Keynote paper

Implications of globalisation on hygienic measures in animal disease control

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Abstract

A new political and economic paradigm has emerged with the turn of the century which also profoundly affects ways of animal disease control. With production of animal-products worldwide rapidly changing from traditional to intensive/industrial, the spectrum of diseases changes from mono-causal to multifactorial. The concurrent development of a global rules-based production and trading environment under WTO-SPS additionally introduces vital food safety concerns which regulate/limit the kind and extent of disease control measures.

The political dimension of animal disease control is indicated as measures aiming at controlling and eradicating diseases are in conflict with the idea of free international trade as being continuously discussed within e.g. the EU and WTO. If these problems are not solved, the free international trade tends to result in a situation where ambitions to improve animal health are discouraged and instead one may end up in a situation where the lowest disease status of a participating country will be considered as the standard.

Production management aspects of disease control, summarized under the term ‚hygiene', both in regards to the "livestock revolution" geared towards production intensification, as well as regarding food safety issues, gain in importance and are at the forefront of animal infectious disease control or prevention programs. These management measures cover the multitude of man-derived factors which essentially focus on altering the susceptibility of host animals to disease agents and on agent's ability to survive and transmit. The hygienic measures include structural, zootechnical and production-organisational elements or combinations of them.

The concept of the epidemiological triad is used to illustrate the role of hygienic factors for disease occurrence. It outlines the spectrum of possible hygienic interventions, ranging from single major techniques against mortalities and morbidities of ‚simple' epidemic diseases to solving complex herd problems of suboptimal production or reproduction; the type of livestock system and available infrastructure essentially determines the scale and economic justification of hygienic measures. A hygiene concept has to be a integral part of an encompassing production and business management process. An appreciation of the relationship of the most important determinants for disease disorders can be gained by epidemiological-statistical methods.

With the current process of intensification of production, demands for measures to ensure production efficiency and increasingly also product quality are growing. Not all farmers will be able to follow these demands. While livestock is one of the fastest growing parts of developing country agriculture, it paradoxically is becoming less of a viable development path for many of the rural poor. The market for disease control, as that of food products, consequently will split up into a premium and a ‚discount' segment. Even further pressure on disease control techniques will be exerted when, additionally to product standards, also mandatory process standards of production are asked for.

2 Introduction

Dramatic changes are going on the field of animal agriculture. A new political and economic paradigm is emerging which is affecting the prevention, control and eradication of animal and zoonotic diseases. Two opposite developments in different parts of the world, the developing and

the developed countries, are driving forces of this general change. In the developing world, demand for animal products will increase at unprecedented rates. This demand- and quantity-driven "Livestock Revolution" (DELGADO ET AL, 1999) asks for new technology and systems to be disseminated to the developing world to eliminate low productivity. In the developed world, in contrast, emphasis has shifted from increasing quantities of products to a 'quality dictate' from the consumer through retail, wholesale, slaughter and processing 'back' to production processes at the farm.
The link between the two opposite developments is set by regulations and standards aiming at the worldwide liberalization of trade of animals and animal products. Globalisation leads to an increasing flow of ideas, capital, people, and goods, including live animals and products of animal origin, around the world in the context of diminishing relevance of national borders.
Livestock disease control as a consequence has undergone a paradigm shift in recent years. More flexible control strategies that focus on regions of highest returns within a country (disease-free or low-risk status of regions of a country) are replacing countrywide blanket eradication programs and disease control on-farm aims at lowest use of e.g. antibacterial/antibiotic drugs and a more prudent consideration and use of hygienic measures.

3 Hygienic measures

The role of hygienic measures in disease control is best explained by the epidemiological concept of the 'epidemiological triad' (THRUSFIELD, 1995). Curative veterinary medicine focuses on the individually sick animal. In animal production it is too late to undertake actions first when clinical signs of disease have developed. Therefore, health control scheme should be established and control measures used that continuously aim at disease prevention in order to avoid health problems. Appropriate measures include control, reduction or elimination of non-epidemic diseases on all levels of animal production, e.g., combat sources of infection, decrease of exposure, optimising hygiene, prudent use of antimicrobial treatment and measures to improve host resistance by e.g., breeding, optimal nutrition, optimal housing and ventilation, good management (e.g., all in all out), reduction of stress.

Epidemiology, in contrast to curative medicine, focuses on animal populations. In populations, the frequency and distributions of diseases and their risk factors is investigated by epidemiological methods. This approach implies, that not only infectious agents are considered, with the aim of eliminating them by use of drugs; additional to agents, also factors of the host animal and of the environment, including management, are considered.
Factors of the three components, agent, host, environment, in combination, of a certain magnitude and in some sequence, lead to the occurrence of a group of diseases called multifactorial diseases. The operational aim of the epidemiological approach is to identify those factors which most easily and efficiently can be eliminated, reduced or excluded.

When determining risk factors in this way are manipulated, a sustainable effect of disease control is achieved. The presence of an infectious agent is just one of a number of events which have to come together ("cascade") to produce disease. If respiratory disease is considered as an erxample, one or more infectious agents, often a bacterial or mycoplasmal infection facilitated by a virus infection, may have to come together with environmental 'triggers' which either increase exposure of the animal to infectious agents (e.g. poor ventilation) or which lower natural resistance of animals to infection (e.g. chilling or the stress of overcrowding (MEREDITH, 2001).

The number of multicausal and multifactorial diseases are on the increase with the worldwide occurring new developments to increase livestock productivity.

Hygienic measures are man-derived measures to improve the sanitary environment of animals. The measures aim at altering the susceptibility of host animals to disease agents and/or on agent's ability to survive and transmit. Structural, zootechnical and production-organisational hygienic measures can be used. Classical measures include excrement removal, clean water and safe feed, ventilation light, pest control, general cleanliness and immuno- and chemoprophylactic measures. In regards to securing animal health, hygienic measures in total aim at maintaining or fostering the productivity of animals. In developed countries, this effect of hygienic measures also extends to the welfare of animals (BOLLWAHN, 1995).

The kind and use of hygienic measures does not follow a standard concept. Production orientation, the kind of production system and the availability of political and infrastructural requirements are key determinants and prerequisites to select suitable measures.

4 International development

Developing countries:
Following the "Green Revolution" the world's developing countries in particular are experiencing a "Revolution in Animal Production". Growing megacities and favorable economic conditions worldwide in combination with improved supplies of plant products will lead to a constantly increasing demand for food of animal origin. The greatest demand is expected in third-world and emerging countries, whereas in industrialized countries a plateau has been reached with the focus on marketing quality due to heightened consumer expectations.

Population growth, rising incomes, urbanisation, changing eating habits and opening up of markets are the driving forces for a continuously growing demand for food of animal origin. Since the early 1980s milk consumption has grown more than 3 percent per year in developing countries and is projected to grow even faster through 2020. Meat consumption has been growing about 5 percent per year and is expected to grow 2.7% per year through 2020 compared to a low 0.6% per year in rich countries (APHCA, 2002).
IFPRI projections to 2020 place the developing countries share of world meat production at 60 percent, and their share of milk at 52 percent, a veritable "Livestock Revolution".

Production methods will have to follow the demand trends. Dramatic shifts from traditional to specialised intensive/industrial production will occur. Intensification of production by genetics, breeding, rearing, nutrition and disease control will lead to changes in the disease spectrum. Multicausal diseases with low mortalities and less clear, visible morbidities will gain in importance.

Developed countries:
Consumers nowadays demand food not only to be economical, but also wholesome and safe in respect of animal welfare and the environment. In combination with the liberalization of global trade, a shift from so far quantity-oriented food production, guaranteeing the nutrient supply of populations, towards a quality-oriented food market, with competition of food commodities, production areas, production chains and brands (BOEHLJE AND HURT, 1996) occurs. Measures accomodating consumer expectations of food safety, animal welfare and the environment are the decisive forces not only for the processing industry, but also for primary production.

Globalisation:
Food safety issues have also become more prominent with the rise in trade of meat and milk. Today, trade of animals and animal products is happening in a global rules-based production and

trading environment with regulatory standards set by international organisations like the OIE, or political blocks like the EU.

Following the signature of the Final Act of the Uruguay Round of Multilateral Trade Negotiations of the General Agreement on Tariffs and Trade (GATT), the World Trade Organisation (WTO) was created in 1995. Among the agreements that were included in the treaty that established the WTO is the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement). The SPS Agreement sets out the basic rules for food safety, and animal and plant health standards (WTO, 1995)
The SPS Agreement specifically empowers the World Organisation for Animal Health (Office International des Epizooties, OIE) as the responsible international organisation responsible for the development and promotion of international animal health standards, guidelines, and recommendations affecting trade in live animals and animal products. The Codex Alimentarius Commission is given the responsibility for implementing the Joint FAO/World Health Organisation (WHO) Food Standards Program.
Key notions contained in the SPS Agreement are risk analysis, regionalization, harmonization, equivalence and transparency. SPS measures should be science based and animal health measures should follow international standards laid out in OIE's International Animal Health Code (OIE, 1999). Key elements of the International Animal Health Code are standardized sanitary measures, harmonisation of animal disease control measures and risk analysis (SAP, 2000).
The renewed importance conferred by the SPS Agreement to the OIE and to WHO/FAO has spurred the interest of countries around the globe. In May 2002, 162 countries were members of OIE.

Policy of the European Union in regards to animal health and food safety expands on the WTO/SPS standards. The EU is the world largest importer of agricultural products of which 1/2 originate from developing countries. The 'White Paper' of the EU (DAELMAN, 2000) of January 2000 outlines a comprehensive policy for food safety, following the 'farm to table' concept. Inherent in this concept is the use of hygienic measures at all stages of production to consumption and restrictions on the use of antimicrobials in food animals.

5 Spectrum of diseases

With intensification of production, the spectrum of diseases will change. 'Simple' mono-causal epidemic diseases (spread unlimited in space, but limited in time) will be replaced by complex, multi-factorial endemic diseases (spread unlimited in time, but limited in space). Pathogens of endemic diseases are weakly adapted to mostly more than one host species, they mainly cause diseases of single organ systems (respiratory, reproductive, enteric diseases, etc.); diseases often are not frank, but latent or subclinical. As most of the pathogens of the endemic group of diseases only cause weak, local and shortlasting immunity, the potential of vaccinations is limited. Control of pathogens is best achieved by efficient organisational measures, most importantly hygienic measures with use of few but targetted veterinary drugs. Endemic diseases are 'herd health problems', without control they maintain themselves in the herd as health problem or as cause of suboptimal production or reproduction.

Implementation and maintenance of a range of hygienic measures in smallholder systems, by e.g. extension, faces the problem of heterogeneity of small farms. Husbandry systems on the farms are often not stabile or constant. Even farms which look 'modern', often are doing e.g. feeding and watering of animals slightly or even completely different. Seasonal differences in farm practices as well as whether the herds are owner- or 'manager'-managed further have to be

considered. For reasons of economics and sustainability, it thus is difficult to introduce and maintain a set of hygienic measures for a larger group of farms. Vice versa, problems also arise when one attempts to assess the effects of hygienic malpractices for a larger group of farms or even an entire 'production system'.

6 Forecast and summary

Animal agriculture worldwide is torn between two opposite developments and demands: the need to increase food security in the developing world and issues of qualities of products and production proccess in the developed countries.

With the current process of intensification of production, demands for measures to ensure production efficiency and increasingly also product quality are growing. Food safety issues, after intensification/industrialisation of production, are likely to provide the second major impetus for development over time. Not all farmers will be able to follow these demands. The likely consequences are twofold: at least in intermediate terms, a split market will exist with premium disease control for a segment of intensive farms aiming at international markets and high-value meat and milk products and discount control for farms stagnant in adopting new technologies. Secondly, while livestock is one of the fastest growing parts of developing country agriculture, it paradoxically is becoming less of a viable development path for many of the rural poor. Demand-driven production systems in developing countries will likely adopt new technologies fairly rapidly, while resource poor farmers, typically lack low-cost, easy to use diagnostics, vaccines and control strategies for disease organisms and vectors and often are not competitive to follow this development path. There is reason to fear that the world's poorest (ca. 1.3 billion) people will not profit from the developments, particularly those in rural areas.

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