis and Q-fever through the work on PPR management and elimination.

2. Livestock, land and the environmental limits of animal source-food consumption. Herrero et al.

The paper provides an overview of the demand and supply dynamics of ASF, including their geographical and species differentiation, and the environmental impacts arising from their respective use of land and natural resources, which may be far afield as global trade in feed resources increases. The paper also highlights the projected environmental, greenhouse gas and health impacts of alternative sector development pathways depending on the goals and aspirations of different countries. In this, it has a summary look at options to address negative externalities from the supply-side through technology and policy options and the demand-side through the reduction of ASF consumption and waste. The paper suggests that a mixture of both will be necessary to reduce trade-offs and that both potential intervention areas are in need of significant additional research. Given the vast diversity of contexts, the ability to effectively target sector transition through different actions, policies and investments will be essential to sustainable livestock futures.

The authors indicate that picking the “battles” will be essential for CGIAR to achieve the desired impacts on livestock, livelihoods and the environment, and that this balance between social and environmental goals will need to be carefully evaluated. In light of this, they suggest the following areas of potential action:

- *Smallholder dairy sector*: Issues related to land fragmentation and feed availability need closer attention, as does testing and implementing transformational feed technologies or engagement in developing feeding systems that could increase biomass recycling;
- *Smallholder pork and poultry sector*: Whilst investment in these smallholder systems is at best a medium-term strategy that could provide livelihood benefits as these producers diversify or identify new exit strategies. Identifying transition options for these producers seems necessary;
- *Future feed demands for the poultry and pork sector*: From an international public good perspective, the sustainable sourcing of the large demand for pork and poultry feed is a critical researchable issue. Biomass value chains, old and new, need to be evaluated, developed and promoted to ensure that competition for food with humans is minimized.
- *Environmental trade-offs*: Identifying the best levels of consumption in relation to other dietary components for different population groups has to be high on the CGIAR agenda, as well as designing viable policy instruments for effecting changes in the demand (prices and others). The identification of ways to decouple red meat production from land, or to create niche products for very specific sets of consumers through labelling systems and certification is another area that require more attention. ‘Circular lamb systems’ is another area where the CGIAR agenda could potentially increase its visibility, and still work in dryland regions for the benefits of vulnerable groups.

- *Sustainability*: Development of economic incentive systems (price premiums) and regulations to pay for reduced emissions, watershed protection, biodiversity protection and others;
- *Data*: A coherent data strategy is necessary to improve our ability to target research on animal productivity and numbers, inputs and outputs, and costs in relevant production systems.