Contribution of veterinary profession to the response to COVID-19 pandemic conveyed through experiences of the Veterinary Faculty Sarajevo

M Smajlovic¹, S Serić-Haracic¹, N Fejzic¹, J Omeragic¹ and T Goletic¹

¹ Veterinary Faculty of the University of Sarajevo, Zmaja od Bosne 90, Sarajevo, Bosnia and Herzegovina

E-mail: sabina.seric-haracic@vfs.unsa.ba

Abstract. The International Organisation for Animal Health (OIE), from the onset of COVID-19 pandemic, promoted One Health in global and national responses. The OIE accentuated the role of the veterinary profession due to testing capacity of animal health laboratories and expertise. Veterinary Faculty Sarajevo through its Veterinary Institute participates in the national veterinary service with diagnostic and advisory roles. It has proactively enhanced the scope and quality of laboratories, including strengthening the interdisciplinarity and internationality. Development achieved through earlier pandemic threats resulted in having laboratory and technical facilities for molecular SARS-CoV-2 detection in the wake of the unveiling COVID-19 pandemic (early 2020). From confirmation of the first COVID-19 cases in Bosnia and Herzegovina (BiH), our staff participated in crisis response teams and, so far, held over sixty media addresses promoting public awareness and science based information. Our laboratories were included in the official detection system and were the first to sequence SARS-CoV-2, then to establish the Alpha COVID-19 variant in BiH human samples and to substantiate one-way virus transmission from humans to pets. The aim of this paper is to describe our activities as a participant in the response to the COVID-19 pandemic, alongside faced challenges and gained experiences.

1. Significance of veterinary profession in COVID-19 response

The dominant public image of a veterinarian is related to clinical practice dealing with small companion or farm animals, even though knowledge, skills and attitude gained through formal and continuous education form the basis for much broader contributions. Veterinary medicine education uniquely routes its graduates to comparative medicine, despite market forces driving it recently more towards companion veterinary medicine and thus sidelining the veterinary profession’s foundational societal values [1]. Nevertheless, the veterinary profession has a longstanding and continuously expanding role in improvement of human and public health by improving animal production and welfare and health and food systems, participating in biomedical and comparative medical research, addressing zoonotic diseases, contributing to environmental and ecosystem health, and thus helping manage 21st century public health challenges [2, 3]. The veterinary profession is globally recognized as an invaluable asset due its public service response to the current, and preventing future pandemics [4]. The current and potential contribution of public health veterinarians in combating COVID-19 includes expertise in epidemiological surveillance and disease management, laboratory capacities for diagnostics and
characterization of SARS-CoV-2 and other zoonotic pathogens, testing of human and animal samples for COVID-19, animal research and development of vaccines and transboundary disease risk assessment [3].

1.1. Experience and expertise with zoonotic emerging diseases
If we consider that most human infectious diseases are zoonotic in origin, out of the estimated 1.7 million unknown viruses of mammalian and avian hosts, 850,000 could have potential for animal to human spill-over [5]. The zoonotic provenance of SARS-CoV-2 is well documented, as is the potential role of animals in virus maintenance [3, 6]. Even before COVID-19, veterinary professionals gained vast experience in the emergence of viral diseases from wild animal populations and epidemics caused by emerging or exotic agents in naïve domestic animal populations. Global collaborative projects, such as PREEMPT, PREDICT and EPT, dealing with these emergencies thrived with the contribution of veterinarians. This led to veterinary epidemiologists being involved even as lead persons in COVID-19 task forces in many countries, while veterinary virologists experienced in virus evolution helped in identifying and predicting important SARS-CoV-2 mutations and their implications [3].

1.2. Animal disease surveillance toolkits
Policies and standards around “disease freedom status” in animal populations based on provisions in the Sanitary and Phytosanitary Agreement (SPS) of the World Trade Organisation (WTO), with the OIE as a globally recognised standards body, have been implemented for decades now. This led to development of a variety of tools and approaches in veterinary control strategies with proven success. Moreover, policy making regarding animal health is commonly required to be evidence based, leading to expansion of the contribution made by veterinary science and research. Hence, many of the COVID-19 measures, such as lockdowns and movement bans, differentiation of countries by disease status, health certification, risk-based sampling strategies, traceability, diagnostic protocol standardization and biosafety have long been globally harmonized and implemented by veterinarians in preventing and combating animal diseases and epidemics worldwide. Unfortunately, the aftermath of initially loosely harmonized and haphazardly introduced COVID-19 public health and containment measures between EU countries prompted approaches as seen earlier in the regulation of animal health. The EU had developed the Joint European Roadmap for coordinated phasing out of containment measures, as well as guidelines for standardized testing approaches [7].

1.3. Diagnosis and molecular characterisation of SARS-CoV-2
The lack of testing capacities and resources for COVID-19 diagnostics was evident worldwide, especially in undeveloped and developing countries with chronically neglected and under-capacitated health care systems. This, particularly in the early days of the pandemic, contributed to poor control of disease transmission. In line with guidelines and recommendations issued by the OIE, many veterinary laboratories were involved in testing human samples, but also supported development of common diagnostic and data exchange protocols and provided surplus personal protective equipment and other expendables [3, 8]. Information on human coronaviruses were lacking until the emergence of SARS-CoV and MERS-CoV, while veterinary medicine has extensive experience with animal coronaviruses, particularly regarding virus evolution and changes in tropism, virulence and inter-species transmission [9]. Veterinary medicine’s contribution follows in our expanding knowledge on SARS-CoV-2 origin and spread, and in development of immunogenic and safe vaccines and effective antivirals [9].

2. Veterinary Faculty Sarajevó’s role in veterinary public health
Veterinary Faculty Sarajevo is a recognized institution in the region, Europe and beyond, with tradition, expertise and capacities for veterinary education, support to the veterinary service, promotion of animal health and biomedical research. As the only higher education institution for veterinary medicine in the country, we provide education through degree programs or continuous education towards achieving high standard competences of our trainees in line with national and international demands and standards [10].
In addition, the Faculty has been continuously committed towards development of research, expertise and diagnostic capacities. Veterinary Faculty Sarajevo is involved in all regular and incident activities regarding endemic, exotic and emerging diseases in animal populations (domestic and wild), including animal disease transmitted by food/feed or vectors [11, 12, 13, 14, 15].

The Veterinary Institute of the Veterinary Faculty is a subsidiary unit that merges all our laboratory services within five Centres and with a separate unit for Inter- and Intra-laboratory quality control and standardization. The Institute’s laboratories are accredited according to the BAS EN ISO/EC 17025:2018 [16] and are appointed as national reference laboratories for several important OIE listed diseases. The buildings of the Institute were purposefully designed, constructed and equipped during the last decade following the highest standards of biomedical laboratory safety (Figure 1 and 2). All laboratories within the Institute can operate under BSL2+ requirements, while infrastructure is in place for a BSL3 subunit. Our laboratories are integrated in the official system of animal disease and food safety control, supporting domestic trade and export certification, veterinary inspection official controls, and as subcontractor, for internal control for food/feed producers. Our “tailor made” laboratory information management system follows up all laboratory protocols and provides the basis for operational management, audits and reporting.

*Picture 1: Processing samples at the Laboratory for Molecular-Genetic and Forensic Research within the Institute*

*Picture 2: Analysing viral genome sequences in the same Laboratory within the Institute*

From the early 2000s, our Faculty recognized the emergence of needs for enhancing expertise in veterinary epidemiology, disease surveillance, disease diagnostics and risk analysis, towards strengthening the capacity to implement OIE standards by provisions of the SPS of the WTO. Our role in veterinary public health was particularly emphasized during the COVID-19 pandemic, since experiences and capacities developed through earlier pandemic threats resulted in ready available laboratory and technical facilities for molecular SARS-CoV-2 detection in the wake of the unveiling COVID-19 pandemic (early 2020).

3. Achievements and experiences of the Veterinary Faculty Sarajevo during the COVID-19 pandemic

From laboratory confirmation of the first COVID-19 cases in Bosnia and Herzegovina (5 March 2020), our staff participated in crisis response teams and, so far, held over sixty national and regional media addresses promoting public awareness and dissemination of evidence/science based information. Our laboratories were included in the official laboratory detection system, first to sequence SARS-CoV-2 [17], then to establish the Alpha SARS-CoV-2 variant of concern (B.1.1.7) in BiH human samples [18] and to confirm and substantiate one-way transmission of the virus from infected humans to pets [19]. Since international quality accreditation (ISO/EC 17025) is not required for human diagnostic
laboratories in BiH, at times, only our laboratory results for molecular COVID-19 diagnostics were acceptable as a requirement for travelling to Austria, Germany and China. Similarly, many national sport bodies and diplomatic offices in BiH choose our laboratory services in providing testing and test results for their international travel needs. However, the recognition received and achievements accomplished did not go hand in hand with necessary and expected support from the relevant government health authorities. Despite proven capabilities, capacities and expertise supporting the official response to the COVID-19 pandemic and even ongoing contributions to other important public health issues, veterinarians in BiH are faced with suspicion and prejudice, shown to various extents by policy makers, the medical community and the public. This discouraging fact tends to be a common experience of veterinary professionals elsewhere as well [3, 4]. Most of our investment in laboratory equipment, facilities, expendables and hiring and training of additional staff came from internal resources, either by self-financing or from self-negotiated donations and partnerships. As a public institution, we faced additional challenges due to public expenditure cuts, slow and administratively demanding public procurement procedures, an employment ban and lag of the public administration, even more accentuated during the pandemic and consequent economic crisis. The Veterinary Faculty managed to triple SARS-CoV-2 molecular testing capacities from March 2020. Currently we are capacitated to run 320 COVID-19 samples daily using PCR-based methods. In regards to whole genome sequencing, we are able to sequence up to one hundred samples per week.

Out of the annual laboratory workload, 80% was accomplished in the second half of 2020, which consequently put a strain on the laboratories but also on other departments. The Faculty simultaneously and promptly needed to adapt to new educational processes (online), and we managed to complete curriculum plans in full. Hence, the most valuable asset in facing and solving the above challenges were our human resources, academic, technical and administrative, people who managed through joint efforts to meet and surpass their tasks, despite facing personal and professional risks and uncertainties along with direct pandemic consequences.

4. Lessons learned
Even though the COVID-19 pandemic provided an opportunity for better general perspectives of the veterinary profession in BiH and strengthened the significance and positive image of the Veterinary Faculty Sarajevo, such perception could be lost without strategic follow-up. This crisis brought to light the preparedness, self-reliance and adaptability of many other veterinary institutions worldwide, but also underlined a chronic lack of recognition and underinvestment for effective integration of our capacity, knowledge and possibilities in public health services. The most profound pandemic effects lie in endangerment of global food security, and disruption of food chains and markets, whereas veterinarians are uniquely placed, not just for assisting in the first response, but for continuous roles in combating lasting and broad consequences of existing and new emergencies [20]. Food security is an essential cornerstone of health and economic growth and, thus, is undeniably linked to global security [21]. Even more important than recognizing external factors impeding the veterinary profession’s public image, appreciation and significance, we are called to better exploit our internal strengths and capacities as well as to oversee the building of our future professional perspectives. The COVID-19 pandemic proved that interdisciplinary actions are an imperative, since only joining experiences, expertise and resources will prevent future pandemics and build capacities for socio-economic resilience and public health infrastructure in facing the challenges before us.

References
[1] Hollier P J, Fathke R L and Brown C C 2014 J. Am. Vet. Med. Assoc. 244 1130
[2] King L J 2006 CDC Morb. Mort. W. Suppl. 55 7
[3] Ferri M and Lloyd-Evans M 2021 One Health 100230
[4] Fathke R L, Rao S and Salman M 2020 One Health 100193
[5] Daszak P, das Neves C, Amuasi J, Haymen D, Kuiken T, Roche B, Zambrana-Torrelio C, Buss P, Dundarova H, Feferholtz Y, Földvári G et al. 2020 Workshop Report on Biodiversity and
Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services (Bonn, Germany: IPBES)

[6] Zhou P, Yang X L, Wang X G, Hu B, Zhang L, Zhang W, Si H R, Zhu Y, Li B, Huang C L et. al 2020 Nature 579 270–273

[7] McKee M 2020 Brit. Med. J. Online 369

[8] OIE 2020 Guidance for animal health laboratories: Veterinary laboratory support to the public health response for COVID-19 (Paris, France: OIE)

[9] Decaro N, Martella V, Saif L J and Buonavoglia C 2020 Res. Vet. Sci. 131 21

[10] Seric S, Fejzic N, Hodzic A, Zuko A and Caklovica F 2007 Proceedings of the 12th International Conference of the Association of Institutions for Tropical Veterinary Medicine (AITVM) (Montpellier, France)

[11] Fejzic N, Seric Haracic S, Dargatz D A, McCluskey B J, Cornwell S M, Salman M and Mumford E L 2008 Slov. Vet. Res. 45 43

[12] Cavaljuga S, Seric-Haracic S, Vasilj I, Scharninghausen J, Faulde M and Fejzic N 2009 Health Med. 3 183

[13] Haase M, Starick E, Fereidouni S, Strebelow G, Grund C, Seeland A, Scheunere C, Cieslikc D, Smietankad K, Mintad Z et. al 2010 Infect. Gent. Evol. 10 1075

[14] Cornwell S and Fejzic N 2011 Prehosp. Disaster Med. 26 51

[15] Šerić-Haračić S, Fejzic N, Saljic E, Hadžijunuzović-Alagić DŽ and Salman M 2018 Turk. J. Vet. Anim. Sci. 42 416

[16] BATA – National Institute for accreditation of Bosnia and Herzegovina 2021 List of accredited bodies, available at www.bata.gov.ba/Akreditirana_tijela/List-of-accredited-bodies.pdf (Sarajevo, Bosnia and Herzegovina: BATA)

[17] Goletic T, Konjhodzic R, Fejzic N, Goletic S, Eterovic T, Softic A, Kustura A, Salihefendic L, Ostojic M, Travar M et. al 2021 Bosn. J. Basic Med. Sci. 10.17305/bjms.2020.5381

[18] N1 News 2021 available at https://ba.n1info.com/english/news/british-coronavirus-strain-has-been-discovered-in-bih/

[19] University of Sarajevo News 2021 available at https://www.unsa.ba/en/novosti/unsa-faculty-veterinary-medicine-transmission-sars-cov-2-virus-human-pet-dog-determined

[20] Hashem N M, Gonzalez-Bulnes A and Rodriguez-Morales A J 2020 Animal welfare and livestock supply chain sustainability under the COVID-19 outbreak: An overview. Front. Vet. Sci. 7 679

[21] UN 2018 Sustainable development goals report (Rome, Italy: Department of Economic and Social Affairs of the United Nations Secretariat)