Research concept note 2008

Facing the major challenges of the 21st century's livestock production in the tropics

Introduction

As livestock-related activities contribute to the ecological footprint, climate change, air and water pollution, transmission of disease to man, the sector has often to face a certain form of reluctance from decision-makers. Provocatively, one could say that livestock has to be banned of the food strategies as those challenges are too important.

However, this is neglecting the fact that the livestock sector contributed since millennia to human development and currently accounts for 40 percent of the agricultural gross domestic product and employs 1.3 billion people in the world. Moreover, livestock is a key asset for poor households providing livelihoods for more than one billion people. Pastoralist population are among the world's most vulnerable citizens. Indeed, two-third of the pastoralists are to be considered as poor.

Livestock contribute to the livelihood of the poor in different ways. Livestock are often one of the important household cash income sources and represent one of the few natural capital assets owned by poor households. In mixed farming settings, livestock provide draught power and manure which in turn boost the crop production. Other benefits from animals are fuel for cooking and heating, materials for house building, … Depending on the location livestock can be important for women providing an own source of income and independence.

Livestock are of great importance for low- and middle income countries in the context of food sovereignty, food security, and the provision of quality protein food to the populations. Own production increases direct food consumption or reduces food expenditure by use of the revenues from selling animals. Rising incomes and growing urban populations are also creating a strong demand for animal products: this is remarkably more pronounced in the South where the livestock production and consumption increase, while it decreases in the North. This increasing demand poses not only challenges but also opportunities for employment and to alleviate poverty among poor households with potential for livestock production.

So, it appears that livestock development has a dual role of addressing the increasing demand of the expanding global population for animal products, as well as achievement of the Millennium development goals of poverty reduction, fitting with the Declaration of Paris on aid efficiency.

Investing in animal health and production research is then necessary for a better understanding of the sector, including the study of the adverse effects and the importance for public health.

Major challenges faced by the livestock sector

The livestock sector as well as the agriculture in general is undergoing far-reaching changes in a global changing environment. Main challenges are:

- *demographic growth* (6.6 billions inhabitants in the world in 2008): 1° increases food demand 2° due to human population pressure, induces new interfaces implying emergence or re-emergence of diseases transmitted to man by animals (zoonoses), and 3° increases pressure on the available rangeland;

- *increased urbanisation*: (50 % of the world population in 2008): induces intra-urban or peri-urban new and complex livestock production systems with increasing concentrations of animals in – and around cities;
- *climate changes*: induces 1° land degradation problems and related land use, 2° changes on the ecology and dispersion of vectors of diseases;
- *globalisation of the market* : more migration of animals and/or transport of animal products induces 1° import of new diseases (transboundary diseases) in countries that are not yet able to identify and control the spread of those pathogens, 2° increase the exposure of the local production systems to international competition, and 3°induce loss of biodiversity;
- *world energy demand* : induces 1° an emerging competition for land and grains between animals and bio-fuel production, 2° a higher awareness for energy use efficiency of animal production systems.

General principles of the approach

To fully comprehend all the different aspects related to sustainable livestock production in the tropics, a holistic and multidisciplinary approach, including sociological, anthropological, economical and other technical disciplines (forestry, rural an urban planners, ..), is necessary to formulate adequate recommendations in order to prioritise the interventions.

Every study should associate all the stakeholders, e.g. pilot farms as meeting point for farmers and scientists, on-the-farm trials, ...

Notwithstanding large commercial farms are of importance to provide sufficient food to the growing cities, the emphasis of the Belgian action should be on small-scale holders and resource-poor people as livestock production plays an important role in poverty alleviation.

Therefore, the study of the market chain is also important, including the introduction of sustainable technology for local transformation of the products and an effective costs and benefits analysis.

New opportunities should be identified to enhance the revenues.

Tropical animal health has to move to a more global animal health approach (from “tropical veterinary medicine” to “veterinary medicine in the tropics”).

Emergence or re-emergence of zoonotic diseases requests a “one medicine – one health” approach with physicians and veterinarians (importance of veterinary public health).

Axes of priority research

Development of efficient epidemiological tools and surveillance systems

Due to financial and managerial constraints in the different countries, appropriate systems of epidemio-vigilance, -surveillance must be worked out in such a way that they are adapted to the local resources and specific regional needs.

They include up-to-date tools as participatory and cultural epidemiology, data management, risk analysis, geo-temporal information systems and decision-making tools, but also the improvement of diagnostics tools and the appropriate statistical tools for interpreting the results.

Enhanced comprehension of transmission pathways, prevention and treatment of major animal diseases and zoonoses

Epidemiological studies on important endemic and epidemic animal diseases such as Foot-and Mouth disease, African Swine Fever, vector-borne diseases, … must be implemented.

Studies on diseases transmitted from animals to man (zoonoses), e.g. tuberculosis , brucellosis, cysticercosis, Rift Valley fever, zoonoses in non-conventional species, … with emphasis on inter- and intraspecies transmission dynamics, risk factors, true impact of zoonotic diseases and comparison rural-urban settings, and dissemination to disease-free countries, also to non tropical regions. The game-livestock- man interface in transmission of disease must be investigated too.

Effective vaccines against some tropical epidemic diseases and strategies to prevent drug resistance must also be developed, while existing vaccines must be improved (e.g. thermostability).

Studies on impact of climate changes and world energy demand

Studies on impact of climate changes on the ecology and dispersion of vectors must be worked out, as well as on dispersion/distribution of vectors due to animal's movements or changing habitat.

The influence of biofuel need on the animal feed availability and the land resources in developing countries must be properly assessed.

Comprehension of the socio- economics of new livestock systems

Knowledge on the benefits and risks of various production systems (urban, periurban, rural) must be acquired with a holistic approach (cf. General Principles).

Market chains (animals on hoof and animal products) need to be properly investigated from producer to consumer, by means of tools like market chain analysis, new institutional economics …

The livelihood at household level must also be analysed.

Finally, anthropological studies on farmers-pastoralists conflicts, land-use, psycho-cultural aspects of food choice, psycho-social benefits of household production (e.g. urban), … have to be carried out.

Valorisation of local biodiversity in sustainable production systems

Inventory, selection, preservation and comparison of local species and breeds, including non conventional animals, must be implemented in order to identify feed – and water efficient animals for further development of sustainable production systems.

The genetic resistance to environmental conditions (climate, diseases, parasites, …) in indigenous and improved breeds must be investigated.

Fodder plants and feed resources combining an acceptable nutritional value and a capacity to enhance the energy and water-use efficiency of the production systems must be selected.

New technologies allowing the use of non conventional feed resources would worth to be investigated or developed.

Animal feeding strategies, including range management, within a larger frame of climate changes and reduction of available range-land (e.g. re-use of water and organic solid wasted as feed, …) must be developed.

New, cheap and effective drugs or treatment procedures for tropical diseases using local pharmacopoeia must be found.