

IMPACT OF GLOBALISATION ON INFECTIOUS PATHOLOGY: NEW CHALLENGES

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1.0 INTRODUCTION

Currently, the situation of diseases caused by infection has changed notably: every year the number of ill animals increases, large centers of stationary undesirable conditions are constantly forming and changes are happening in the way infections show symptoms and are being carried, the importance of associative diseases raises, new taxa appear, adaptive features of pathogens are transforming, more often there are exposed new infectious diseases of humans and animals, etc.

Infectious diseases have always been basically a natural calamity for people and along with fear caused interest and aspiration to find out the causes of these phenomena.

As time progressed, diagnostic and precautionary products were invented and significant results in fighting these diseases were achieved. The experience gained and positive outcomes of pox eradication on global scale, successful poliomyelitis elimination in most regions of the world signified the possibility of curing dangerous diseases. The idea of solving the problem of elimination of disease excitors in nature and disease eradication came up.

However, in conditions of globalisation, according to the WHO data, already in 1996 infectious diseases were the leading cause of deaths of humans and animals.

There were noticed newly appeared or seldom registered infectious diseases of people and animals, and their wide spreading over many countries of the world. Some of the appeared diseases such as aids in people, RRSS in swine, hydrophobia for bats in Australia, Paramix virus diseases (Nepa swine virus, Hendra virus in horses) are new diseases, other such as tuberculosis and aesk disease which are more actively targeting developed countries, although it was thought that they remain controlled.

Moreover, the population increase led to the need of providing animal husbandry products since 1950's in world practice and intensive development of industrial animal husbandry. All this caused a raise of animal populations, the closeness of livestock in maintaining conditions, intensification cycle of production and as a result – the change of status of animal health and also that of features and spectrum of disease excitors.

Globalisation of stock-raising caused the appearing of new pathogenic properties of ESSE-pathogenic microorganisms which cause an infectious disease at high concentration of animals.

The most dramatic emerging infection of the beginning of the twentieth century was the influenza pandemic (1918 - 1919) that took lives of few millions of people. The possibility of such pandemic at the beginning of the twenty-first century is still disturbing as we do not fully understand what happened then or can it occur again.

Moreover, some diseases continue to spread at a high rate (brucellosis, tuberculosis), others (foot-and-mouth disease) reappear and cause severe damages. There are arising such diseases that were almost not registered in the recent past (parainfluenza-3, rinotracheidosis, rota- and corona virus infection of calf, poliocerosis, chlamidiosis, microplasmosis, etc.) Such diseases as infectious anaemia of horses have practically stopped to show even without applying specific precautions and diagnostics.

In conditions of globalisation it is necessary to understand peculiarities of spreading traditional infection diseases in new conditions, appearing and spreading new infection diseases of animals on the population level (population of exciter effect animal populations (and/or people) in conditions of suddenly changed due to human activities environment.

The display of epidemic process need to be analysed from the perspective “agent – host - environmental” in which every component brings in its content. In contemporary conditions of globalisation in episodic process the exciter plays the key role due to its permanent changeability, broad spreading, complicated control and forecasting. Therefore, viruses are constantly changing – point mutations (quazivid peculiarities – almost all RNA viruses), recombination, reassortation, adaptation, constant evolution.

Synergism of exciters in poly microbe diseases leads to the formation of complexes, whilst the role of separate species may vary up to insignificant. This way in the formation of PMWS – the syndrome of multi-system exhaustion after weaning the prior role belongs to sugar virus of the 2nd type (SVS 2). However as a mono infection it is disposed only in 2% of symptom displays and more than 80% - multi-infection.

The second factor that is promoting disease occurring and spreading is the immune body status. The health condition of a person and productive animals may be controlled by people but this factor is impossible to be tracked and evaluated in wild nature. More and more often situations are worsened by the appearing of the second immunodeficiency and immunosuppressive conditions, which enhance the spreading of diseases.

The third factor is environment: climate, type of managing ones household, stresses, animal migration, type of preservation (ventilation, sanitation), environmental conditions (temperature, humidity and so on), and feeding (protein, macro- and microelements, vitamins). Natural and climate conditions define the world division of not only natural-center infections but also other infection diseases. In particular, out of 8 milliard hectares of potential agricultural lands more than half are not used regarding zoonose spreading (malaria, trypanosomosis, onchocercosis, and so on).

Zoographical factors (global division of animals or global zoography) are obtaining defined geographical compliance, especially for productive animals. High zoographical closeness is noticed in china regarding swine and poultry (more then a half of world population), Australia – sheep, and Latin America – cattle.

Similar conditions allow pathogens to adapt in populations of vulnerable animals, evolutionate, cover natural habitats of domestic and wild animals and create emerging situations (in Asia, high closeness and the degree of contacts of water flawing birds, swine

and people provide conditions for regular emerging of highly episodic varieties of viruses of flu). The change of climatic and ecological terms (change of climate, global warming, changes in ecology, expansion of animal populations) constantly creates pre-conditions for the display of episodic processes.

A not less action is rendered by the terms of globalisation: trade, tourism, traveling, transport, biomedicine (vaccines), industrial agricultural systems, land-reclamation, deforesting, etc.

Conceptually, disease emerging is a result of dynamic co-operations between quickly evolving infectious agents, environmental changes and owner's condition, which provide such agents with friendly to them new ecological niches (Friend, 2006).

Infectious diseases of people, domestic and wild animals are interconnected with two general descriptions: firstly, they are in the process of permanent change, increasing in the amount of incidents, extending the circle of owners, natural habitat of spreading or changing virulence, patotype or other properties of the exciter. Secondly, these changes are almost always conditioned by anthropogenic impact on environment (destroying forests, urbanization), by a change in the structure of owners' population (closeness rises) or conduction (extensive use of medications, intensification of production, international trade) (Gilbert *et al*, 2000).

For explaining all possible forms of displaying episodic process, Last (1988) suggested to use an iceberg principle – universal principle in obedience to which «obvious is always only a small part of actual». In an episode-logistic context it means that infectious disease as clinically expressed extreme degree of infection is always only part of the last one, and along with a manifest infection appropriately coexist its hidden forms in different frequently prevailing correlations.

The iceberg system is fair practically for all emerging infections. So, chlamidiosis shows up clinically in 7-10 % (death 1-2 %) of cases and more than 90 % of cases it is a sub-clinical flow that is the most dangerous as constantly there is infecting of healthy animals, which for many animals transforms into lifelong carrying of chlamidiosis (to 20 % female cats).

In modern conditions, pathogens are able to adapt themselves to the owner in existing terms and preserve their biological properties (infection activity, invasion, ability for reproduction (antibiotics resistance), etc., that result in appearance of the hidden forms of the illness.

This fact is observed for piglings which are a susceptible (an extraordinary target in a way) object, that increases virulence of exciter and allows to form steady undesirable state on all swine livestock.

A visible example of overcoming species' barrier between dogs and lions is a plague of carnivorous, causing death of the bigger part of African lions in 1994 in Tanzania and emerging situation of death of seals from the dogs plague in the lake Baikal in 1989 (Osterhaus, 1991)

Application of antibiotics, which was originally considered as a rescue from a row of infectious diseases resulted in appearance of antibiotics resistant races of microbes which without causing signs of illness circulate on the livestock, resulting in screening of illness.

Thus, in the conditions of globalisation exposure of episodic process in a subclinical form can frequently take place that hampers not only diagnostics but also allows pathogens to persist on the susceptible livestock, and at certain terms to result in the appearance of disease.

Nowadays there are 1415 pathogens that cause people's diseases, 616 in domestic and agricultural animals and 374 at domestic carnivorous. Multi-household pathogens are especially wide-spread among people (61.6 %) and even more among pathogens of domestic animals (agricultural animals – 77.3%, carnivorous – 90%) (Cleaveland, 2001).

Thus, pathogens can circulate between different types of owners and present a potential threat to the health of people. It is supposed that the probability of contact between people, wild and domestic animals is growing which will result in the origin of diseases.

Development of infections, bound by circulation and persistency in the organism of a few excitors is more and more frequently pointed out.

There are registered cases of the simultaneous impacting organisms of pigs of VCPS and VRRSS or VCPS and excitors of salmonellosis, forming of syndromes and complexes (PMWS and the complex of respiratory illnesses of piglings - PRDC). There is a supposition that in etiology PRDC can participate up to 7 viral pathogens and up to 8 bacterial pathogens.

Moreover, basic diseases (classical plague of swine, CPS), foot-and-mouth disease, etc) which were a big deal in the past, were almost eradicated, however in many countries the sporadic flashes of such diseases can appear, if the their causing pathogens are brought in the populations of domestic animals from wild (CPS in the Netherlands).

Currently, there is wide distribution of complexes of respiratory diseases of pigs which by are characterised by the reproduction of a number of excitors (RRSS, svc 2, etc). All this signifies permanent changeability of pathogens, forming of new illnesses and complexes and their expansion between domestic and wild animals and humans [18, 19].

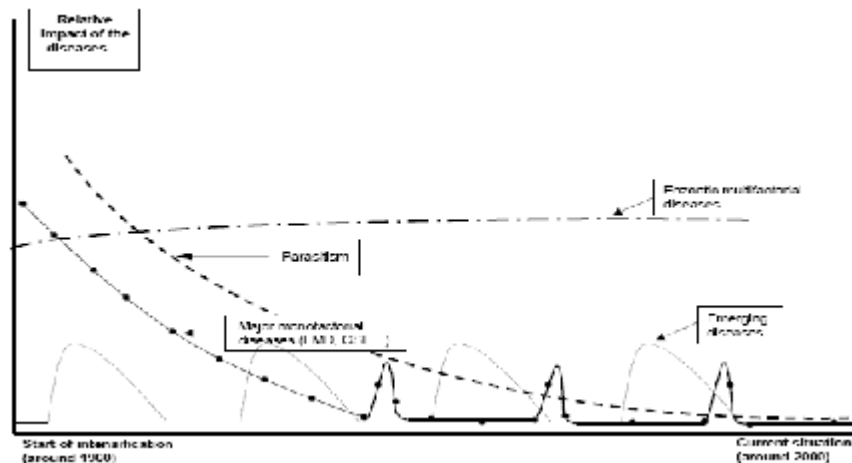


Figure 1: The exposure of emerging and reemerging infectious diseases of animals from 1960 to 2000 (Madec, 2003)

In figure 1 (Madec, 2003) is presented the chart of exposing infectious diseases over 40 years, which shows the permanent circulating of excitors of multifactor infections from the moment of globalization of stock-raising, decline of the role of monofactor diseases (except for the row of flashes) and flucturing structure of emerging infections.

To the problem of the modern ongoing of infectious diseases should be directed questions of immunosuppression and immunodeficits, the role of which in the diseases of polymicrobial etiology is yet to be estimated, including cases with the viral infections.

2.0 CONCLUSION

Globalisation caused the change of the type of distribution of animal species, creation of new conditions of environment and establishment of interspecific relations, allowing and contributing infringements changeability of excitors of traditional diseases and appearance of new illnesses.

The structure of diseases has changed, thus along with classic and factor there is marked forming of emerging/reemerging illnesses. Features of co-adaptation in the system (agent-host-environment) in modern terms often result in persistence of excitors and sub-clinical form of the display of illnesses.

Co-evolution of micro and macro organisms resulted in appearance at the population level of polymicrobial diseases/complexes of diseases which have substantial influence on animals and people.

The mentioned questions are only the apex of an iceberg of all those processes, which arise up between infectious pathogens and owners, in contemporary terms.

The all above-stated requires a careful study, understanding, estimation and use for the search of decision by screening, serial monitoring, prognoses, estimation of risks taking into account all constituents.