STANDARDS AND INDICATORS USED TO INCREASE EFFECTIVENESS AND EFFICIENCY IN MANAGEMENT OF CRISIS (COVID-19) AND ITS IMPACT ON AGRICULTURAL FARM/INDUSTRY MANAGEMENT AND MARKETING

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Abstract

Animal health and diseases have a major impact on human health and behaviour (i.e. zoonosis, schools, communication etc), food production (African Swine Fever), economy (direct and indirect costs) and trade (export, import, intercommunity trade). Even almost all countries have implemented all kind of management measures, humanity still face up today huge problems, for example the most recent experience, being COVID-19, which ceased almost all human activities in the world and changed people behaviour for several years (2019 up today). For this reason, the paper represents a systemic review of recent information on different management indicators developed - epidemiological/economic etc in order to assist managers (politically, authorities, farmers, all the people involved) to prevent, survey and control such diseases, to develop best practices for benchmarking their country health systems/farm management system etc, and finally to led to an effective and efficient management of infectious disease in livestock during crisis. In this regard, the retrospective method was used and the information reviewed was collected from the latest information published between 2019-2022, available on WHO, Economic Impact, CDC websites, where through a tremendous and collaborative effort across different public health organisations, scientists in the world, dashboards and standard indicators publicly available have been developed. The results of this study demonstrate that the managers of livestock during crisis, the competent authorities, the governments have to consider, undertake and include these kind of tools/indicators in their management in order to assist them to develop their emergency preparedness capacity and to manage in an effective way the infectious diseases during crisis respectively prevention, early detection, rapid response, identifying their vulnerabilities etc.

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

INTRODUCTION

The paper represents a systemic review of recent information on different management indicators developed - epidemiological/ economic etc in order to assist managers (politically, authorities, farmers, all the people involved) to develop best practices for benchmarking the capabilities system in context of crisis and finally to led to an effective and efficient management of infectious disease during crisis, such as early detection of a crisis (pandemic episode), keeping track of impact of the diseases and effective management of the crisis situation [8, 9, 10]. The dashboards /indicators provide them in real time information in order to analyse, prioritise and plan their activities, invest efficiently and durable and to identify and address their system vulnerabilities.

MATERIALS AND METHODS

Information analysed in this paper is data publically available developed especially as a result of COVID 19 pandemic episode through a tremendous and collaborative effort across different public health organisations, experienced reaschers in the world. The paper is looking to factors that influence the health system capability involved in the management of pandemic crisis, encompassing fundamental elements and mechanisms, associated relations and rules between them and the indicators/standards used to

characterize it (if exist/not/are defined/not, are functional/not ?/ their dynamic in time).
Finally the paper covers:
- **Entities** affected by the crisis,
- Organisations **hierarchy,**
- **Links** between entities.
- **Activities** carried out by entities.

RESULTS AND DISCUSSIONS

Based on the analyse of the data reviewed it is understandable that because of the evolution of Covid 19 a new era of SMART Inter/Intra - Entities communication tools have been developed and put in place, such as new and/or improved platforms, dashboards which are publically available. They can be used in different ways: to evaluate the health system of countries/ to compare data across the countries of the world, identify vulnerabilities, keeping track of impact of disease and finally can be used to decide and manage the crisis [13].
The Global Health Security (GHS) Index [4] is an example of the most recent benchmarking tool of health system capabilities of countries in the world. The GHS Index has been initiated in 2019 by the Johns Hopkins Center for Health Security at the Bloomberg School of Public Health, Nuclear Threat Initiative and 80 researchers from Economist Impact based on the information already available on the countries preparedness systems (Table 1, Fig. 1).
Using the GHS Index the system capabilities and capacity of a country can be evaluated using: 6 categories, 37 indicators, and 171 questions.
The score for each country is a sum of the six categories. Each category is scored on a scale of 0 to 100, in which 100 stands for the best scenario and 0 correspond to the worst scenario.
However weights are dynamic and can be changed when the system is used. In addition the system is revised and improved each time that a new knowledge emerges, such as the experience gained during the COVID 19 pandemic, reshaping the individual country profile concerning its capability and capacity to respond to pandemic crisis.

Table 1. Some epidemiological indicators used in case of COVID

GHS indicators	
PREVENTION	
Cases in the preceding days	Biosecurity
Weekly Case % Change	Biosafety
Cases in the last X days/1M pop	Dual use research and culture of responsible science
Deaths in the last X days	Immunization
EARLY DETECTION & REPORTING	
	Laboratory systems (SWOT)
	Forecasts supply chain for clinical laboratories
	Immediate surveillance and reporting
	Accessibility and transparency of the data collected through Surveillance programmes
	Investigation case by case
	Sustainable and well trained epidemiologists
PROMPT RESPONSE TO CRISIS	
	Planning - preparedness and response in case of crisis
	Continues practing of operations involved in an emergency response
	Cooperation and coordination between authorities involved (public health,security etc)
	Communication of risks
	Infrastructure available for communication
	Imposing restrictions on trade and tarvel
ADEQUATE & LONG-LASTING SYSTEM TO DEAL WITH CRISIS	
	Enough capability
	Enough supply chain
	Enough trained personnel
	Measures and practices developed to respond to a threat or danger in their operations
	Communication system dedicated for emergencies
	Emergency equipment
	Testing and research capacity
	Quiq systems of approval of new changes in legislation
POLITICAL ENGAGEMENT TO IMPROVE CAPACITY, TO FINANCE AND TO ADHERE TO NORMS	
	Reporting system for measure crisis impact etc
	Available funds foreseen for crisis
	International and cross-border agreements for cooperation
	Internationally agreements on sharing data
COUNTRY VULNERABILITY TO THREATS/RISKS	
	Political ,security, environmental, Socio-economic
	Infrastructure capacity
	Public health system

Source: Economist Impact, 2021, GHS Index Methodology, [4]
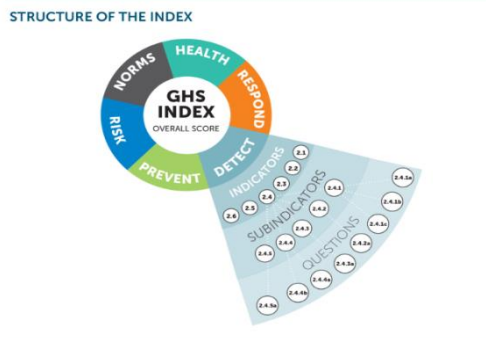https://www.ghsindex.org, Accessed on 31.01.2022.

Fig. 1. The GHS Index assesses the system in crisis situation across 6 categories, 37 indicators, and 171 questions using publicly available information
Source: Economist Impact, 2021, GHS Index Methodology, [4]
https://www.ghsindex.org, Accessed on 31.01.2022.

Using this system many countries have been assessed during the COVID 19 pandemic episode.

Using the GHS Index has been identified that a lot of countries were seriously not ready for addressing the pandemic threats, such as:

- plenty political and security risks,

- no/poor resources allocated for management of a crisis,

- no taking into account the real needs of exposed population,

- no investments in pandemic preparedness,

-not having a capable system to address catastrophic biological events

So, using of this system revealed:

-concerns related to the detection and reporting system

-seriously problems related to the laboratory systems were found (no strength and quality of the laboratories, lack of laboratory supply chain developed and/or defined, not a real-time surveillance system, reduced reporting capacities for pandemic situations).

-triggered an alarm regarding the rapid response (plans,risks communication, links between public and authorities)

-it was found that only 69 countries have an comprehend national emergency response plan in place and 58% of countries scored below average.
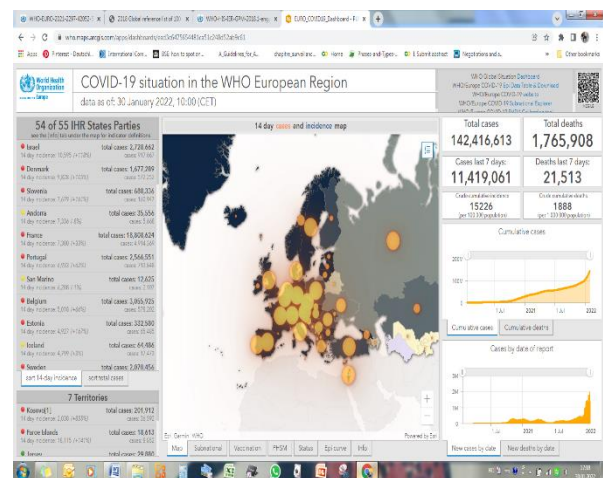
-showed serious concerns related to the health system capacity, respectively reduced workforce, facilities, and healthcare access.

-however, despite the assessment results out of 23 countries, **only 4 countries addressed the gaps** , which demonstrate that even the GHS Index helped to identify the systemic vulnerabilities, without commitment and accountability of the governments, no progress can be made to improve the health security system of the country.

-concerning country vulnerability to threats main indicators described are the risks associated to political, security, environmental systems, the infrastructure capacity and the adaptability of the socio-economic system.

the assessment exposed major problems such political instability due to repeatedly transfer of power, social tensions and unrest, lack of trust in government advice, which clearly have/had a huge negative impact on a country's response during the crisis.

Actually Covid 19 episode proved what the results of GHS Index showed.

Fig. 2. Covid 19 situation in the WHO European Region
Source: WHO Europe, [16]
https://www.arcgis.com/apps/dashboards/ead3c6475654481ca51c248d52ab9c61, 05.02.2022.

Following COVID-19, based on the experienced gained many recommendations have been made in order to strengthen the preparedness for the future crisis situations of the whole world.

In conclusion using the tools described each country can have a prediction on the impact of the disease (population health, economic impact etc).

Moreover, the COVID-19 crisis has revealed that many factors are involved and influence the system response in a crisis:
- public health and scientific capacities,
- understanding the disease,
- measures put in place to respond to the threat,
- social and economic adaptability in short and long term.

The experienced gained during COVID proved that the factors listed above are crucial and have a huge impact on how countries respond during a pandemic crisis (Fig. 2).

Early M Sorrely & others are talking in their paper, *in 2015, Mapping of networks to detect priority zoonoses in Jordan [11]* about the challenges faced by middle income countries meet by public health and veterinary surveillance and laboratory sectors, drawing attention that early, timely detection of disease and warning systems are main concerns and are crucial to control the crisis and to create a link between main stakeholders involved.

However, most of the time limitation of resources (staff and money) affect the cross sector communication.

They highlight in their paper that Mapping zoonoses/diseases and the burden of diseases **help to identify vulnerabilities of the systems capabilities (**limited vaccine supply and inability of the system to cover the entire susceptible population locally tests not available, systems activated only in the case of emergencies**)** and where efforts should be focused to improve prevention, communication, and coordination across both veterinary and human health systems. In the end of their paper they identified three areas to be improved such as:

(1) the reporting and communication system structure,

(2) the emergency preparedness and response plan,

(3) the laboratory capacity.

According to the International Health Regulations (2005) – (IHR) [14] all members must build up and keep capacities for crisis situations.

At the beginning of 2021 the self assessment annual reporting tool (SPAR) was reviewed and improved, based on the experience got during the COVID-19 pandemic and has 15 capacities and 35 indicators compared to 13 capacities and 24 indicators in the first edition, such as policy, legal and normative instruments to implement IHR, IHR coordination and National IHR Focal Point, National IHR Focal Point function. Multisectoral coordination mechanisms, support for IHR implementation, Financing for IHR implementation and emergency response, Laboratory system (Specimen referral and transport system, Implementation of a laboratory bio safety and bio security regime, quality system, testing capacity modalities Effective national diagnostic network), Surveillance), Early warning surveillance function and Event management, Human resources etc.

The global scores for WHO shown in the figure below demonstrate that the world has made considerable steps in terms of health emergency preparedness in time (Figures 3 and 4).
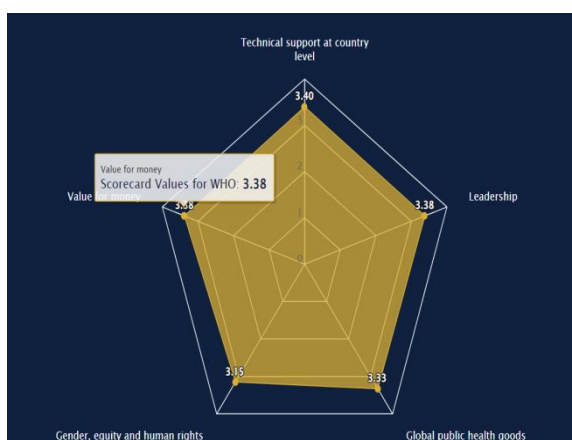

Fig. 3. Health emergency preparedness capacities
Source: WHO Europe, [16], https://www.who.int/about/accountability/results/who-results-report-2020-mtr/output/2020.2.1.2.-capacities-for-emergency-preparedness-strengthened-in-all-countries, Accessed on 30.01.2022.

Manuals of epidemiological burdens of diseases [11] have developed and bring an important contribution to estimate the disease severity and determining the populations at-risk for high risks diseases. Not controlling this kind of data it is enormously difficult for policy-makers to decide on how to distribute the already limited resources.

The tool developed by WTO in case of Seasonal Influence estimate the morbidity burden (incidence rates) estimate the proportion of cases who died (case fatality ratio), assess the plausibility of the results, identify gaps in the surveillance system (particularly related to data collection), asses the costs associated with the disease respectively the direct costs (care for the diseased) and the indirect costs (lost productivity, disabilities, or death).

The CDC in USA developed the CDC Covid Data Tracker [1] that provides an overview of several important indicators used to assess the impact of COVID-19.

They underline that no data should be seen as more important than the other, and the data provided should be analysed as a system, in order to understand entirely the COVID evolution and impact.

On the site can be found the integrated key data for COVID -19 in the United States and permit to explore data /compare data between different USA states. Data sources and methods used are described.

Other tools for surveillance have been developed by ECDCs [3] such as EPIPULSE (launched on 2021).

Country	Value	Trends	Value	Trends	Value	Trends	Value	Trends	Val
Lithuania	7250.1		70.9		47.9		3974.2		30
Luxembourg	1529.9		20.8		23.7		2439		751
Malta	270.7		19.4		4.1		3019.1		305
Netherlands	6921.6		8.7		38.6		5184.9		163C
Norway	4434.5		15.3		62.9		2951.9		43C
Poland	990.4		85		22		1781.2		
Portugal	2527.3		57.6		17.5		5505.9		1372
Romania	1224		67.3		22		2155.7		1097
Slovakia	4745.7		51.1		30.3		7375.6		1828
Slovenia	3803.2		108.8		5.1		26255		2132
Spain	784.5		32.7		17.6		1632		588
Sweden	818.9		35.5		15.5		1386		564

Fig. 4. Global scores for WHO showing health emergency preparedness in time
Source: WHO Europe, [16], https://www.who.int/about/accountability/results/who-results-report-2020-mtr/output/2020/2.1.2.-capacities-for-emergency-preparedness-strengthened-in-all-countries, Accessed on 30.01.2022.

Dr. Jonas Gomes de Silva (2021) mentioned in his paper [2] that at the beginning of 2020 many countries were eager to learn from nations benchmarked as the best able to save lives during COVID pandemic. Based on the methodology developed by Silva (in 2020) among 108 well-evaluated countries, the top six benchmarked countries against Covid-19 were from Asia with emphasis on Vietnam, Taiwan, and Thailand.

The research is descriptive, uses an online questionnaire with bibliographic and documentary approaches, and the main policy measures adopted by the Tawain government was international travel control, effective public-private collaboration, public information campaigns, integration with mass media, increase the medical and personal equipment capacity, combat fake news, public event cancellations, improve intensive care unit structure, support the expansion of the testing system, and schools closures.

On the other hand COVID 19 further being a health crisis, **also have generated economic and food crisis** and consecutive its impact, governments have/had to ensure also the functioning of the food system, delivering safe food, finding alternative ways to deliver adequate amount of food to population in restrictive conditions, putting different measures in place in order to address staff shortage where was absolute necessary. .

As well, livestock farmers, slaughterhouses, producing plants have faced major problems, such as:
- Workers/Farmers' health and closing of their activities,
- Shortage of labour force,
- Animal Welfare issues,
- Trade and markets temporarily suspended and policy changes,
- Supply chain slowdowns and shortages,
- Disruption in to the supply chain,
- Support of farm prices
- Additionally costs for assure worker safety and staff protective equipment and other COVID measures,
- Shifting in market demands,
- Panic

Ben Lilliston of the Institute for Agriculture and Trade Policy back then was saying that

"*Workers are having to go back to work, and farmers are having to euthanize their animals,*" and "*It's a very chaotic, crazy situation.*[Meat Plants Around the World Struggle With Virus Outbreaks. 2020, https://www.theguardian.com/environment/2020/may/11/chaotic-and-crazy-meat-plants-around-the-world-struggle-with-virus-outbreaks, Accessed on April 03, 2022)]

During COVID-19 many livestock were euthanatized, milk was dumped and fresh vegetables left to rot in contrast with people standing in lines for food banks (Photos 1 and 2).

Milk

Photo 1. Ricky Jones, the operations manager at Magic Valley Quality Milk Transport, walks out the door as 4,100 gallons of milk pour down the drain. With restaurants and schools closed across the country, milk processors have lost a large chunk of their market, leaving dairy farmers with no one to take their milk. Photograph by Pat Sutphin, Times-News Via AP, Source: National Geographic, [7].

Potatoes

Photo 2. Ryan Cranney's farm in Oakley, Idaho, made 500,000 pounds of potatoes free to the public when restaurant sales collapsed due to pandemic closures. Photograph by Pat Sutphin, Times-News via AP, Source: National Geographic, [7], https://www.nationalgeographic.com/science/article/covid-19-disrupts-complex-food-chains-beef-milk-eggs-produce, Accessed on 03.04.2022.

Meat

Pig production and poultry production in our days are designed as intensive productions and any disruption in their technological flow had a huge impact on both sides: upstream on animal welfare leading in killing many animals, downstream affecting the consumer's behaviour and the environment (Figure 5).
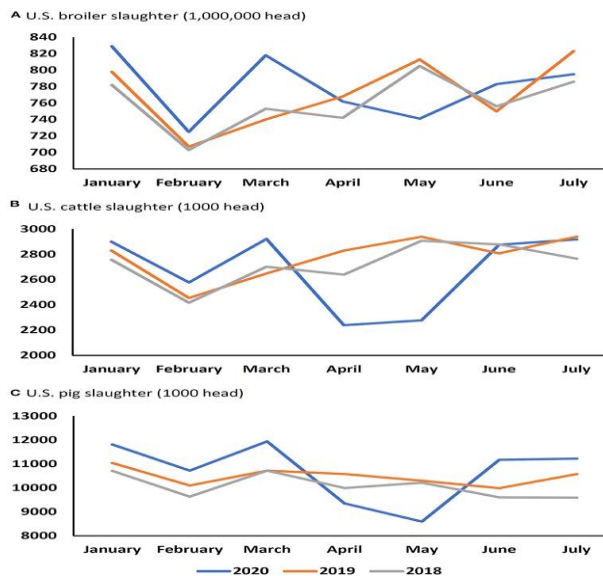

Fig. 5. Numbers of (A) broiler chickens, (B) cattle, and (C) pigs slaughtered per month in the United States between January and July over the last 3 years
Source: U.S. Department of Agriculture – National Agricultural Statistics Service, [12].

Actually closures of pig/poultry processing plant over several weeks, lead in cascade to closure of cattle, poultry, and pig farms, which means that in a while some animals will have slaughter weight, but had nowhere to go for slaughter, which because of animal welfare reasons will be euthanized.

This caused panics among the consumers and disruption in food supply (Photos 3 and 4).

Panic consumers and disruption in the food supply

Photo 3. Queues in big stores and shelves emptied by Romanians scared of corona virus
Source: Europe FM [5],

https://www.europafm.ro/emag-anunta-ca-va-subventiona-costul-mastilor-medicale/, Accessed on 03.04.2022.

Photo 4. The line for lunch at Sharing Caring Hands on Tuesday, March 24, in Minneapolis. David Joles/Star Tribune/AP
Source: Mother Jones [6],
https://www.motherjones.com/food/2020/04/these-photos-show-the-staggering-food-bank-lines-across-america/, Accessed on 03.04.2022.

However despite the negative impact of the COVID 19, governments and farmers must to take into account the experience to review the current systems and policies/ legislation in order to address future crisis.
Therefore, consecutive COVID many policies have been analysed and have been changed accompanied by regulatory reforms, laying now the basis **for a more resilient, sustainable and productive agriculture food system**.
A **dashboard** has been developed by the Organisation for Economic Co-operation and Development (OECD) to monitor the recovery of their members' countries around 4 key priorities agreed by the OECD members:
- **Strong dimension** focuses on the recovery of household and businesses
- **Inclusive dimension** focuses on recovery of the income and jobs of the most vulnerable class,
- **Green dimension** focuses on progress towards a green transition, consistent with the goals of the Paris Agreement and the 2030 Agenda.
- **Resilient dimension** focuses on the factors that can assist countries to enhance endurance to crisis and to prepare better for potential challenges.

CONCLUSIONS

Many research papers and the last pandemic event (COVID 19) showed clearly the importance of standards and indicators developed by researchers and international organisations to help managers to decide on right policies and to design properly their actions during the pandemic crisis.
The tools developed also shows that the standards and indicators helped the world managers to warn the world about the pandemic crisis, to keep track of outcomes of the pandemic diseases and to manage the crisis.
However, the world will always learn new lessons from future pandemics and world experts will have to understand the new pandemics in order to respond to the new challengers.
Clearly opportunities will always exist to build up new capacities that will be more resilient to further long-term gains for preparedness of the countries.

This kind of standards and indicators developed proved during COVID 19 that they provided results that engaged globally all the entities involved, and contributed to open debates that guided to new viewpoints and catalyzed the progress in addressing COVID 19.

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