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METHODS TO INCREASE EFFICIENCY OF MANAGEMENT AND AUDIT INSTRUMENTS TO CONTROL ANIMAL DISEASES IN CRISIS SITUATIONS

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Abstract

*Animal health is **a** considerable importance for humans. Animal diseases have a significant impact on human health (ie if there are zoonosis.), or they are producing food decline production, on the economy (direct and indirect costs) and on the trade of a country/countries (changing the trade policy regime, such as in the case of three major outbreaks diseases – Bovine Spongiform Encephalopathy (1992,when spiked) and Classical Swine Fever (detected in 1997, first in Netherland**s**) in Europe, Food and Mouth Diseases (nine years of Taiwan negotiation) in Asia. Generally, they are affecting mostly the less developed countries where because of the poverty and the economic vulnerability have /not invested in infrastructure (small farms), technology and research. The world has been and will be always surrounded by all kind of new diseases that today are subject of debates at international level (OIE, WTO, European Commission, CODEX or other scientific groups, etc). With the entire policies, preventive and control measures taken up to now, we are still facing up to new challenges such as÷ contagious nodular dermatosis, avian influenza, small ruminant pests, African Swine Fever etc. Or, science does not have all the time the answers in a magic bag to the challenges raised by the animal health crisis. So, the aim of my paper is to collect information old and current about politics, crisis management of the Animal Health Diseases, major disease outbreaks data (USA, Europe - Romania, Australia, Africa etc) and by analogy and comparison to look for new links between different factors in order to enrich the knowledge about the practical tools for the management of infectious disease in livestock during crisis.*

Key words**:** *animal health, crisis management, economy, trade, zoonosis*

INTRODUCTION

This article is looking **to review the traditional and current practices** in order to control crisis in human and veterinary health, since old times (antiquity) up today.

The article also refers to **management of the crisis**. In short, the philosophy of the management has developed somewhere in the **1800s**, but literature quote that the earliest strategists of management were Sun Tzu (545 BC-496 **BC)**, Machiavelli (1469-1527) and many others until 1800, etc. In this sense, we will also deepen the knowledge concerning the current systems of management for animal health developed in the world (Europe – European Commission, OIE and WTO-International organisations etc) [11,20].

We would like to stress that in order to control critical situations as effectively as possible; managers have to have instruments / methods in place **to allow them** to take correct decision at the right moment. Literature shows that today there are many concepts and methods developed. The ones that belong to **the XXI century** are very sophisticated (modelling simulating a crisis management system, risk assessment etc) and are staying at the origin of politics and management decisions.

However, recent experiences show that **theoretical models are not equal to reality** (see **BSE -1980, tuberculosis a world emergency in 1993, AI H1N1 pandemic** episode - **2009**, **ASF** crisis in EU, **2014-2019** etc) [9.12.20]. Therefore, we have to agree that the existent theoretical models cannot cover all diseases and moreover new diseases in general overcome **the theoretical models** developed by humankind.

So, summing up the paper list in

chronological order **the milestones of the management of animal health crisis over centuries** and highlights where is possible their strength or their weaknesses. We are also looking to identify a more realistic management approach for decisions making system, in order to reduce the negative impact of diseases on the economy, society, environment and politic system of the world.

MATERIALS AND METHODS

In order to assess the control systems for animal health we proceeded to collect and review a great deal of bibliographic data, legislative, reports, scientific materials available, from all the times and all organisations involved in the animal health control over time and today (OIE, WTO, FAO, European Commission, EFSA etc) Competent Authorities websites from Europe, USA, Australia, Africa etc, high level intergovernmental forum, non-governmental organisations, scientific and others international bodies.

We pull out the iconic moments over time concerning management and the control and the eradication of epidemics /epizootics /pandemics that affected the population of humans and animals from antiquity to present day.

We conducted a comprehensive comparative bibliographic study on different periods and stages, and we give emphasis to to the EU Institutions (primarily European Commission, EFSA) including the new EU animal health legislation.

In view of the very close link between both animal health and public health, we considered that it is appropriate to present a situation relating to both branches of human medicine and veterinary medicine. We also considered that it is necessary to compare the evolution of the others sciences because they supplied the means for fighting and eradicating epidemics / epizooties /pandemics at international level.

In the end, the article encompasses information from a variety of crisis control approaches from the past to near present, international or indigenous knowledge.

RESULTS AND DISCUSSIONS

All the literature reviewed shows that the origins of human and veterinary medicine have **very deep roots in the history of mankind** – it started with the domestication of the first animal and with the first attempt to treat animals, it started with the first description of disease symptoms (such as the papyruses from Greece). As literature describes, the first animals to be domesticated for food are thought to be sheep (11,000 and 9,000 B.C. in Asia). Then goats followed, around 8,000 BC. Archaeological evidence revealed that trepanation was performed over a cow skull during **the** Neolithic period (3,400-3,000 BCE) and the first veterinary record belongs to the twelfth Dynasty of Egypt, namely the Egyptian Papyrus of Kahun [11,20].

Reviewing the literature is evident**ly** clear that **many of the discoveries in both disciplines human and veterinary medicine,** during **the** time, were and are **due** to the development of **other disciplines** such as **genetics, archaeology, history, art, literature, technology information**.

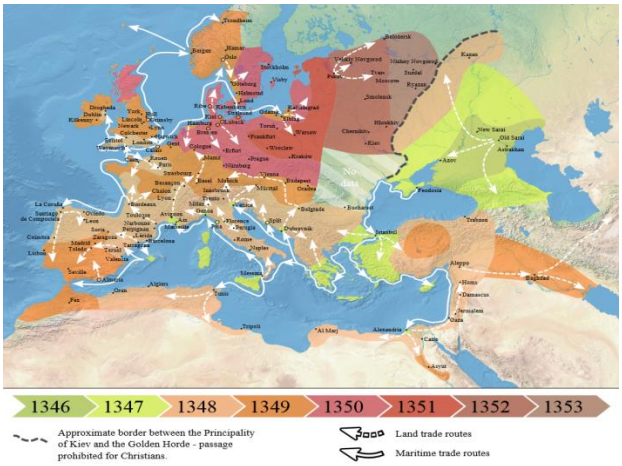
Literature shows that in the beginning critical events (such as pests, cholera, smallpox etc) on human and animal health, **practical aspects especially necessity (producing food)** have been the **trigger factors** for the first individual treatment trials, which later turned into studies, researches of several personalities or multidisciplinary teams, resulting into effective methods of combating and eradicating some major diseases with epidemic/epizootic and pandemic evolution. Th**en** m**any other challenges along centuries** (zoonosis, **foodborne** outbreaks, **the** appearance of pandemic episodes) **led** to the development of new concepts and new disciplines of investigations-epidemiology, genetics, risk assessment, molecular biology, digital device input as a support for research, management disease etc. The emergence and evolution of communicable diseases from animals to

humans and vice versa have **motivated** all mankind involved - farmers, practitioners, and joint scientific researchers to work together and to discover new treatments, new means of prevention and eradication, even the consumers. Then t**he rapid changes and the increased complexity of today world** put new demands on **mankind who** embraced new and different strategies. They realize that **a** single uniform approach cannot be applied in order to obtain significant improvements **in** the management of diseases - so they moved on to new concepts such as "/emergency planning for controlling infectious animal diseases"[1,3,4,6,7,8, 13,20] - widely recognised around 1990, such as *"Prevention is better than cure"(the 2007-2013 EU Strategy), or "One Health" (2008 - a multidisciplinary collaborative approach to solving global and environmental health challenges CDC, USA), or The OIE Sixth Strategic Plan (2016–2020) [11,20]*.

The earliest theories and concepts, in **antiquity**[11.12.20,21,23] about the disease / the fight against epidemics / epizootics/pandemics were launched by **pioneers** who experienced unknown diseases, until they attempted to treat individuals of a particular disease (4,000 BC - 476 AC). Summing up, the state of knowledge at that time was resumed to **observation -** the **first tool of research,** to **description** of the diseases or symptoms of episodes of illness (papyrus - first time Greeks) and **generation of hypotheses** about phenomena such as *transmission of diseases, possible precautions / prevention and control*. In this context, there are countless papers and articles about the ***black time in the history of mankind***. [11,20]

Almost all writings generally converge in the same direction that the **epidemiological thinking seems to begin with Hippocrates** (460-360, that is). Through his work "About Air, Water and Places" (460 years BC), he is considered that he shifted from **mysticism to the concept of preventive medicine** based on scientific demonstrations. **Hippocrates is considered the parent of human and veterinary medicine** and is the **first epidemiologist** of the antiquity, of the world [11,12,20].

Middle Ages (200 / 600-1500 / 1700) [9.12.20,23] brought new episodes of illnesses, some with endemic evolution, others occurring in the form of epidemics. Plague **is** considered to be the most devastating disease in the history of mankind.



Source: Maps by O.J. Benedictow[11,20]

Table 1. The impact of different pandemic episodes in the world (541-1665)

TIMELINE	IMPACT
Justinian's plague 541-542	25–50 million people in two centuries of recurrence, equivalent to 13–26% of the world's population at the time of the first outbreak
Bubonic plague Europe 1347	a third and a half of the European population died in a few years
Plague London 1665	100,000 dead people / 18 months,
Plague Milan 1629/31	60,000 dead people from about 130,000
Variola in Japan (735-737)	decimated 25-35% of the population
Leprosy (especially in the Scandinavian countries)	were two serious transmissible diseases in humans
syphilis (France-sixteenth)	
unidentified epidemics, China1641	80-90% mortality population
epidemics in America brought by Europeans (1500-1550)	population in Peru and Mexico decreases from 60 to 10 million

Source: [9.12.20]

Following these atrocious experiences, the curiosity of the mankind combined with human intelligence seems to lead to **the** crystallization of **new scientific concepts / theories / discoveries** and the removal of others. Thus, there is evidence that **the first vaccination** attempt dates back to 1000 CE **in**

China, such as inoculating smallpox material by scratching the skin. The **concept of quarantine** is shaped somewhere in the fourteenth century. The term "quarantine" originates from the Italian words "quaranta giorni", which means 40 days. The vessels coming from infected areas were obliged to stand for 40 days in the open before embarking in the port. In order to assess the severity of epidemics - **the first systematic / statistical record of biological events is written** by John Graunt (1620-1674). Records were existing before John Graunt, since 1592, but they could not be used because they were discontinued and therefore were not sufficient to conclude. John Graunt, (April 24, 1620 - April 18, 1674, London), was an English statistician and is considered **the founder of demographic science**.

Mathematics is applied for the first time in biology in the twelfth century by Fibonacci. It uses the so-called **"Fibonacci series"** to describe the rabbit population.

Around **1590,** mankind discovers a new world of living things in the water, in and around them, thanks to the **invention of the microscop**e. The Italian physician Francesco Redi provides **scholarly evidence** (**1668**) against the spontaneous generation theory (an outdated Aristotelian concept) claiming that some living organisms are born of dead matter. The year **1670** brings a **pioneer in microbiology**- Anton van Leeuwenhoek who observed directly the microorganisms. This novelty arises after the discovery of Athanasius Kircher, who was seeking treatment when Rome was struck by bubonic plague in 1656. Based on new experiences and observation, starting with **1546, the theory of transmissibility** gains new valences. The Italian researcher and practitioner, Girolamo Fracastoro, in his book De Contagione et Contagiosis Morbis, points out that the diseases are caused by transmissible organisms, which he calls all seeds (seminaria morbi) that transmit infections by direct or indirect contact or even without contact over long distances. Based on Leeuwenhoek's work, physician Nicolas Andry claims in **1700 t**hat the microorganisms he calls "worms" are responsible for triggering diseases. In **1762,** Austrian physician Marcus Antonius von Plencze (1705-1786) published a book entitled "Medical-Physics Opera". He develops the **theory of contagiousness** which states that certain animals present in soil and air are responsible for causing specific diseases. Furthermore, **Von Plencis** distinguishes diseases that are both epidemic and contagious (such as measles and dysentery) from diseases that are contagious but not epidemic (such as rabies and leprosy). Finally, von Plenczi's theory was not accepted at the time by the scientific community.

Modern Age (1700-1900): plague, smallpox, and tuberculosis **continue in modern age.** Moreover, **new diseases** are emerging: typhus, yellow fever, influenza, measles, dengue fever, typhus [11,12,20,21,23].

Humanity continues to become **more aware of the microorganisms.** New innovations are developing. Mankind begins to establish **rules, even legislation to control them**. In 1796, Edward Jenner uses the smallpox infectious material and creates the **smallpox vaccine**. **The technique spreads rapidly around the world**. His method experienced technological changes over the next 200 years **and ultimately led to the eradication of smallpox (1980)**. In Europe, the **tuberculosis disease** rate began to rise at the beginning of 1600. In 1815, in England, one in four people died of "TB". Hermann Brehmer opens **the first TB sanatorium in 1859** in Sokołowsko, Poland. Bacillus, Mycobacterium tuberculosis, was discovered on March 24, **1882** by Robert Koch. For this discovery, Koch received the Nobel Prize for Physiology and Medicine in 1905. However, Koch did not think there was a link between tuberculosis in cattle and tuberculosis in humans. For this reason, infected milk was not considered at that time a source of infection. Subsequently, the risk of transmission from this source was significantly reduced due to the introduction of the **pasteurization process** (April 20, **1862**). In 1890, Koch claimed that a certain glycerin extract from tuberculosis bacillus constitutes the "cure" against tuberculosis. He

called this extract **"tuberculin".** Although "tuberculin" proved to be ineffective, it was adapted as a **screening test** to identify the presence of the disease in the pre-symptomatic phase. [9,12.20] Albert Calmette and Camille Guérin recorded their first success in **tuberculosis immunization in 1906**. They used a mitigated strain of bovine tuberculosis bovine to create a vaccine they called **the BCG vaccine** (Calmette and Guérin's bacillus). The BCG vaccine was first used in humans in France in 1921. On the other hand, the BCG vaccine was widely used in the United States, Great Britain, and in Germany only after the second world war. Tuberculosis has created deep concern in the nineteenth and early twentieth centuries, **is** considered an endemic disease of the poor urban population. After scientists established around the year **1880**, that the disease was contagious, tuberculosis was included in a list of **disease-obligatory notifiable** diseases in the UK. **Campaigns** have begun to persuade people not to spit in public places, and poor infected people are "encouraged" to go to sanatoriums that resemble prison rooms. (**Sanitary facilities for middle** and upper classes provided excellent health care services.) . Sanitaria were supposed to offer the advantages of a clean air environment. But even under the best conditions, 50% of those interned died in the next five years (about1916). In 1918, in France, one in six people died of tuberculosis. Until 1950, the number deaths decreased by almost 90%. **Changes in the public health system significantly reduced the incidence of tuberculosis** even before streptomycin and other antibiotics began to be used. Even under these conditions, the disease remained a serious threat to public health. At its establishment in 1913, **the UK Medical Research Council focused on tuberculosis research**. In 1946, the development of the antibiotic called streptomycin in fact transformed effective treatment and healing of TB patients. Prior to the introduction of this medicine, the only treatment (except sanatoriums) was surgical intervention. Although specialists have been hoping to completely eliminate tuberculosis (see pox), **the emergence of drug-resistant strains around 1980** has made eradication of tuberculosis less likely. The subsequent recurrence of the disease has prompted the World Health Organization (WHO) **to declare tuberculosis a world emergency in 1993** [9,12.20].

In **1878** the pressure exerted by typhus, cholera, and yellow fever brought by immigrants on the vessels determined the **United States to adopt the first federal law on quarantine** [11,12.20].

In 1900 Walter Reed discovers the **first insect-transmitted yellow fever virus**. The disease originated in the African region spread to South America through the trade of slaves (17th century). Since the 17th century, several epidemics of this disease have occurred in America, Africa and Europe. In the 18th and 19th centuries, yellow fever was regarded as one of the most dangerous infectious diseases. A new image of the plague appeared in the 18th century for Western Europe and the nineteenth century for Eastern Europe.

Plague begins to strike again and at regular intervals, almost every decade: France 24 appearances between 1437 - 1536 and 12 in the period 1536-1670, the whole Europe in 1576, 1585, 1628, 163, 1720. The largest impact of this disease was paid by Florence, where 50% of the 110,000 inhabitants died (1338), Hamburg, where 66% of the population was decimated in 1343-1357, and Paris where 40,000 people died in 1450, and in Naples (1656) half of the 450,000 inhabitants died. The last outbreak in Marseilles made 50,000 victims out of its 100,000 inhabitants. Neither England was exempted from this killing disease. In 1665 there was a terrible epidemic that seizes a sixth of the United Kingdom's population, out of which only 68,000 were in London. The city was "saved" by a devastating fire bursting in 1666, leading to the killing of rats. The writings of that time describe a sinister painting of mankind touched by the plague. People took unnecessary measures such as spraying vinegar letters and money, sparkling fire-fighters at the intersection of roads, the

disinfection of houses with perfumes and briquettes, city dwellers wandered in the streets with bird-headed masks, their beak filled with aromatic plants and spices to alleviate stench. And this, because a medieval prejudice considered the plague to be widespread by birds. Other measures were taken wrong so that in London all dogs and cats were killed, rat colonies proliferating, which led to the intensification of the plague. The prescriptions prescribed by the doctors were primitive and therefore the patients suffered uselessly. Daniel Defoe reports in "The Plague Journal" as doctors thought they were defeating the disease if they cauterized purulent swellings (tumors) and recalcitrant tumors. He mentions that some bubbles were so strong they could not be opened with an instrument, so they were cauterized, many patients dying of pain. The contemporaries capture the hallucinatory spectacle offered by the plague. Marseilles is the scene of a total disaster in the 1720s. "The damaging mudslides flow from the houses where the corpses rot and rise from the streets full of mattresses, bedding, laundry, rags, and all kinds of lean waste. The graves filled with corpses reveal hideous bodies, some swollen and black like beads, blue, eggplants and yellow, all cracked and cracked, rotten blood, "writes Jean Delumeau in" Fear in the West: 14th Century, a Fortress besieged ".

Fig. 2. Plague Costume, 1720. Contemporary engraving showing the costume worn by physicians during the plague at Marseilles, France, in 1720
Source: Photography by Granger) [11,12,20]

Epidemics had a devastating psychological impact on survivors. The inhabitants rushed out the crowded towns. In London, 200,000 people **left** the city and wander through the forests, without having anywhere to sleep, without food and water, only with their clothes. Those who remained barricaded themselves in the houses knocked the windows and nails and try to resist alone. If one of the family members was ill, then it was quickly isolated, and when was dying, the corpse was pulled out of the window with ropes, from where it was taken up with some hooks, put in trolleys and taken to the common pits. As soon as the plague died down, people were returning to life.

In 1738, 23 districts in Transylvania were contaminated and 41,000 people died. In the same year, during the third reign of Constantin Mavrocordat, the pestilence ravaged 30,000 people in Bucharest".

During the **eighteenth century,** Daniel Bernoulli studied the **smallpox** on the human population in order to describe the evolution and the laws that govern the disease. **This created the first statistical model of the disease** (epidemiology / probability theory). They were heated debates at that time about variation. His approach was to calculate the increase in life expectancy if the pox could be eliminated as a cause of death. More recently, its approach has been generalized (**Dietz & Heesterbeek, 2002**). Another valuable contribution to the understanding of infectious diseases was the study of **the temporal and spatial model of cholera** cases in London by John Snow (1855). He was able to identify that the water pump was the true source of infection (Johnson, 2006; Snow, 1855). In 1873, William Budd manages to identify similarly how the typhoid fever spreads (Budd, 1873). Into the1840, William Farr uses probability calculations to study epidemics in order to discover the laws governing the amplification and extinction of epidemics (Farr, 1840, pp.**).** In 1664, Sollysel (France) states that morva is a very contagious disease, although its etiology is established only in 1882, when the bacillus (Burkholderia mallei) is isolated from a horse that died. At the beginning of the nineteenth century, the transmission of disease from dead horses to

humans was demonstrated in Europe, where the disease persisted for many centuries, especially among the horses of the army.

Analyzing the contemporary age (1900 up to now), it turns out that mankind fight with the microorganisms continues. It seems that microorganisms are evolving and that they often go beyond mankind's ability to prepare [14].Despite lessons learned and new discoveries, the world is still not ready to deal with microorganisms.[9,23]

Contemporary age, like the other stages described, is characterized by the emergence and evolution of other devastating pandemics such as exanthema (1907, the United States), influenza (1918-1919, United States) cholera (1910-1911, Napoli).

Population displacements and agglomerations caused by wars constituted factors favouring different outbreaks (**typhus** at the end of the First World War - over 3,000,000 dead in Eastern Europe, i**nfluenza** / all over the globe, resulting annually in between 3 and 5 million severe illnesses and 250,000 and 500,000 deaths). **The first influenza pandemic of the 20th century is the Spanish flu of 1918**. It was a type of flu that emerged during World War I, and it seems, that is similar to avian flu disease today. It has reached many countries with the return of soldiers on the front, mainly affecting young people and having a high mortality rate that decimated between 50 and 100 million people worldwide between 1918 and 1919. It is believed to have been one of the most lethal pandemics, after "Black Death," in the history of humanity.

After 1945 others several serious diseases such as poliomyelitis (1945-55, USA), cholera (1961-present), AIDS (1980-USA), influenza (Asian flu in 1957 with 2 million the 1968 Hong Kong flu with one million deaths), transmissible spongiform encephalopathies (EST 1985 - today), malaria and tuberculosis, affected mankind.

David Griffin and Justin Denholm write an article on **July 9, 2017**, where they mention that four of the diseases of the contemporary world with which mankind had to deal, and for which preventive treatment and treatment have been identified, are still a problem today. These are **tuberculosis, smallpox** (recently eradicated), **AIDS** and **influenza**. Their article illustrates how internationally management allowed effective control of disease outbreaks / pandemics (eg eradication of smallpox, decreasing rates of occurrence of diseases). The authors note that **we need to learn from past pandemic lessons [10], to** appreciate the value of international collaboration, the perseverance, and commitment to humanity. Emphasizes that each of all these enumerated diseases **is** produced by very different etiological agents and as such our responses to them are very different. In part, this is also due to the social context in which these diseases occur and evolve, with a critical role. The authors mention in their article that tuberculosis (or TB) was responsible for the death of more people than any other infectious disease in history; **over one billion deaths over the last 200 years, that its origin is still unclear, and that it infects other species, such as bovines (swine, birds). Today, about a third of the world's population is considered to be infected with TB in its latent form. This means that the bacterium is present, but is controlled by the immune system, the infected person has no symptoms and can not be spread to others.** At the same time, the authors point out that while much progress has been made, ***continued and increased political and financial support is essential [10] to ensure coordinated diagnosis and management strategies, supervision and care and universal access to them.*** Similarly, financial investment is needed to develop new tools and tools **for the detection and treatment of tuberculosis**. With regard to TB, it has been one of the catastrophes of mankind, killing and destroying a huge number of people throughout the centuries; only in the 20th century died between 300 and 500 million people. In 1967 some 15 million people fell ill. In the same year, the World Health Organization has carried out an intense campaign to vaccinate and inform the public about this disease.

In 1977, the smallpox was completely eradicated and no case has ever been reported

since then. They also note in this article that in 1980, **smallpox is the first human infectious disease that has been declared eradicated by the World Health Organization**. This was due to an international activity coordinated by Australian microbiologist Frank Fenner. Mass vaccination, together with public health surveillance and preventive measures, aimed at educating communities and identifying and treating individual cases.

About **AIDS** we noted that in the early 1980s, a small number of homosexual men in the United States began to experience unusual infections, previously seen only in people with severe immune deficiencies. In the coming years, the human immunodeficiency virus (HIV) has been discovered and its global burden has been recognized. We **emphasize** that HIV / AIDS has **mobilized Western communities** to behave like never before (public health interventions and legislative changes). All the changes led to lower rates of new HIV cases, while global investment in research and public health led to the development of antiretroviral drugs that stopped replication of the virus, helped control HIV infection, and significantly reduced the risk of AIDS progression. On the other hand in 1999 researchers discovered that the HIV strain identified in monkeys is almost similar with the one in humans and from there and many other researches they developed different theories concerning the source of HIV, when and where the HIV starts in humans etc

Regarding **influenza**, the authors point out that the virus is generally responsible for respiratory disease of varying severity and generally does not require treatment. However, influenza has been responsible for more deaths in the last century than HIV / AIDS and Spanish influenza, Asian influenza, flu Hong Kong. The Spanish influenza pandemic of 1918 has led to the deaths of over 40 million people; more than double the number of deaths in World War I over the last four years. It has progressively spread throughout the world, through the modernization of transport and trade systems and the mass movement of military troops. And in more recent times, outbreaks of avian influenza and swine flu have occurred. There is a permanent threat of a repeated influenza pandemic due to the industrial-scale cultivation of birds and pigs that are susceptible to being infected and of people's proximity to these animals. **The World Health Organization has declared the outbreak of influenza A (H1N1) in June 2009 to be a pandemic**. Influenza can also affect other animals, such as pigs, horses and birds.

The scientific clarifications of many of the epidemics /epizootic/ pandemics are based on the lessons learned / previous e]periences, yet many of them are belonging to the contemporary era [10, 22]. **At the beginning**, epidemiologists used the written sources (antiquity, middle age, modern age) to compare, identify and track the ways and rates of transmission of the disease, the vulnerability and resistance of species to various pathogens. **In the contemporary age,** other sciences come to contribute to humanity's fight against major diffuse diseases: Biomathematics / Statistics and Probability Theory (such as the introduction of risk estimation -1620, the development of the first static model of a disease - 1700, the study of the temporal and spatial model of cases - 1855) is an instrument that helped / assist in discovering the underlying laws that describe the evolution of diseases / epidemics / pandemics, risk analysis that permit to characterize the nature and the likelihood of a disease to appear in a population, Molecular biology (founded in 1930), genetics (mainly 1900s), paleo pioneers (middle of XIXth century) - and archeopathology that have found new ways to highlight pathogens in human remains in the distant past. It is also worth mentioning that **the 21st Century** is the century of the informational era / digital era, and it is associated with massive changes in new technologies, new devices in the field of medical, social research etc.

An essential element of the contemporary age **is the organisation of the mankind at international level** seeking cooperation and integration **at all levels -** scientific, economic,

political and social, in order **to fight against the epidemics/epizooties/pandemics episode**.

In this context on 25 January 1924, the International Organization of Epizootics (OIE), now the World Organization for Animal Health (WAHO), is established. The purpose of the OIE is to control infectious animal diseases [16,17,18].

The OIE objectives / priorities are [15, 16, 17, 18]:

- ensuring transparency regarding the overall health situation of animals;
- collecting the analysis and dissemination of veterinary scientific information;
- encouraging international solidarity in disease control;
- protecting global trade by publishing health standards for international trade in animals and products of animal origin;
- improving the legal framework and the resources of national services;
- provide a better guarantee for animal food and promote animal welfare through a scientific veterinary approach;

On **16 October 1945**, the Standing Food and Agriculture Organization (**FAO**) was established. The Animal Health Service of the FAO addresses four animal health issues: cross-border diseases, vector diseases, veterinary public health (including food safety) and veterinary services. The latter must join forces and encourage more active participation of the private sector by defining complementary roles for each with specific responsibilities in order to improve and / or maintain the overall health status of a country.

On **April 7, 1948**, the World Health Organization (WHO) was established. Its goal is to reach the highest possible level of health by all people.

On **1 January 1995,** the World Trade Organization (WTO) was established.

The European Commission has formal observer status within OIE since 2004.

Co-operation and coordination between international organizations is a basic tool in the fight against epidemics / epizootics / **pandemics**. There are countless sectors where the OIE collaborates with the other international organizations (WHO, FAO, Codex Alimentarius, WTO, and, more recently, INTERPOL)

Since 2010, the OIE has engaged in a **Tripartite Alliance** with the WHO and the FAO, establishing responsibilities for these three organizations in combating diseases that have major health and economic consequences, particularly on zoonoses. Within the framework of the **Tripartite Alliance**, FAO, OIE and WHO recognise their respective responsibilities in fighting diseases, including zoonoses, that can have a serious health and economic impact. [2]. They have been working together for numerous years to prevent, detect, control and eliminate disease risks to humans originating directly or indirectly from animals. In 2010, the FAO/OIE/WHO Tripartite Concept Note (April 2010) officially recognised this close collaboration, with joint strategies at the human-animal-environment interface, to support their Member Countries. **Three priority areas of work were defined: zoonotic influenzas, rabies and the fight against antimicrobial resistance.** (*Article in Journal of Veterinary Epidemiology 19(2):96-99 · January 2015 with 10 DOI: 10.2743/jve.19.96*) [12].

Antimicrobial resistance is one of the three priority aspects of this **Tripartite Alliance**. Its activities involve the coordination of global strategies to combat short-, medium- and long-term antimicrobial resistance and support for their implementation at the national and regional level With antimicrobial resistance (AMR) on the rise in the EU, it is vital to ensure that lessons [8] learnt from successful strategies are made accessible to all Member States. To deal with the cross-border health threat of AMR, it is crucial to identify and share best practices and policies, so that a lack of action in one region or sector does not undermine progress made in others. To assist with and accelerate this collaboration, in early 2017 the Commission set up an AMR One Health network of government experts from the human health, animal health, and environmental sectors, as well as the **EU scientific agencies working in the human**

and animal health sectors (ECDC [5], EMA, and EFSA). Within the AMR One Health network, its members work towards facilitating mutual learning, sharing innovative ideas, building consensus, comparing progress made in key areas and, where necessary, accelerating national efforts to tackle AMR. The OIE recently made a strong contribution to the WHO's Global Action Plan on Antimicrobial Resistance, adopted in 2015, which seeks to ensure, for as long as possible, the treatment of infectious diseases with effective, quality antimicrobial agents. By proposing key actions to be implemented in the next five to ten years, the Plan emphasises the importance of the OIE's intergovernmental standards and supports the implementation by the OIE of a global database on the use of antimicrobial agents in animals.

In 2011, the European Commission and the OIE concluded a Memorandum of Understanding on their general relations (2011 / C 241/1).

By going through these historical stages, it can be said that pandemics that evolved for thousands of years become clearer in the last 20-30 years than in the past centuries. For 2500 years, historians and representatives of famous schools have tried to identify the disease that produced **a** plague in Athens by comparing the symptoms described by Thucydides with that of contemporary diseases. Therefore there have been numerous theories concerning plague and Ebola, typhoid fever, smallpox, measles, cholera, influenza, ergot poisoning, and a host of other diseases transmitted by animals. The scientific community at that time did not accept any of them. In addition, the description given by Thucydides was questioned because some of the features of the disease were questioned. But only in the last 60 years studies and research conducted epidemiological approach and mathematical models, risk analysis [7,14] and other modern approaches have demonstrated that diseases can be monitored through a common strategy and management and precautionary methods. Studies conducted by Manolis J. Papagrigorakis et. Al. (1995), on the "examination of ancient dental pulp DNA" allowed analysis much more accurate of what happened in 430 BC.

The epidemiological approach and the mathematical models compared Athens's plague with other ancient epidemics described earlier in the article, **still the** epidemic from Athens in 430 BC, **remain a mystery**.

Epidemiology as a stand-alone discipline emerged only after the Second World War [2].

Current epidemiology, in its many forms, is the science on which the rules of prophylaxis, control, and eradication of infectious diseases have been built. However, science does not always have answers to all questions and often seems to be overcome by not knowing etiological agents or the evolution of these agents. For example, the herpes virus that infects humans evolves over time, adapting so that they continue to retain the ability to infect human cells (the question arises as to who first appeared the virus or cell?). Resistance to antimicrobial agents that due to excessive use and abusive use of antibiotics is another priority for the consideration of human kind.

From the bibliographic study on the history of some epidemic diseases in Romania, there is little evidence of plague in the XIII th century in our country. They begin to abound only from the 16th century. From that moment on, it's about every decade. In 1576, 7,000 people died in Brasov, in 1585, the famine associated with plague broke out in Moldova, and a new devastating epidemic emerged in three years. In 1684, the first measures to prevent and combat (the closure of the borders, the inhabitants are urged to leave the towns, the aliens are carefully guarded) ("The Plague in the Epidemiology of the Romanian Past" written by Pompey Gh. Samarian) Grigore Ghica orders to build a hospital for the plagues at Pantelimon, and set up the guild of the dudes (who oversaw and buried the plague). Romanians use "healing" remedies for healing: cataplasms made of flour with honey applied on swellings, vinegar **and** charcoal. In purulent cases they used painful methods: "When pustules appeared, they were cut with scissors and after the dirt

disappeared, superficial sacrifices were practiced, and then they were dancing small ulcers with ointment, until the perfect change for good, after which the healer was used "(Pompey Gh. Samarian). The worst epidemic of plague occurs in 1812-1813 in Muntenia (about 40,000 deads), the most affected being Bucharest. By 1830, the last cases of plague were recorded in the Romanian lands, and to 1850 the molars disappeared from the Balkans. Between the two world wars, there was a morbidity and mortality raised by exanthematic typhus. Thus, in the winter of 1917 and the spring of 1918, there were over 750,000 sickness cases in Moldova followed by 125,000 deaths. At the end of the Second World War, only in Moldova, they mentioned over 80,000 cases, with about 3,500 deaths.
The literature cites that Romania has been and is surrounded by diseases that are subject of today's international debates. Even applying preventive measures, we still deal with some of these: contagious nodular dermatosis, avian influenza, African swine fever etc . The recent experiences showed that the diseases are very expensive, costs attributed to control the diseases, costs derived from the trade losses costs, increased labour costs etc and therefore they have a major economic and social impact."

Fig. 3. Pig death due to African swine fever in Romania
Source: 2018, TV1 Satu Mare.

The EU animal health law [6] aims to prevent and to control animal diseases that are transmissible from animals to humans and from humans to animals. It provides rules for preventive measures, for active and passive surveillance, for early detection of diseases human-to-human or animal-to-human diseases and seeks to strengthen the level of vigilance and training of competent authorities against the risks posed by diseases. Furthermore make available rules for prioritization and classification of diseases, establishment of responsibilities, notification and reporting of the diseases systems, surveillance and eradication programs and disease-free status, raising awareness of disease, disease preparation and control, emergency measures to be taken in the event of an emergency caused by a disease.
The EU legislation particularly aims to reduce the negative effects on animal health, public health, and the environment and take into account the link between animal health and public health, the environment, including biodiversity, and precious genetic resources as well as the effect of climate change, antimicrobial resistance, food safety, and so on.

CONCLUSIONS

Given the fact that the assessment is in the first stage (collection data, reviewing it) the methods that we are looking for are not defined yet. No interpretation is ready yet at this stage of the article.
But during this reviewing exercise, we learned that:
-humankind learned and can still learn much from the past,
-different other sciences are helping us today to read the past (archaeology, genetic) to predict [2] the future (modelling) [3,5,14,19], to communicate, calculate faster, mapping the risks and distribution of epidemics (information technology) etc
-humankind defeated some fights along centuries with microbes but continue to fights against others,
-microbes looks that they are adapting in hostile environments
-evolution brings new gaps in knowledge,
-little scientific evidence is available in order to support mechanism involved in emerging diseases,
-continued and increased political and financial support is essential to ensure

coordinated diagnosis and management strategies, supervision and care and universal access to new knowledge

-an essential characteristic of the contemporary age is the organization and management of humanity at **the** international level / 1924 represent the moment when mankind has started to organi**z**e themselves at international level against microorganisms (OIE)

-humankind managed to eradicate Smallpox in 1980

-in case of HIV- Western communities mobilized to behave like never before (public health interventions and legislative changes).

But, in other cases, the microorganisms evolving therefore they overcome mankind's emergency preparedness (ie antimicrobial resistance).

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