



CAPACITIES AND RESOURCES FOR MANAGEMENT OF AVIAN INFLUENZA OUTBREAKS IN BULGARIA

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Summary

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The study investigated the necessity of improvement of the technical, financial and human resources in the veterinary sector, the need for strengthening the control on the prevention and eradication measures on avian influenza and the update in the legislation. A sociological survey was carried out through an anonymous written questionnaire with open and closed questions. More than one-third (36.67%) of the respondents in the study assessed the activities of the competent authorities in Bulgaria for eradication of the avian flu outbreaks as “Very good”. For 43.33% one of the main reasons for spreading the disease appeared to be the misinformation and non-declaration of the infection by the farmers, the illegal import and low biosecurity level. For more effective management of the future avian flu outbreaks, more than half of the respondents (56.67%) recommended improvement of the control measures. Of them, 20% proposed stricter control on the eradication at the farms; another 13.33% of the respondents stated the necessity of legislative amendments regarding the zoonotic character of the disease.

Key words: avian influenza, disease management, poultry, waterfowl, wild birds

INTRODUCTION

Avian influenza appears to be among the most threatening contagious diseases for birds and for public health. The highly pathogenic strains of the virus could affect both wild and domestic birds, posing threats of extinction for worldwide endangered species and health and economic losses for poultry and waterfowl farms in the affected territories. Although the developed countries have implemented spe-

cific rules for the prevention and/or eradication of the disease, certain difficulties still arise in the management of avian flu outbreaks even in territories within the EU. Avian influenza (AI) is perceived nowadays as a global public health concern, being highly contagious to a number of food producing poultry and waterfowl, as well as wild birds and pet birds. Avian influenza virus (AIV) is known also for its

zoonotic potential, as occasionally mammals may contract avian influenza. It has been reported that from January 2014 to November 2016 AI has been identified in 77 countries and 13 strains have been detected (OIE, 2019b). Till now, AIVs have been detected in poultry and wild birds on all seven continents (Swayne, 2016). This viral disease is also included among the agents causing natural disasters as per Emergency Events Database classification – epidemics and pandemics due to biological hazards as contagious diseases of animals (Balieva, 2015).

The global priority of public health protection in shared collaboration between the three leading international organisations in the field (World Organisation for Animal Health – OIE, World Health Organisation – WHO, Food and Agriculture Organisation of the United Nations – FAO) have provided policy advice, strategy design and technical assistance for the control and eradication of AIVs (OIE, 2019b). However, the control strategies for AI in poultry vary regarding the preferred goal – prevention, management or eradication, and additional specific factors for each affected country as public awareness, communication, biosecurity measures implementation, diagnostics and surveillance capacities (Sims & Swayne, 2016). For better control of AI it is also necessary to evaluate the role of the anthropogenic, environmental and ecological factors that drive the virus-host interactions (Zarkov & Urumova, 2013; Simms & Jeggo, 2014), especially the mechanism of establishment of new endemic foci of AI through wild birds-waterfowl, waterfowl-poultry, wild birds-poultry, poultry-mammals interactions (Reed *et al.*, 2003; Fouchier *et al.*, 2006; Stallknecht & Brown, 2008).

As a member-state of OIE and EU, Bulgaria strictly follows all regulations on AI control strategies. Regarding the increased importance of the AIVs for both industrial poultry and waterfowl farming, the traditional for the country backyard birds farming and migratory routes and habitats of wild birds, it became necessary to identify the current state of capacities and resources of the Bulgarian competent authorities for effective management and eradication of avian flu outbreaks in the country.

MATERIALS AND METHODS

To identify the capacities and resources of the public and private veterinary sector in Bulgaria for managing avian influenza outbreaks, a sociological survey was carried out among official veterinarians, owners and/or managers of poultry farms and wildlife veterinarians from NGO protecting wild birds. The questionnaire was distributed in the spring of 2019 personally or sent in an online form to the following target groups: official veterinarians from the competent authority (53.33%), industrial poultry and waterfowl farm managers (30.00%), veterinarians from other institutions regarding animal (bird) health and contagious diseases prevention (16.67%). The questions were related to the stakeholders' awareness and perceptions on: 1) effectiveness of the activities of the competent authority on management of AI outbreaks in Bulgaria in the period 2015–2018 (covering diagnostics, eradication measures, compensation of farmers, disease prevention and public relations and information); 2) level of communication between the competent authority and other stakeholders in the decision-making process on AI outbreaks eradication; 3) efficiency and availability of sufficient

resources of Bulgarian Food Safety Agency (BFSA) for the purpose of eradication of avian flu outbreaks; 4) main causes for the spread of the disease according to the respondents; 5) recommendations on the AI disease prevention and eradication. All respondents had to use a five-grade scale for assessment of the statements in the questions.

Thirty filled questionnaires were returned and processed statistically (Statistica for Windows, Release 4.5, StatSoft, Inc., 1993) with results presented on figures (Excel, Windows 7).

RESULTS

Regarding the current EU legislation, all member states have to strictly implement the measures for prevention, surveillance, control and eradication of avian influenza (highly pathogenic strains).

The study showed that the professional activities of the Bulgarian Food Safety Agency (BFSA) for the purpose of AI control in the country for the period 2015–2018 were assessed in general as adequate and effective (Fig. 1). The summarised results showed that 36.67% of the respondents evaluated the actions taken by the competent authority as “Very good”, while 16.67% of them perceived these actions as “Excellent”. Another 16.67% held the position that BFSA had performed “Good” in all activities for eradication of the outbreaks. At the same time 20.00% of the respondents evaluated the actions taken as “Satisfactory”. The smallest share of 10.00% was that of the respondents who saw the performance of BFSA during the Avian flu outbreaks eradication as “Poor”.

Interesting perceptions of respondents’ were identified regarding the communication flow between BFSA and animal own-

ers and other stakeholders (research institutions, veterinary faculties, professional organisation, independent experts, Risk Assessment Centre) in the process of decision-making and implementation of measures against the disease (Fig. 2). Data showed that 16.67% of the respondents believed that BFSA maintained satisfactory exchange of information with representatives from scientific, expert and professional organisations in the process of discussion, implementation and execution of the measures on prevention and eradication of avian flu. Approximately half of the participants in the study perceived the communication flow between BFSA and the stakeholders as “Good” (36.67%) and “Very good” (20.00%). The level of exchange of information was seen as insufficient by poultry and waterfowl farm owners and managers: the communication between the competent authorities and animal owners was described as “Poor” by 20.00% of the respondents, and “Satisfactory” by 30.00% of them.

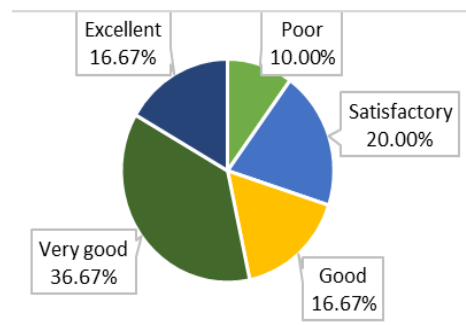


Fig. 1. Respondents’ perceptions on the effectiveness of professional activities of the Bulgarian competent authority for management of AI outbreaks in the period 2015–2018.

A significant positive correlation ($r=0.68$, $P<0.05$) was found between the group of the respondents who defined the performance of BFSA as “Very good” and

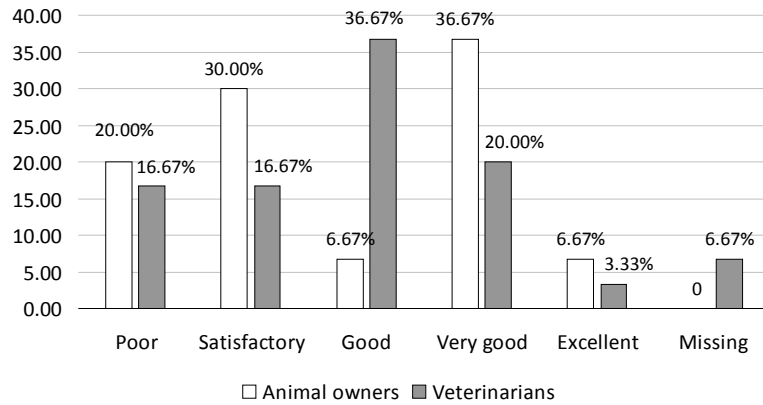


Fig. 2. Respondents' perceptions of the level of communication between the Bulgarian competent authority with poultry/waterfowl farmers and other stakeholders in the decision-making process.

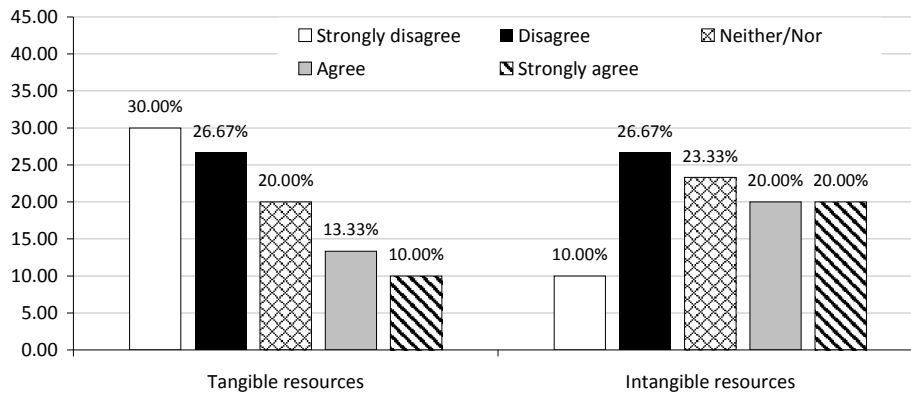


Fig. 3. Respondents' perceptions on the efficiency of the material resources (technical, financial) and non-material resources (qualified staff, professional expertise, adequate control measures development) provided by BFS.

the stakeholders who also determined the communication process of the competent authority with them as “Very good”.

For the purpose of contagious animal disease control, the competent authorities had to provide all the necessary material (tangible) and non-material (intangible) resources for prevention and eradication of the registered outbreaks.

At the same time, the respondents from the public and private sectors held

the opinion that the competent authority could not provide enough technical and financial resources which hampered the control of the disease (Fig. 3). Only 10.00% of the respondents perceived that the responsible state institution was equipped with enough material resources for effective eradication of avian flu outbreaks, supported by other 13.33% with the opinion that the lack of resources was negligible.

The biggest share (30.00% “strongly disagree”) got the respondents who saw the available tangible assets within the competent authority as quite insufficient, while other 26.67% stated that the material resources were rather insufficient. These difficulties were to some extent overcome by the performance of highly qualified staff, experienced in the preparation and implementation of adequate disease control measures (as “agreed” by 20.00% of the respondents and “strongly agreed” by another 20.00%).

Regarding the factors affecting the mechanism of spread of AIVs (Fig. 4), 43.33% of the respondents pointed out the concealing information about the outbreak by the farmers as one of the most serious causes, while 6.67% of the participants in the study did not consider this misinformation as a probable factor for spreading the disease. Similar perceptions on the

low level of biosecurity within the farms were demonstrated, as 26.67% of the respondents saw it as the most probable cause, while only 3.33% thought that low biosecurity was the least probable factor to induce disease outbreak. Ineffective detection of the outbreak was seen as the least probable cause by 26.67% of the respondents, compared to 13.33% who saw it as the most probable factor for complicated epizootic situation of avian influenza.

Contradictions arose when it came to the border control for animal disease prevention. Ineffective border checks (illegal trade) were perceived as the most probable cause for emergence of the AIVs by 30.00% of the respondents, while 26.67% of them held the contrary position e.g. that this was the least probable factor.

The role of the wild birds in the epizootic was also investigated in the study.

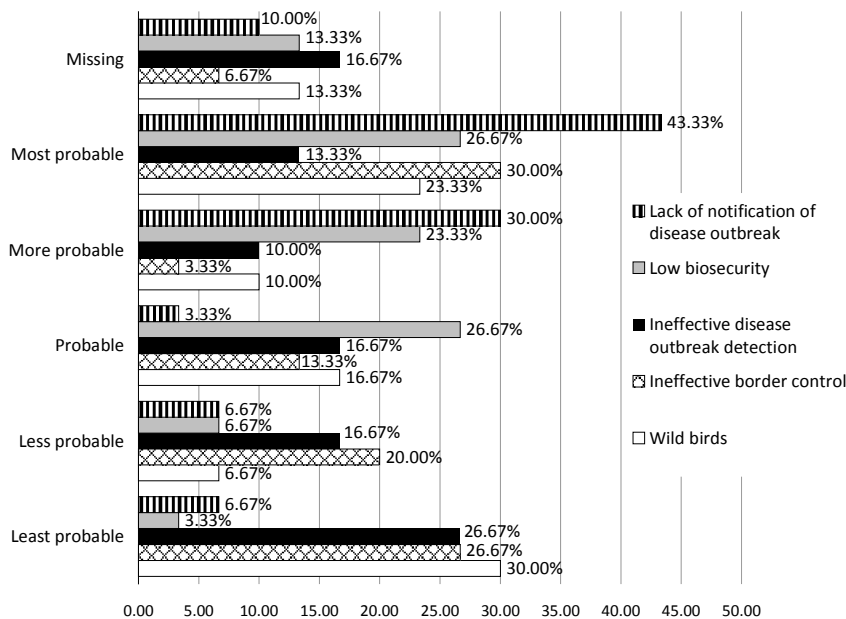


Fig. 4. Probability of causes for avian influenza outbreaks emergence according to respondents' personal opinion.

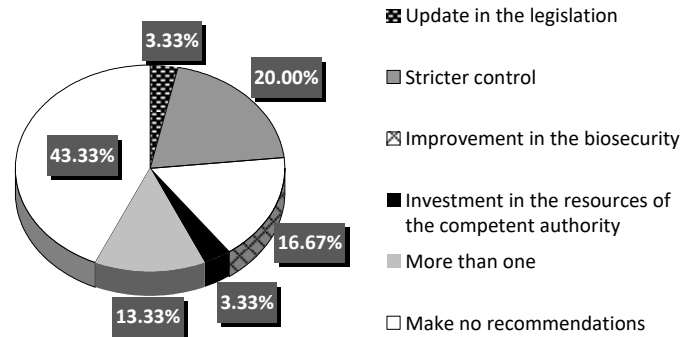


Fig. 5. Respondents' recommendations on capacity building for effective AI prevention and eradication.

Wild birds were seen both as the most influencing factor for transmission of the virus to domestic birds by 23.33% of the respondents and the least probable cause for it by approximately one-third of the participants (30%). A significant positive correlation was found between the group of the stakeholders for whom wild bird transmission of AIVs was very probable and the group of respondents assessing the overall exchange of information and communication with the competent authority as “Very good” ($r=0.52$, $P<0.05$). At the same time the higher probability of AI infection occurrence in poultry farms through migratory birds correlated negatively with the misinformation and not reporting the disease outbreak by the farmers ($r=-0.57$, $P<0.05$).

Based on their personal expertise and experience in managing AI outbreaks, a total of 56.67% of the participants in the study gave some recommendations on disease prevention and eradication (Fig. 5). The highest share (20.00%) was that of the respondents who urged for stricter control on the implementation of the legally provided measures for eradication. Another 16.67% insisted on improvement

of biosecurity of the poultry and waterfowl farms, including backyard units. Necessity for update in the legislation regulating the contagious animal disease control, especially diseases with zoonotic potential as avian influenza, was seen by 3.33% of the respondents. The same was the share of the participants in the study (3.33%) who stated the need of investment in the tangible and intangible resources of the competent authority.

DISCUSSION

Bulgaria appeared to be among the major producers of foie gras (duck fatty liver) (mainly in the regions of Plovdiv, Haskovo, Stara Zagora) with high density of domestic birds populations and industrial holdings, both in the intensive waterfowl farming and breeding of broilers, breeder and laying hen flocks. The total number of the birds in intensive farms was estimated on 15.5 mln as to December 31st 2018. Laying hens were 6,951,000, broilers – 6,921,000, turkeys – 35,000, ducks – 1,408,000, geese – 13,000, other productive bird species – 191,000 (Anonymous, 2019). The sector had been continuously

threatened by outbreaks of highly pathogenic strains of Avian influenza (HPAI) which appeared to be prevalent for Europe in the last years – H5N6 in the United Kingdom, Denmark, Sweden, the Netherlands, Germany; H5N8 in Italy, Bulgaria (Georgiev, 2018; Peeva, 2018; 2019). Due to the complex and joint efforts for prevention and control of HPAI both of the competent authority and the major industrial poultry farmers in the country, the number of the outbreaks in Bulgaria decreased as only 2 outbreaks were registered in 2019, compared to 28 in 2018 and 72 in 2016 (OIE, 2019a). At the same time epidemiological data confirmed that HPAI outbreaks in Europe had also decreased in 2018/2019 compared to the cases in 2016/2017 regarding H5N6 and H5N8 (Peeva, 2019).

Regarding the current EU legislation, all member states had to strictly implement the measures for prevention, surveillance, control and eradication of avian influenza (highly pathogenic strains). For this purpose the competent state authorities are responsible for ensuring all material and non-material resources necessary for prevention and eradication of disease outbreaks.

The decreased number of the AI outbreaks in the Bulgaria during the last years corresponded with the statement of the majority of the respondents in the study regarding the performance of the competent authority. The professional activities of BFSA in the period 2015–2018 for the eradication of AI outbreaks were evaluated as “Very good” and “Excellent” by 53.34% of the participants in the study.

According to the respondents, difficulties arose due to the lack of sufficient technical and financial resources, which hampered the control of the disease.

These obstacles were to some extent overcome by the qualified staff, experienced in development and implementation of adequate control. Although the main responsibilities and duties in disease eradication were assigned to the state veterinary administration, the effective and successful management of the outbreaks was possible only with the collaboration between the public and private sectors and other stakeholders. With regard to this, more than half of the respondents hold the opinion that BFSA maintained satisfactory to good level of communication with representatives from scientific, expert and professional organisations during the process of discussion, implementation and execution of the measures for prevention and eradication of avian influenza.

However, for successful long-term results in overcoming the global threat of animal epidemics it had become clear that a multi-level management approach was needed with collaboration between competent authorities, farmers, researchers and other stakeholders (Capua, 2006; Brunet & Houbaert, 2007; Zingg & Siegrist, 2012). The core point in the collaborative approach appeared to be communication and awareness of public perceptions on the measures implemented. The study showed that the communication flow between the BFSA and farmers during the eradication of AI outbreaks in the country was described controversially. Half of the farmers assessed the exchange of information with them in the process of discussion, implementation and execution of the measures for eradication of avian flu as “Satisfactory” to “Poor”. At the same time the other half of the respondents described the communication with the authorities from “Good” through “Very good” to “Excellent”. The improvement in communication between all stake-

holders was set also as one of the important recommendations of the Chief Veterinary Officers (CVOs) of G7 for the purpose of strengthening the capacities for managing the global AI crisis (Anonymous, 2017).

Communication flows had to be, however, set in two directions – not only from the government and experts to the farmers and public, but obligatorily from the animal owners and farm managers towards the competent authority. Misinformation and non-declaration of outbreaks by the farmers appeared to be one of the more or most probable causes for spreading the AIVs (stated by 73.33% of the respondents). Collection of data and regular surveillance should be assisted by all stakeholders as early warning and timely detection determined the appropriate decision-making, implementation of measures and allocation of resources (Clements & Pfeiffer, 2009; Brouwer *et al.*, 2018). Furthermore, monitoring of diseases in wild birds could also help in modifying the critical control points to reduce AIVs transmission between the susceptible bird species and mammals (Boyce *et al.*, 2009). Worldwide, data showed that from 2003 till 2017 860 cases of H5N1 infection in humans with 454 of them lethal were registered (Peeva, 2018). Research understanding of the role of wild birds in the infection dynamics was linked by some authors with possible human health risks, environmental change, local AIV prevalence levels and socio-economic issues (Brouwer *et al.*, 2018; Lisovski *et al.*, 2018; Movalli *et al.*, 2018). The respondents in the study also held the position that the wild birds played a certain role in the transmission of AIVs to domestic birds for some of the registered outbreaks in the country (33.33% saw this cause as more or most probable). This position is

supported as well by Waldenström *et al.* (2017) who explored the migratory routes of wild birds in Europe with relevance to their importance as major reservoirs of avian influenza type A. Bulgaria is a part of the Eastern migratory route through Via Pontica and Via Aristotelis with a rich faunal biodiversity (Golemanski & Popov, 2011) which poses a permanent risk of AIV transmission during the spring and autumn migrations of wild waterfowl birds (Anonymous, 2018). On the contrary, Soliman *et al.* (2012) argued that the role of the migratory, particularly aquatic birds, in the transmission of HPAI was unclear.

The transmission of the virus might occur through the interconnections between production poultry and waterfowl farms, both in intensive and extensive systems, at the background of low biosecurity measures e.g. uncontrolled bird movement, movement of employees and workers, etc. (Georgiev, 2018). The unsatisfactory level of biosecurity on farms was seen as a serious reason for spreading AI outbreaks by 50 % of the participants in the study (26.67% pointed it out as “most probable” and 23.33% – as “more probable” cause of AIV transmission). On-farm biosecurity measures appear on the first line of defense against HPAI, especially for free-range duck farms (Delpont *et al.*, 2018) although Cuia *et al.* (2019) argued that these measures should be developed under well-analysed practices to better fit the stakeholders.

CONCLUSION

The study on the competences and resources for managing AI showed that the overall performance of the BFSa for control of avian influenza outbreaks in Bul-

garia in the period 2015–2018 was perceived as adequate and effective.

The misinformation and concealment of avian flu outbreaks was recognised as a serious cause for spreading the disease (as some farmers, due to economic reasons, did not notify the official veterinarians in order to take the relevant measures to prevent transmission of the virus to other industrial farms).

Other factors that facilitated the spread of AIVs according to the respondents appeared to be the ineffective farm biosecurity measures, uncontrolled movement of people and transport vehicles, and the possible contact between domestic and wild birds and migratory waterfowl.

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