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Agroterrorism involving biological agents and related threats in Poland and Europe in the context of the COVID-19 pandemic and the war in Ukraine

Abstract

With the growing threat of agroterrorism and the highest level of risk in Poland and the European region since the Biological and Toxin Weapons Convention (1972) and the Additional Protocols to the Geneva Conventions (1977) came into force, it is important to analyse the challenges in the area of biosecurity and food security and make recommendations. The analysis carried out by the author of this article indicates that the COVID-19 pandemic has contributed to the dissemination of knowledge of the basics of microbiology and epidemiology and to the increased availability of low-cost, portable microbiological diagnostics, which may also have negative effects. The analysis took into account the possibility of foreign intelligence influencing food production in Poland, e.g. through disinformation via social media. Conclusions of the analysis include: expanding monitoring of the expert community and social media, strengthening the vigilance of food producers and agricultural experts, simulating introduction scenarios, studying radicalisation processes and using epidemiological assessment tools in case of alarming events.

Keywords:

agroterrorism,
bioterrorism,
food security,
biopolitics,
INFOOPS

No event in the 21st century has changed social life in Europe as much as the COVID-19 pandemic¹ and the war in Ukraine². The spread of the SARS-CoV-2 virus made microbiology and epidemiology one of the dominant topics of interest to a large part of the public for a time. Although public discourse during the COVID-19 pandemic was mainly concerned with human viruses, the knowledge gained can be extrapolated to infections caused by other pathogenic microorganisms.

Russia's war against Ukraine and rising fertiliser prices are deepening the global food crisis³. Russia, seeking, among other things, to undermine Ukraine's ability to export agricultural and food products, attacked Ukraine's transport infrastructure and de facto blocked Black Sea ports from the end of February to the end of July 2022 (exports of grain products from Ukrainian ports have resumed since August 2022 under cross-agreements via the UN and Turkey⁴).

The focus of the article is on the following questions⁵:

1. What impact has the COVID-19 pandemic and the war in Ukraine had on the agroterrorism phenomenon?
2. What benefits can potential terrorists achieve through agroterrorism and bioterrorism in a hybrid war environment?
3. To what extent has the previous barrier of having knowledge of microbiology and epidemiology, epizootics, epiphytic plants and having laboratory equipment and certain skills, which represents

¹ A. Jarynowski, M. Stochmal, J. Maciejewski, *Przegląd i charakterystyka prowadzonych w Polsce badań na temat społecznych uwarunkowań epidemii COVID-19 w jej początkowej fazie* (Eng. Overview and characteristics of ongoing research in Poland on the social determinants of the COVID-19 epidemic in its initial phase), "Bezpieczeństwo. Obronność. Socjologia" 2020, vol. 13, pp. 38–87.

² J. Maciejewski, *Grupy dyspozycyjne w systemie bezpieczeństwa państwa* (Eng. Deployment groups in the state security system), XXIII International Seminar series "Social systems research methodology", Wrocław, 7 IV 2022.

³ B. Radziejewski, *Widmo krąży po świecie. Widmo głodu* (Eng. A spectre looms over the world. The spectre of hunger), Nowa Konfederacja, 25 V 2022., <https://nowakonfederacja.pl/widmo-krazy-po-swiecie-widmo-glodu/> [accessed: 12 VIII 2022].

⁴ *Black Sea Grain Initiative*, Wikipedia, https://en.wikipedia.org/wiki/Black_Sea_Grain_Initiative [accessed: 12 VIII 2022].

⁵ The article is a continuation of the theses contained in the paper entitled: *(Re-)Emergence of agroterrorism during the food crisis*, presented by the author on 20 July 2022 for the NATO Centre of Excellence for Military Medicine, and a presentation entitled: *Agro/bio-terrorism in Europe? Analysis of selected suspicious biological events (significant from the One Health perspective) after 24.02.2022*, delivered on 25 X 2022 at the NATO BioMed Panel.

a certain limitation on the possibility of undertaking bio- and agroterrorist activities, been lowered for potential terrorists such as lone wolves and small organisations?

4. Who (inspired by whom), how and when could carry out an act of agroterrorism in Poland and the European region and what would the consequences be?
5. How can disinformation about biological weapons, food security and the COVID-19 pandemic affect the public?
6. What areas of interest related to biological weapons and biosecurity are most important in the face of contemporary threats?

Agroterrorism versus bioterrorism

The term agroterrorism⁶ implies not only a biological attack on livestock and crop production (this dimension is included in the broader term bioterrorism), but also an attack on means of transport and transportation, infrastructure, agricultural inputs, as well as having a negative impact on the social determinants of production (another criminal or terrorist action of the food type). Agroterrorism can involve the use of biological, mechanical, chemical or IT means, but for the purposes of this article only biological agents (along with supporting actions) will be discussed.

Activities of an agroterrorist nature can be carried out by a variety of actors. Due to the possibility of detection, these activities can be divided into:

- small-scale activities carried out by small terrorist organisations (e.g. environmental or religious organisations) that do not have to face detection;
- hybrid actions below the threshold (i.e. actions where protective mechanisms will not be effectively implemented) of the 1972 *Biological and Toxin Weapons Convention* (BTWC⁷) and the 1977 Additional Protocols to the Geneva Conventions (on the Protection

⁶ H. Keremidis et al., *Historical Perspective on Agroterrorism: Lessons Learned from 1945 to 2012*, “Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science” 2013, vol. 11, pp. 17–24. <https://doi.org/10.1089/bsp.2012.0080>.

⁷ *Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, done at Moscow, London and Washington on 10 April 1972.*

of Victims of International Armed Conflicts⁸) undertaken by states (e.g. attacks on supply chains or polarisation of food producers) or obstruction by aggressors to prove an act of terrorism. In these cases, much more weight is given to concealing the real principal.

The aforementioned legal acts are currently the two main international norms addressing the phenomenon of agro-terrorism. Pursuant to Article 1 of the Biological Weapons Convention: *Each State Party (...) undertakes never in any circumstances to develop, produce, stockpile or otherwise acquire or retain: 1) microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes.* It is worth mentioning that on 8 July 2022, contracting states to the Biological Weapons Convention were notified that Russia had triggered Article 5 of the Convention, obliging parties to cooperate with each other in resolving difficulties that may arise in connection with the purpose or application of the Convention, and called for a formal consultative meeting⁹. It took place from 1-5 September 2022 (this was the second time in history, following the 1997 Cuba vs USA case).

Article 54 of Protocol I and Article 14 of Protocol II to the Geneva Conventions concern the protection of assets essential to the survival of civilians. Pursuant to Article 14: *Starvation of civilians as a method of combat is prohibited. It is therefore prohibited to attack, destroy, remove or render useless, for that purpose, objects indispensable to the survival of the civilian population, such as foodstuffs, agricultural areas for the production of foodstuffs, crops, livestock, drinking water installations and supplies and irrigation works.*

It is known that pathogens used for agroterrorism activities were in the arsenal of the Soviet¹⁰ and US militaries and other countries¹¹. They were used before 1972, and therefore before the Biological Weapons

⁸ *Additional Protocols to the Geneva Conventions of 12 August 1949, concerning the Protection of Victims of International Armed Conflicts (Protocol I) and the Protection of Victims of Non-International Armed Conflicts (Protocol II), drawn up in Geneva on 8 June 1977.*

⁹ F. Lentzow, J. Littlewood, *Russia finds another stage for the Ukraine “biolabs” disinformation show*, Bulletin of the Atomic Scientists, 8 VII 2022, <https://thebulletin.org/2022/07/russia-finds-another-stage-for-the-ukraine-biolabs-disinformation-show/> [accessed: 12 VIII 2022].

¹⁰ M. Leitenberg, R.A. Zilinskas, *The Soviet biological weapons program: A history*, Cambridge 2012.

¹¹ Л.П. Жиганова, *Биотерроризм и Агротерроризм-Реальная Угроза Биобезопасности Общества*, “США и Канада: Экономика, Политика, Культура” 2004, vol. 417, no. 9, pp. 3-25 (it is worth exercising caution when analysing Russian sources, as there is a lot of propaganda in them, especially in the military field).

Convention (the Geneva Protocol of 1925 dealt only with biological agents, among other means, affecting humans in wartime¹²), including by countries that later joined NATO (this is the opinion among epizootiologists and epiphytologists). For example, in 1971, the United States most likely intentionally introduced the African Swine Fever Virus (ASFV) to Cuba¹³, as confirmed by, among others, Ukrainian participants in the Soviet epizootiological mission to Cuba¹⁴.

What is worrying is that, despite the existence of the Biological Weapons Convention, there are still at least 18 countries and territories (China, France, Iraq, Iran, Israel, Japan, Canada, North Korea, Cuba, Libya, Germany, South Africa, Russia, the United States, Syria, Taiwan, the United Kingdom and the terrorist organisation known as the Islamic State) almost certainly in possession of such weapons and in all likelihood, according to Stanisław Maksymowicz, a health expert, working on their new types¹⁵. The most expensive Biological Safety Level (BSL) 3 and 4 laboratories are not needed for this.

There are some important differences between bioterrorism in the narrow sense and agroterrorism. Infectious diseases can be classified according to the type of host. In Poland, the division into, among others, is used¹⁶:

- human hosts (diseases in this group are of greatest interest to the general population, special services and the medical community);
- animal hosts that are also vectors for diseases transmissible to humans (e.g. rabies, Lyme disease, outbreaks of highly pathogenic avian influenza in mammals, SARS-CoV-2 outbreaks in mink; they

¹² *Protocol concerning the prohibition of the use of asphyxiating, poisonous or similar gases and bacteriological agents in war.*

¹³ Б. Стегній, А. Герілович, А. Бузун, *Африканська чума свиней: історія, сьогодення та перспективи*, Київ 2015.

¹⁴ Private communication of the author of the article with current and retired employees of the Institute of Experimental Veterinary Virology in Kharkiv.

¹⁵ S. Maksymowicz, *Atak biologiczny i agroterrorystyczny na Polskę. Jakie scenariusze są prawdopodobne?* (Eng. Biological and agroterrorist attack on Poland. What scenarios are likely?), *Nowa Konfederacja*, 31 V 2022, <https://nowakonfederacja.pl/atak-biologiczny-i-agroterrorystyczny-na-polske-jakie-scenariusze-sa-prawdopodobne/> [accessed: 7 XI 2022].

¹⁶ A. Jarynowski, A. Semenov, V. Belik, *Perception of infectious diseases with animal and humans hosts on the Polish internet*, 20th Congress of the International Society for Animal Hygiene, Berlin, 5–7 X 2022, http://interdisciplinary-research.eu/wp-content/uploads/2022/08/Abstract-form-ISAH_jarynowski_corr.pdf. [accessed: 7 XI 2022].

are of moderate interest to the general population, with some peaks of a local nature; they receive attention from the special services, medical and veterinary communities);

- animal or plant hosts (diseases affecting these host groups are of virtually no interest to the general population and of little interest to the special services; they are of interest mainly to the veterinary and phytosanitary services and to stakeholders - farmers and ranchers, foresters, hunters, environmentalists).

In some countries, such as the UK, Ireland, Australia or New Zealand, awareness of epidemiological and food security appears to be very high (which may manifest itself, for example, in the number of scientific articles being written there on these issues¹⁷). This is also due to certain geographical factors and Poland is unlikely to match such a level of knowledge and exemplary supervision. However, it is apparent that there is a move towards North American and Western European standards in building knowledge of food safety or bioterrorism (e.g. it is taught in agricultural and biochemistry studies¹⁸). In Polish society, however, knowledge of and interest in these issues are still low, despite information campaigns¹⁹.

In the case of a biological attack, attackers may perceive the following factors as giving agroterrorism an advantage over bioterrorism²⁰:

- infectious material can be collected, processed and transported with minimal risk to one's own health;
- the risk of detection in the run-up to an attack is low (relatively weak oversight by intelligence, veterinary or phytosanitary agencies of biological agents²¹ that do not pose a threat to humans);

¹⁷ More than half (768 out of 1,336, i.e. 57%) of the scientific papers searched in the Scopus database using the key phrases “invasive species” and “infectious” are from at least one of these countries.

¹⁸ P. Cwynar, *Bioterroryzm – sylabus*, Wrocław University of Life Sciences, 2021, <https://sylabus.upwr.edu.pl/pl/document/7562fe08-5a02-4db5-8d31-d7144fdd99bb.pdf> [accessed: 1 XI 2022].

¹⁹ A. Jarynowski, A. Semenov, V. Belik, *Perception of infectious diseases...*

²⁰ A. Jarynowski, Ł. Krzowski, *BIO (AGRO) Terrorism/Crime in post-covid era in context of massive scale dissemination of microbiology/epidemiology knowledge*, “DiMiMED – International Conference on Disaster and Military Medicine”, Düsseldorf, 15–16 XI 2021, <https://events.military-medicine.com/media/landingpage/25/attachment-1639063402.pdf> [accessed: 12 VIII 2022].

²¹ Harmful biological agents such as a virus, bacterium, protozoan, fungus or toxin (editor's note).

- low cost yet high economic and food security impact (highly cost-effective measure²²);
- ideological and utilitarian motivations of potential agroterrorists²³, for example the EU Green Deal programme - attacks may be motivated by social tensions caused by the climate crisis and the associated need to reduce greenhouse gas emissions by reducing animal production; animal rights and animal welfare²⁴ - e.g. attacks on abattoirs or factory farms; unclean animals in Islam (e.g. pigs).

In contrast, the disadvantages of a biological attack, from the perspective of the attackers, compared to bioterrorism are²⁵:

- no panic effect and little interest in animal or plant diseases among the general public²⁶ (so getting a terrorist not related to agriculture or animals may be difficult);
- ethical dissonance²⁷ for a potential agro-terrorist encouraged to act on ideological grounds.

In the context of the phenomenon of agroterrorism, it is worth mentioning the idea of One Health, according to which the concept of health should not be seen solely in human terms, but should also include the well-being of animals and the environment as a whole²⁸. It is a concept that views the health of humans, animals, plants and the environment as elements of a single and interdependent system, in which human health

²² J. Monke, *Agroterrorism: Threats and preparedness*, <https://sgp.fas.org/crs/terror/RL32521.pdf>, p. 1 [accessed: 7 VIII 2022].

²³ *Debata Bezpieczeństwo żywnościowe Europy w świetle nadchodzących wyzwań* (Eng. Debate on European food security in the light of upcoming challenges), Instytut Gospodarki Rolnej, 2022, <https://instytutrolny.pl/debata-bezpieczenstwo-zywnosciowe-europy-w-swietle-nadchodzacych-wyzwan/> [accessed: 2 XI 2022]. Material has been archived: <https://web.archive.org/web/20221104152532/https://instytutrolny.pl/debata-bezpieczenstwo-zywnosciowe-europy-w-swietle-nadchodzacych-wyzwan/>.

²⁴ *Jedno zdrowie. Ludzie i inne gatunki* (Eng. One Health. Humans and other species), H. Mamzer, P. Białas (sci. eds.), Wrocław 2022, p. 11.

²⁵ A. Jarynowski, Ł. Krzowski, *BIO (AGRO) Terrorism/Crime in post-Covid era...*

²⁶ A. Jarynowski, A. Semenov, V. Belik, *Perception of infectious diseases...*

²⁷ H. Mamzer, *Choroba jako zjawisko społeczne. Analiza walki z afrykańskim pomorem świń* (Eng. Disease as a social phenomenon. An analysis of the fight against African swine fever), "Ruch Prawniczy, Ekonomiczny i Socjologiczny" 2020, vol. 82, no. 2, pp. 281–297. <https://doi.org/10.14746/rpeis.2020.82.2.19>.

²⁸ S.Y. Essack, *Environment: the neglected component of the One Health triad*, "The Lancet Planetary Health" 2018, vol. 2, no. 6, e238–e239. [https://doi.org/10.1016/S2542-5196\(18\)30124-4](https://doi.org/10.1016/S2542-5196(18)30124-4).

is inextricably linked to the wellbeing of animals and the environment, and diseases transmitted between humans, animals and the environment are strongly interconnected. Such a holistic approach is needed because there is a close relationship between human health, the condition of farm animals and wildlife and plant phytopathology, among others, and the differences between these groups have been introduced by humans and are largely artificial. Social determinants or infection control methods are in principle the same, but knowledge is built up in a siloed way (separately for fields such as medicine, veterinary medicine and plant protection). In the opinion of the author of this article, this siloed approach is maintained by officials²⁹ (separate laws on the prevention and control of infections and infectious diseases in humans; on the protection of animal health and the control of infectious diseases in animals; on the protection of plants against agrophages), and administrative procedures aimed at reintegration by the civil service (especially the combined administration) of knowledge from different fields are implemented in isolation from biological paradigms³⁰. The idea of One Health is gaining more and more importance and popularity. Following Poland's accession to NATO, the organisational structure of the military preventive medicine centres was adapted to the counter-threat paradigm developed within the framework of this approach (in accordance with NATO models adapted to Polish conditions by, among others, Jarosław Foremny)³¹.

²⁹ It is an opinion formulated on the basis of the author's experience in combating ASF, HPAI in poultry and mammals, COVID-19, work related to attempts to clarify and limit the effects of the ecological disaster on the Oder river, as well as minimising the risks of biological contamination of grain from Ukraine. In order to fully understand the issue, it is necessary to familiarise oneself with the applicable sanitary, veterinary and food law in the form of: EU regulations on the control of infectious diseases of humans, animals and plants; laws on the activities of the central government administration and local government units and the functioning of the relevant inspections; executive acts (in the form of regulations of the relevant ministers and the Prime Minister) on the cooperation of national inspections.

³⁰ M. Kędzierski, *Integracja czy połączenie. Analiza możliwości zwiększenia efektywności działania inspekcji weterynaryjnej oraz ochrony roślin i nasiennictwa* (Eng. Integration or merger. An analysis of options to increase the efficiency of the veterinary and plant protection and seed inspections), <https://efrwp.pl/publikacje/integracja-czy-polaczenie-analiza-mozliwosci-zwiekszenia-efektywnosci-dzialania-inspekcji-weterynaryjnej-oraz-ochrony-roslin-i-nasiennictwa/> [accessed: 7 VI 2023].

³¹ A list of these centres is available at: <https://www.gov.pl/web/obrona-narodowa/wojskowe-osrodki-medycyny-prewencyjnej> [accessed: 2 III 2023].

The impact of the COVID-19 pandemic on the phenomenon of agroterrorism

During the pandemic, many people were able to acquire knowledge related to the transmissibility of infectious diseases previously reserved for a small group of specialists. One of the counter-epidemic measures was to familiarise the public with this knowledge in order to reduce the incidence of COVID-19 (e.g. through the use of personal protective equipment or self-testing). This knowledge could be used in a variety of ways. The pandemic also forced advances in selected scientific fields, exposed global biological vulnerabilities and refocused attention on the possibility of targeted attacks using biological agents, which NATO experts identified as a possible risk factor³². Certain diagnostic techniques, such as point of interest/point of care (POI/POC), or portable diagnostics, have become more common, and therefore more accessible. In addition, there are advances in a number of biological, engineering and military sciences that also have the potential for dual use research of concern (DURC) and can be used to plan and execute terrorist attacks or sabotage using biological agents. In general, there have been scientific and technological advances in the fields of medicine, biology and technology for decades (as discussed, among others, at the nine BTWC review conferences), but according to the author, the changes in the last few years have been by leaps and bounds. Questions remain about the motivations for actions against the common good³³ and the processes leading to radicalisation. The COVID-19 pandemic has contributed to³⁴:

- increasing the ease of obtaining infectious material (knowledge of basic microbiology and pathogenesis). This consists of practice in sample collection and preparation (widespread self-testing on COVID-19), knowledge of immunological processes, viral load dynamics, seroconversion, susceptibility of individual organs and systems. In addition, to the development of synthetic biology using computational machine learning models³⁵ to predict toxicity

³² S. Clement, *Biological Threats: Technological Progress and the Spectre of Bioterrorism in the Post-Covid-19 Era*, <https://www.nato-pa.int/download-file?filename=/sites/default/files/2022-01/024%20STCTTS%2021%20E%20rev.%201%20fin%20-%20%20BIOLOGICAL%20THREATS.pdf> [accessed: 8 VIII 2022].

³³ A. Jarynowski, M. Stochmal, J. Maciejewski, *Przegląd i charakterystyka prowadzonych w Polsce badań...*, p. 73.

³⁴ A. Jarynowski, Ł. Krzowski, *BIO (AGRO) Terrorism/Crime in post-Covid era...*

³⁵ S. Clement, *Biological Threats: Technological Progress...*

or virulence and infectivity in different areas or ultimately genetic modification of bioagents;

- simplifying the verification of the infectious agent (access to diagnostics). The rapid advances in science resulting in the widespread availability of low-cost, portable microbiological diagnostics, e.g. in the form of cassette tests (especially the dissemination of practical skills in the use of these tools to a wider audience), although primarily used to combat the COVID-19 pandemic, also has side effects;
- increasing the ease of introduction (knowledge of basic epidemiology, including transmission pathways) - understanding the principles of the epidemiological triad (infectious agent, host and environment where conditions for transmission exist), transmissibility of infectious material, seasonality, understanding how epidemiological surveillance systems work.

The progress can be illustrated using the example of potential scenarios for the intentional introduction of ASF virus under pre-³⁶ and postcovid³⁷ conditions in Poland and Europe. It should be stressed that due to the technical drawbacks of using biological weapons against humans (the political consequences of their use against an aggressor, such as Russia, could be very serious) their use seems unlikely³⁸. Agroterrorism, on the other hand, is a real threat, especially as such actions need not be spectacular in nature and can be carried out below the detection threshold. Smaller local operations using sleeper agents are possible. The scale of agroterrorism can be difficult to estimate and the repertoire of actions

³⁶ A. Jarynowski et al., *ASF jako zagrożenie biologiczne w Polsce i na świecie* (Eng. ASF as a biological threat in Poland and worldwide), in: *Bezpieczeństwo regionalne. Węzłowe problemy i procesy*, P. Bajor (ed.), Kraków 2021, pp. 239–254. <https://doi.org/10.12797/9788381383899.14>.

³⁷ A. Jarynowski, Ł. Krzowski, V. Belik, *Afrykański pomór świń: epizootiologia, ekonomia i zarządzanie kryzysowe w kontekście naturalnego bądź intencjonalnego wprowadzenia* (Eng. African swine fever: Epizootiology, economics and crisis management in the context of natural or intentional introduction), “*Studia Administracji i Bezpieczeństwa*” 2021, vol. 11, no. 11, pp. 129–153. <https://doi.org/10.5604/01.3001.0015.6752>.

³⁸ G. Kessler, *How the right embraced Russian disinformation about ‘U.S. bioweapons labs’ in Ukraine*, “*The Washington Post*”, 11 III 2022, <https://www.washingtonpost.com/politics/2022/03/11/how-right-embraced-russian-disinformation-about-us-bioweapons-labs-ukraine/> [accessed: 7 VIII 2022].

is truly wide. Its effect may be to undermine food production and social polarisation in Poland and in the European region³⁹.

Epidemiological, epizootic, epiphytic analysis in the context of food security

Biological agents that endanger humans are quite well studied by the Polish scientific community. A search conducted by the Military University of Land Forces shows that between 2009 and 2018, an average of 10 scientific papers per year were published in the Polish literature on these agents⁴⁰. Zoonotic agents (causing zoonoses) remain a major area of research, as they are of medical importance. In contrast, the problem of infections not affecting the human population is largely overlooked. The topic of food safety is also popular (between 2009 and 2021 there were about 15 thematic papers per year by Polish authors⁴¹). Biological agroterrorism factors, on the other hand, are rarely discussed outside the agricultural science community. In the opinion of national experts, so far Poland has not appeared to be directly threatened by agroterrorism, especially towards plants⁴², which may be evidenced by the carelessness of Poles in dealing with invasive species or seeds of unknown origin. The low level of interest in the threat of agroterrorism against plants (as opposed to actions against

³⁹ A. Jarynowski et al., *African Swine Fever – potential biological warfare threat*, preprint, <https://easychair.org/publications/preprint/vjFf> [accessed: 7 VIII 2022].

⁴⁰ *Broń masowego rażenia, broń biologiczna, broń chemiczna, broń jądrowa. Cz. 2* (Eng. Weapons of mass destruction, biological weapons, chemical weapons, nuclear weapons. Part 2), K. Mordzak (elaborated), Wrocław 2019, https://www.wojsko-polskie.pl/awl/u/96/0c/960cad22-5698-4356-b8f5-38117fb19499/bron_cbn.pdf [accessed: 7 VIII 2022].

⁴¹ *Bezpieczeństwo żywnościowe*, K. Mordzak (elaborated), Wrocław 2021, https://www.wojsko-polskie.pl/awl/u/50/d4/50d46baf-332b-4acb-aeb3-8f5b17777590/bezpieczenstwo_zywnosciowe.pdf [accessed: 7 VIII 2022].

⁴² J. Lipa, *Agroterroryzm – wyzwaniem dla kwarantanny i ochrony roślin* (Eng. Agroterrorism - a challenge for quarantine and plant protection), "Progress in Plant Protection" 2006, vol. 46, no. 1, p. 167; M. Lenda et al., *Misinformation, internet honey trading and beekeepers drive a plant invasion*, "Ecology Letters" 2021, vol. 24, no. 2, pp. 165–169. <https://doi.org/10.1111/ele.13645>; M. Lenda et al., *Effect of the Internet Commerce on Dispersal Modes of Invasive Alien Species*, "PLoS ONE" 2014, vol. 9, no. 6, p.e99786. <https://doi.org/10.1371/journal.pone.0099786>.

animals⁴³), caused, inter alia, by the lack of documentation of such cases, may lead to dormant vigilance.

Potentially hostile terrorist organisations (funded by regimes such as the Russian Federation or China, or parastatal entities such as the Islamic State) can make use of a wide repertoire of tools and capabilities, such as mathematical modelling⁴⁴ and artificial intelligence, to optimise the effects of agroterrorist action. In particular, lone wolves (terrorists acting alone, not part of a larger terrorist network)⁴⁵ are worth noting whose activities are characterised by low budget and so-called kitchen microbiology or do-it-yourself microbiology. The increase in knowledge and development of technology caused by the COVID-19 pandemic may favour their agroterrorist activities. There are certain groups of medical, veterinary, agricultural or environmental and biological professions that, because of their expertise, may predispose them technically to agroterrorism. However, it is worth emphasising that the transmission patterns of infectious animal and plant diseases are relatively well known (due to the possibility of experimentation as opposed to human experimentation), and therefore a veterinary or plant protection specialist will more easily develop an effective introduction plan than a physician or representative of another medical profession. In the case of human diseases, there is less epidemiological knowledge and, despite billions of dollars spent on research, the basic characteristics of SARS-CoV-2 are still not known⁴⁶, e.g. ID50 (median infective dose)⁴⁷.

The use of the most dangerous animal and plant pathogens, such as ASFV or *Xylella fastidiosa* (a gram-negative bacterium that inhabits

⁴³ M. Wiśniewska, *The food terrorism – the essence and the methods of systemic defense*, “Journal of Modern Science” 2023, vol. 50, no. 1, pp. 331–349. <https://doi.org/10.13166/jms/161535>.

⁴⁴ A. Jarynowski, A. Grabowski, *Modelowanie epidemiologiczne dedykowane Polsce* (Eng. Epidemiological modelling dedicated to Poland), Portal CZM, 2015, <http://www.czm.mif.pg.gda.pl/wp-content/uploads/fam/publ/jarynowski2.pdf> [accessed: 7 VIII 2022].

⁴⁵ C.R. MacIntyre et al., *Converging and emerging threats to health security*, “Environment Systems and Decisions” 2018, vol. 38, no. 2, pp. 198–207. <https://doi.org/10.1007/s10669-017-9667-0>.

⁴⁶ S. Karimzadeh, R. Bhopal, H. Nguyen Tien, *Review of infective dose, routes of transmission and outcome of COVID-19 caused by the SARS-COV-2: comparison with other respiratory viruses*, “Epidemiology and Infection” 2021, vol. 149, e96. <https://doi.org/10.1017/S0950268821000790>.

⁴⁷ ID50 - the average infectious dose under natural conditions that causes 50% of those exposed to develop a disease.

the conducting tissue of plants), in disease-free areas can have serious consequences. Exports of products in infected or quarantine agrophage areas could be banned, resulting in losses of up to millions of euros per month.

Animal production

On a global scale, the main activities to supervise the risk of agroterrorism are carried out by the Food and Agriculture Organisation of the United Nations (FAO) and at European Union level by the European Food Safety Authority (EFSA). In Poland, the Veterinary Inspection is responsible for animal biosecurity⁴⁸. The development of epizootics depends on a number of factors, such as the density and size of farms, the level of bioassurance, interactions with the environment⁴⁹. Epizootics are characterised by an average rate of development, but usually a dozen or more kilometres per year (not taking into account the long-range leaps outside the functional area that happen via humans⁵⁰). By means of pathogen introduction, significant disorganisation of animal production (e.g. cutting supply chains) can be achieved in the medium term.

The World Organisation for Animal Health (WOAH, formerly Office International des Epizooties, OiE) used livestock diseases for its 2018 classification (this classification has now fallen out of use). Similarly, the US Centers for Disease Control and Prevention (CDC) classifies the causative agents of animal diseases into groups based on their level of risk⁵¹:

- group A is the highest risk - they cause severe disease, spread rapidly, easy to acquire infectious material, e.g. ASF, FMD (Foot and

⁴⁸ At: <https://bip.wetgiw.gov.pl/asf/mapa/> you can observe biohazard maps at national level, and at: <https://empres-i.apps.fao.org> – global.

⁴⁹ A. Jarynowski, V. Belik, *African Swine Fever (ASF) Virus propagation in Poland (Spatio-temporal analysis)*, preprint, https://www.researchgate.net/publication/338436134_African_Swine_Fever_ASF_Virus_propagation_in_Poland_Spatio-temporal_analysis [accessed: 7 VIII 2022]. <https://doi.org/10.13140/RG.2.2.29807.6167>.

⁵⁰ A. Jarynowski, V. Belik, *Spatio-temporal analysis of African Swine Fever Spread in Poland with network perspective*, preprint, https://www.academia.edu/43262326/Multilayer_network_approach_to_African_Swine_Fever_Spread_in_Poland [accessed: 12 VIII 2022].

⁵¹ OiE, *Classification of diseases notifiable*, <https://www.oie.int/en/animal-health-in-the-world/the-world-animal-health-information-system/old-classification-of-diseases-notifiable-to-the-oie-list-a/> [accessed: 29 VII 2022].

Mouth Disease), CSF (Classical Swine Fever), HPAI (Highly Pathogenic Avian Influenza);

- group B is medium risk - causes moderately serious diseases with low mortality rates, spreads moderately easily, e.g. brucellosis, salmonellosis.

World-class veterinary epidemiologist Dirk Pfeifer said that ASF (...) is *probably the most serious animal disease the world has had for a long time, if not ever*⁵². The ASF-induced pork shortage in China may have contributed to the transmission of SARS-CoV-2 from animals to humans, as it forced the search for alternative protein sources in wildlife⁵³. Certain organisations or individuals, acting for various motives, i.e. ideological, political or economic, may benefit from the introduction of ASF. A potential agroterrorist (coming from a naturalist background or no background at all, but having studied the biological mechanisms governing infectious diseases during the two years of the pandemic) will now be able to collect material and verify its infectivity and optimally introduce the pathogen into the selected area. Scenarios for the introduction of the ASF virus, including into Western Europe and western Poland, were presented by the article's author in September 2019 at the 3rd Jagiellonian Interdisciplinary Security Conference⁵⁴ and in October 2019 at the 44th BIOMED-EP meeting via the Polish delegation at NATO headquarters in Brussels⁵⁵, i.e. before the virus 'jumps' to western Poland and Germany⁵⁶. A distinction must be made between reports based on conspiracy theories, e.g. about helicopters dropping frozen wild boar bodies⁵⁷, and real deliberate actions by potential terrorists.

⁵² D. Normile, *African swine fever keeps spreading in Asia, threatening food security*, "Science", 2019, <https://www.science.org/content/article/african-swine-fever-keeps-spreading-asia-threatening-food-security> [accessed: 12 VIII 2022]. Translations in the article are from the author (editor's note).

⁵³ Wei Xia et al., *How One Pandemic Led To Another: Asfv, the Disruption Contributing To Sars-Cov-2 Emergence in Wuhan*, preprint, https://www.researchgate.net/publication/349628301_How_One_Pandemic_Led_To_Another_Asfv_the_Disruption_Contributing_To_Sars-Cov-2_Emergence_in_Wuhan [accessed: 7 VIII 2022]. <https://doi.org/10.20944/preprints202102.0590.v1>.

⁵⁴ A. Jarynowski et al., *ASF jako zagrożenie biologiczne w Polsce...*

⁵⁵ A. Jarynowski et al., *African Swine Fever – potential biological...*

⁵⁶ A. Jarynowski, Ł. Krzowski, V. Belik, *Afrykański pomór świń...*

⁵⁷ *Zarazone ASF dziki spadają z nieba? Mające być dowodem zdjęcie budzi poważne wątpliwości* (Eng. ASF-infected wild boars fall from the sky? The supposed proof photo raises serious doubts), Lublin112.pl, 22 VII 2018, <https://www.lublin112.pl/zarazone-asf-dziki->

For the sake of illustration, it is worth outlining a case study of a feasibility study for different potential introduction paths, involving the following steps⁵⁸:

- collection of infectious material (from wild boar carcasses, pork products, delivery by secret services or own breeding);
- processing of material and preparation for optimal transport (preparation of blood, tissue, body pieces, inoculum⁵⁹);
- introduction of infection (choosing the time and the targets and then injecting or feeding or watering wild boar or pigs) with infectious material.

The lack of success in combating infectious animal diseases became one of the reasons for the tensions between food industry representatives - government - environmentalists, which occurred in January 2019 (protests against sanitary shooting of wild boars⁶⁰), in October 2020 (projects such as animal welfare, the Five for Animals, combating ASF and HPAI⁶¹) or in July 2022 (among others, the issue of importing food products from Ukraine and the solidarity of Polish farmers with Dutch farmers)⁶². The scale of the agricultural protests, despite the COVID-19 pandemic and the war, is clear. In Poland they are organised on a smaller scale, but in other EU countries they are larger in scope and more violent. Animal rights activists have already carried out acts of diversion during the full Russian invasion of Ukraine (February 2022). On 19-20 June 2022, they caused the deaths

spadaja-nieba-majace-byc-dowodem-zdjecie-budzi-powazne-watpliwosci/ [accessed: 7 VIII 2022].

⁵⁸ A. Jarynowski, Ł. Krzowski, *BIO (AGRO) Terrorism/Crime in post-Covid era...*; A. Jarynowski et al., *ASF jako zagrożenie biologiczne w Polsce...*

⁵⁹ *Inokulum* (Latin) – a suspension of virus particles, bacterial cells or fungal spores (sometimes fragments of filaments) pathogenic to a plant, prepared by a human being for the purpose of artificially infecting the plant (inoculation). From: Encyklopedia PWN, <https://encyklopedia.pwn.pl/haslo/inokulum;3914841.html> [accessed: 10 V 2023] – editor's note.

⁶⁰ A. Jarynowski et al., *African Swine Fever Awareness in the Internet Media in Poland – exploratory review*, “E-methodology” 2019, vol. 6, no. 6, pp. 100–115. <https://doi.org/10.15503/emet2019.100.115>.

⁶¹ H. Mamzer, *Choroba jako zjawisko społeczne...*, p. 293.

⁶² A. Jarynowski et al., *Animal breeders protests in Polish Twitter - preliminary research*, preprint, http://interdisciplinary-research.eu/wp-content/uploads/2022/04/animal_related_protests_in_twitter_preprint_pdf.pdf [accessed: 12 VIII 2022].

of 130 animals and extensive material damage at piggeries and slaughterhouses in Bocholt and Schermbeck, Germany⁶³.

Climate change (and perceptions of it) is another factor that is intensifying environmental movements. Among other things, demands are being made to reduce animal production responsible for greenhouse gas emissions by reducing demand and supply. This is leading to the emergence of a new sub-category of environmentalists - potential participants in acts of agro-terrorism, as animal rights activists have so far been the main category of perpetrators⁶⁴.

Plant production

At EU level, the agrophages to be monitored or quarantined, i.e. the most dangerous pathogens, pests and weeds that reduce crop yields, are identified by the International Plant Protection Convention (IPPC) in cooperation with the FAO and EFSA. In Poland, the supervisory authority is the State Plant Health and Seed Inspection Service (PIORiN)⁶⁵. Particular attention should be paid to the agrophages: *Xylella fastidiosa* (a bacterial pest of, inter alia, olive trees which, according to EFSA, is the most serious problem in the EU⁶⁶), *Candidatus Liberibacter solanacearum* (a bacterium causing the potato disease known as zebra chip), *Ralstonia solanacearum* (a bacterium causing the potato disease known as slime mold) and *Colletotrichum fructicola* (a fungus causing a disease of fruit, e.g. apples). Due to specific epidemiological cycles in plant pathogenic agrophages (e.g. sowing with a seed cycle), the rate of spread of epiphytosis depends on many factors, such as crop structure, weather conditions and climate. The rate is usually slow - rarely exceeding a few kilometres per year (sometimes there are

⁶³ A. Deter, *50 verummte Aktivisten blockieren Bocholter Schlachthof* (Eng 50 masked activists block Bocholt slaughterhouse), Topagrar, 20 VI 2022, <https://www.topagrar.com/schwein/news/aktivisten-blockieren-bocholter-schlachthof-13131573.html> [accessed: 7 VIII 2022].

⁶⁴ *Bridging the expertise of the animal health and law enforcement sectors*, <https://www.woah.org/app/uploads/2023/02/building-resilience-against-agro-crime-and-agro-terrorism.pdf> [accessed: 4 III 2023].

⁶⁵ At: <https://www.sygnalizacja.agrofagi.com.pl> agrophage risk maps can be observed at national level, and at: <https://gd.eppo.int> - global.

⁶⁶ European Food Safety Authority (EFSA), *Update of the Xylella spp. host plant database - systematic literature search up to 31 December 2021*, "EFSA Journal" 2022, vol. 20, no. 6, e07356. <https://doi.org/10.2903/j.efsa.2022.7356>.

long-range jumps due to human activity). Consequently, with the help of agrophages it is difficult to achieve results in a short time (the exception is the targeted use of locusts). However, the introduction of an invasive agrophage can have far-reaching effects on the ecosystem that are difficult to model or predict⁶⁷.

Colletotrichum fructicola is worth a closer look⁶⁸. This pathogen spreads slowly. Infection can occur through direct contact with the mycelium and through the airborne route - spores can be carried short distances by wind and by mechanical vectors in the form of insects. Two outbreaks of infection have been reported in Italy and one in France between 2019 and 2021. Poland, which accounts for a third of EU apple production, has a high host potential. However, *Colletotrichum fructicola* is a climate-dependent pathogen (it is unlikely to survive winter in Poland outside of the fruit storage system), so intentional introductions for natural reasons and phytosanitary measures are only likely to be single-season.

Disinformation on biological weapons and food - a theoretical contribution

Biological weapons have enormous intimidation potential. This was demonstrated by the Russians when, with the subject of alleged secret US laboratories on Ukrainian soil, they began a series of public invectives by the Russian Ministry of Defence⁶⁹ in the form of a series of presentations in 2022 (10 and 17 March, 14 April, 27 May, 17 June, 7 July, 4 August, 3 and 19 September). It should be noted that the theme of infectious animal diseases, mainly ASF and avian influenza, ran through each of them. Igor Kirillov, commander of Russia's Radiological, Chemical and Biological Defence Forces, repeatedly stressed that the Russians had 'acquired' evidence

⁶⁷ A. Jarynowski, F. Lopez-Nunez, H. Fan, *How network temporal dynamics shape a mutualistic system with invasive species?*, preprint, <https://arxiv.org/ftp/arxiv/papers/1407/1407.4334.pdf> [accessed: 7 VIII 2022]. <https://doi.org/10.48550/arXiv.1407.4334>.

⁶⁸ EFSA Panel on Plant Health (PLH), *Pest categorisation of Colletotrichum fructicola*, "EFSA Journal" 2021, vol. 19, no. 8, e06803.

⁶⁹ И. Кириллов, *Тезисы брифинга начальника войскарадиационной, химической и биологической защиты ВС РФ генерал-лейтенанта И.А. Кириллова* (material of the Ministry of Defence of the Russian Federation collected by the author from the Telegram channel, available from the author on e-mail request).

of biological experiments on humans, as well as pigs, wild boars, birds or insects, being carried out on Ukrainian territory⁷⁰. At the UN Security Council session on 11 March 2022, there was a confrontation between the US and Russia⁷¹. In addition, on 8 July 2022 Russia triggered, as already mentioned, Article 5 of the Biological Weapons Convention and called for a formal consultative meeting. In August and September 2022, an inspection proceeding was held against the US and Ukraine (allegations or insinuations about Poland could have been made there, which is why the observation of a formal meeting of states parties to the Biological Weapons Convention was very important, as Poland is, after the US, Ukraine, Germany, the next target of Russian propaganda on biological weapons⁷²). It is therefore worthwhile for Poland to prepare for this in advance (on 9 September 2022, at the formal meeting of states parties to the Biological Weapons Convention, the Polish representative presented a position in Geneva that coincides with that of the EU). According to US analysts, Russia may be attempting in this way to mask the use of biological agents as part of a staged incident or their use in support of tactical military operations⁷³. In September 2022 Kirillov changed his stance, pointing to the nuclear threat. The reason may have been the failure of the biological weapons campaign.

The internal narrative within Russia⁷⁴ has long featured the theme of Poland developing biological weapons. Both in the media and in 'scientific' studies, there are anecdotes on the subject, some of which date back to the Polish-Moscow wars (from the 16th to the 18th century). Most allegations are based on the mythical Polish biological programme of the inter-war period developed during and after the Polish-Bolshevik war (1919–1939)⁷⁵ and as part of the activities of the Polish Underground

⁷⁰ Ibid.

⁷¹ S. Maksymowicz, *Atak biologiczny i agroterrorystyczny na Polskę...*

⁷² A. Jarynowski, Ł. Krzowski, S. Maksymowicz, *Biological mis(dis)-information in the Internet as a possible Kremlin warfare* (draft), <https://zenodo.org/record/8081493> [accessed: 26 VI 2023].

⁷³ Ibid.

⁷⁴ I. Kiriya, *From "Troll Factories" to "Littering the Information Space": Control Strategies Over the Russian Internet*, "Media and Communication" 2021, vol. 9, no. 4, pp. 16–24. <https://doi.org/10.17645/mac.v9i4.4177>.

⁷⁵ There was indeed such a programme, but it concerned research into biological and toxin weapons protection, and enemy propaganda has exploited and is exploiting its existence for its own ends.

State (1939–1945). In Russia’s external narrative, techniques used against Poland (mainly through Polish-language propaganda channels or channels resonating with Russian propaganda⁷⁶) are primarily used to create anxiety⁷⁷.

To explore public engagement with biopolitical topics, it is worth using media monitoring⁷⁸. Potentially pro-Kremlin accounts participating in the discourse on the war are also known to appear (more than 50 times more likely to be involved) in the discourse on the anti-covid and vaccine protests⁷⁹. Consequently, quite a lot can be deduced about public sentiment from the dynamics of social media discourse, even in areas not necessarily at first sight related to the war (such as biopolitical issues). It is noteworthy that the rather unusual dynamics of interest in Germany in the COVID-19 vaccination with the Oxford/AstraZeneca vaccine⁸⁰ (and especially in vaccines’ adverse events⁸¹) bear the hallmarks of foreign

⁷⁶ *Analiza i dekonstrukcja rosyjskich przekazów dezinformacyjnych oraz propagandowych na temat Polski i Polaków* (Eng. Analysis and deconstruction of Russian disinformation and propaganda messages about Poland and Poles), <https://infowarfare.pl/realizowane-projekty/> [accessed: 25 VI 2023]; M. Marek, *Rosyjska dezinformacja w Polsce – cele i przekazy* (Eng. Russian disinformation in Poland - targets and messages), Centrum Badań nad Współczesnym Środowiskiem Bezpieczeństwa, 30 III 2022, <https://infowarfare.pl/realizowane-projekty/> [accessed: 25 VI 2023].

⁷⁷ T. Helmus et al., *Russian social media influence: Understanding Russian propaganda in Eastern Europe*, Santa Monica 2018.

⁷⁸ A. Jarynowski, *Infodemiologia oraz infonadzór – doświadczenia doby pandemii* (Eng. Infodemiology and infosurveillance - the pandemic experience), in: *Epidemiologia i bezpieczeństwo CBRN. Nauka, innowacje, implikacje praktyczne*, A. Mróz-Jagiello, J. Walczak (eds.), series: Epimilitaris, Zielonka 2022, pp. 235–248.

⁷⁹ When one draws 50 German-language Twitter accounts engaged simultaneously in anti-vaccine and anti-sanctions discourse during the COVID-19 pandemic and compares their engagement in war discourse at the start of the Russian invasion in 2022, one finds that on average 49 accounts can be classified as pro-Kremlin and only one as pro-Ukrainian. See: A. Jarynowski, *Pro-Kremlin German Twitter users are more likely to be involved in both anti-lockdown and anti-vaccine discourse than Anti-Kremlin users*, preprint, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4079045 [accessed: 7 VIII 2022]. <https://dx.doi.org/10.2139/ssrn.4079045>.

⁸⁰ D. Jemielniak, Y. Kremvovich, *An analysis of AstraZeneca COVID-19 vaccine misinformation and fear mongering on Twitter*, “Public Health” 2021, vol. 200, pp. 4–6. <https://doi.org/10.1016/j.puhe.2021.08.019>.

⁸¹ V. Belik, A. Jarynowski, *Elucidating the interplay of COVID-19 epidemic and social dynamics via Internet media in Germany*, on-line conference “Preparedness for future pandemics from a global perspective”, 15 XI 2021, <https://zenodo.org/record/6400773#.ZGRny3ZByUk> [accessed: 7 VIII 2022].

intelligence interference (potentially Russian⁸², but some analysts also point to Chinese⁸³ as part of overt and covert vaccine diplomacy⁸⁴).

In Poland, distinguishing between the pro-Kremlin and anti-Kremlin narrative is not as easy as in Germany, where the invasion is supported more overtly. In Poland, it is less clear-cut⁸⁵ and requires more intensive work by services such as the Internal Security Agency, the Military Counterintelligence Service, as well as the National Security Bureau. It is worth emphasising that the way in which Russian propaganda is conducted varies from country to country or from medium to medium, so as a rule, Polish services should focus more on their own empirical analyses⁸⁶ than on the world literature (especially from the US⁸⁷). Jarynowski and co-authors noted that certain accounts appeared in all discourses and often in atypical positions (e.g. in discourses on coronavirus⁸⁸ or lockdowns⁸⁹ appearing on the right, but acutely in the context of ASF eradication they clustered with

⁸² EEAS, *Short assessments of narratives and disinformation around the Covid-19 pandemic (update December 2020 - April 2021)*, EUvsDisinfo, 28 IV 2021, <https://euvsdisinfo.eu/eeas-special-report-update-short-assessment-of-narratives-and-disinformation-around-the-covid-19-pandemic-update-december-2020-april-2021/> [accessed: 7 VIII 2022].

⁸³ A. Lipińska, *Chińskie operacje w dobie COVID-19. Dezinformacja – metody, dziedziny i ewolucja* (Eng. Chinese operations in the era of COVID-19. Disinformation - methods, fields and evolution), “Cyber Security and Law” 2022, vol. 7, no. 1, pp. 61–71.

⁸⁴ *What next for vaccine diplomacy?*, “The Economist”, 3 V 2021, <https://www.economist.com/podcasts/2021/05/03/whats-next-for-vaccine-diplomacy> [accessed: 7 VIII 2022].

⁸⁵ *W okresie ostatnich 48 godzin dynamicznie rośnie zagrożenie dezinformacyjne w tematyce wydarzeń #Ukraina #Rosja w polskiej przestrzeni internetowej* (Eng. In the last 48 hours, the disinformation threat in the topic of #Ukraine #Russia events in the Polish online space has been growing dynamically), IBIMS, <https://ibims.pl/komunikat-ws-szerzenia-dezinformacji-ws-sytuacji-na-ukrainie-w-polskiej-przestrzeni-internetowej/> [accessed: 7 VIII 2022].

⁸⁶ A. Jarynowski, *Pro-Kremlin German Twitter...*

⁸⁷ D. Broniatowski et al., *Vaccine Communication as Weaponized Identity Politics*, “American Journal of Public Health” 2020, vol. 110, no. 5, pp. 1378–1384.

⁸⁸ A. Jarynowski et al., *Attempt to understand public health relevant social dimensions of COVID-19 outbreak in Poland*, “Society Register” 2020, vol. 4, no. 3, p. 20. <https://doi.org/10.14746/sr.2020.4.3.01>.

⁸⁹ A. Jarynowski, D. Płatek, *Sentiment analysis: Topic modelling and social network analysis. COVID-19, protest movements and the Polish Tweetosphere*, in: *The Covid-19 Pandemic as a Challenge for Media and Communication Studies*, London 2022, pp. 210–224. <https://doi.org/10.4324/9781003232049-21>.

the ideological left⁹⁰. The only pattern linking these attitudes is to work against One Health through biological denialism⁹¹.

In view of the above, the issues of the food crisis, biological laboratories and the COVID-19 pandemic can also be viewed as the subject of information operations (INFOOPS) and psychological operations (PSYOPS)⁹². In the context of the existence of the infodemia phenomenon⁹³ (as we could see during the COVID-19 pandemic⁹⁴) the involvement of foreign intelligence, through so-called bot armies, troll farms, agents of influence or useful idiots, in the discourse on infectious diseases plays a major role⁹⁵. Unfortunately, in this information war⁹⁶ we are dealing with a very well-prepared and experienced opponent who will use food and biological agents for propaganda purposes, as this makes it easier for him to influence Polish society. However, it is worth emphasising that it is not Poland, but mainly the countries of the Global South, which depend on cheap food imports from Russia and Ukraine, that are the main theatre of information activities. Therefore, it is important to keep a close eye on what kind of moods are aroused there and whether shortages of grain supplies could trigger unrest and, consequently, a wave of migration.

⁹⁰ A. Jarynowski et al., *African Swine Fever – potential biological...*

⁹¹ M. Duplaga, *Znaczenie kompetencji zdrowotnych w świecie infodemii* (Eng. The importance of health literacy in a world of infodemia), Institute of Public Health, <https://izp.wnz.cm.uj.edu.pl/pl/blog/projekt-znaczenie-kompetencji-zdrowotnych-w-swiecie-infodemii/> [accessed: 7 VIII 2022].

⁹² *Analiza i dekonstrukcja rosyjskich przekazów dezinformacyjnych...*

⁹³ According to the WHO definition, infodemia is an excess of information, including false or misleading information, during an epidemic (editor's note).

⁹⁴ G. Eysenbach, *How to fight an infodemic: the four pillars of infodemic management*, "Journal of Medical Internet Research" 2020, vol. 22, no. 6, e21820.

⁹⁵ R. Kasprzyk, *Modelowanie i analiza procesu złośliwego sterowania ludźmi* (Eng. Modelling and analysis of the process of malicious human control), in: *CyberExpert 2021 – Metody i narzędzia w procesie tworzenia cyberzdolności Sił Zbrojnych RP – wyzwania i perspektywy*, Warszawa 2022, pp. 9–28.

⁹⁶ J. Richards et al., *Introduction to the Special Issue section: Challenges for the state and international security – the current state and prognosis for the future*, "Security and Defence Quarterly" 2022, vol. 37, no. 1, pp. 1–3. <https://doi.org/10.35467/sdq/147537>.

Disinformation on biological weapons and food - an empirical contribution⁹⁷

In order to perform an auxiliary analysis of media content in terms of biopolitical themes, tools designed for media monitoring were used (according to the internal definitions of these tools regarding searching, filtering and classifying online material). BuzzSumo was used to obtain a collection of materials published in media with a large reach (according to the tool's definition) in the form of passive websites of traditional broadcasters and online portals (textual form) and video materials (audiovisual form), i.e. published in so-called content media, without distinguishing the type of medium. Using Brand24, mentions were obtained with a distinction between social-content media and non-social media. Thanks to an academic account to the API, posts from Twitter were collected. Relative daily search counts for individual phrases on Google were obtained using the Google Trends tool. After analysing the Polish-language content published between 24 February and 1 August 2022 for the occurrence of the keywords "biolab", "bioweapons" and their variants, 65 articles and multimedia posted on traditional media websites, i.e. radio, television, press, and passive web portals with the largest reach, and 396 tweets were found. As many as 41% of mentions in social-content media had negative overtones (mainly expressing web users' anger at the United States and Ukraine for conducting 'illegal' research or fear of a biological attack on Poland), which testifies to the strong emotional character of the discourse. It is worth noting that the interest of the Polish public in the topics of biological laboratories and biological weapons (based on Google queries) was 2.6 times higher than in Russia and twice as high as in Germany. The waves of interest closely correlate with the uptake of Russian propaganda (which was most evident in March 2022). The peak of this activity in the Polish media was between 9 and 24 March 2022 (which is less than 10% of the total time frame). During this period, as many as 72% of queries on Google, 49% of articles on passive websites and content media and 43% of tweets were recorded. It follows that the Kremlin's influence on Polish society has had an effect in the sense that it has created a wave of interest.

Between 24 February and 1 August 2022, a monitoring of Polish language content for phrases such as "hunger", "food security", along with

⁹⁷ A. Jarynowski, Ł. Krzowski, S. Maksymowicz, *Biological mis(dis)-information in the Internet...*

their variants, was also carried out using the same tools and for the same media. 958 articles and multimedia and 59 453 tweets were found. Only 33% of non-social media and social media mentions were negative. This may be due to the fact that the discussion via these media was multithreaded, with one thread being about the support given by Polish farmers to Dutch farmers in the summer of 2022 (unity effect⁹⁸) and the overtones of these materials were positive. In the case of hunger, there was a fairly even distribution of interest. It is interesting to note that digital traditional media slightly increased interest in the topic between 24 April and 23 May 2022 (e.g. discussions of food exports from Ukraine). The highest number of searches (13% more than the average) on Google took place between 24 February and 14 April 2022 (a symptom of anxiety related to the start of the war), above-average interest on passive websites and online portals and content media was recorded between 23 May and 24 June 2022 (discussion of Ukrainian grain and Poland's role in transport), and increased activity on Twitter between 4 and 14 July 2022 (a large proportion of tweets were about agricultural protests in the Netherlands and negotiations on access to Ukrainian grain in Poland or by unblocking the Odessa ports), reflecting the different dynamics of interest in the targeting of different media. It is noteworthy that the widespread fear of a food crisis and the overpricing of food products in Poland had already died out by April 2022⁹⁹. Therefore, it seems that Kremlin propaganda in the first phase of the conflict in Ukraine fuelled the fear of food overpricing and later shifted the focus to the potential threat to Polish agriculture from the influx of cheap food from Ukraine. The reason for the significant increase in interest in social media in July 2022 is largely due to topics related to the arrival of Ukrainian grain in Poland and to solidarity protests with Dutch farmers against EU programmes such as the Green Deal or From Field to Table¹⁰⁰, conducted, for example, via accounts linked to the Agrounia organisation.

⁹⁸ A. Jarynowski et al., *Animal breeders protests in Polish Twitter...*

⁹⁹ A. Jarynowski, Ł. Krzowski, S. Maksymowicz, *Biological mis(dis)-information in the Internet...*

¹⁰⁰ J. Barreiro Hurlé et al., *Modelling environmental and climate ambition in the agricultural sector with the CAPRI model*, JRC Publications Repository, <https://publications.jrc.ec.europa.eu/repository/handle/JRC121368> [accessed: 7 VIII 2022].

Short-term perspective (2022–2023)

At the time of writing (August–October 2022), the BRAVO terrorist threat alert level was in force in Poland and it appears that it will be maintained until the end of 2023, and possibly even raised. In view of the above, it is recommended to intensify monitoring, e.g. by NATO countries' intelligence, among professionals (including medical, veterinary, agricultural personnel) towards radicalisation or agentic activities in Poland and the European region¹⁰¹. More so, research should continue, with a security dimension, into the social determinants of pandemics and war, especially in terms of people with a commitment to the current situation. The following phenomena can be expected (listed in order from most to least likely):

- polarisation of food producers towards the rest of society. It is worth noting that the farmers' protests in the Netherlands (the immediate reason for which was the commitment to reduce the meat and dairy herd as part of a wider process linked to the introduction of the Green Deal programme¹⁰²) can be used by Russian propaganda centres to reinforce social polarisation along already existing lines of conflict¹⁰³;
- disinformation about the US (with Polish participation¹⁰⁴) biological laboratories (e.g. using the UN forum to diminish the credibility of the US government and allies among their own citizens¹⁰⁵ and to gain the support of third countries), and it is precisely the fight against foreign propaganda (especially from the Russian Federation and ISIS) that has been identified as one of the priorities for terrorism research in Poland¹⁰⁶;

¹⁰¹ A. Jarynowski et al., *African Swine Fever – potential biological...*

¹⁰² Reducing cattle and pig populations is one of the objectives of international policies to reduce greenhouse gas emissions. Action to combat climate change or defend animal rights has the potential for dual use and may or may not also be used for hostile purposes.

¹⁰³ M. Piekarski, *Możliwe scenariusze zagrożeń terrorystycznych na terytorium Rzeczypospolitej Polskiej w kontekście zagrożeń hybrydowych* (Eng. Possible terrorist threat scenarios on the territory of the Republic of Poland in the context of hybrid threats), "Terroryzm – studia, analizy, prewencja" 2022, no. 2, pp. 71–92. <https://doi.org/10.4467/27204383T.ER.22.019.16339>.

¹⁰⁴ A. Jarynowski, Ł. Krzowski, S. Maksymowicz, *Biological mis(dis)-information in the Internet...*

¹⁰⁵ G. Kessler, *How the right embraced Russian disinformation...*

¹⁰⁶ D. Szlachter, *Terroryzm w Polsce i kierunki jego rozwoju. Wyniki badań ankietowych (skrótowy*

- increased action against infrastructure and the agricultural supply chain (e.g. using pro-environmental organisations);
- introduction of plant or animal pathogens into disease-free areas (e.g. ASF could jump to the Netherlands, which could further intensify protests).

As a destabilising tool in the form of agroterrorism is relatively readily available, it is first and foremost necessary to ask what tactical or operational objectives, which may be part of actions at the strategic level, a hostile country, such as Russia, can achieve with it. The range of agroterrorist activities is very wide and is not limited to biological agents¹⁰⁷. It is possible, for example, to use a computer virus to cause the thawing of strategic meat reserves or the contamination of water in rivers irrigating fields¹⁰⁸, or the spraying of chemicals onto fields in the Vistula delta by drones sent from the Kaliningrad region¹⁰⁹. In countries with a strong agricultural position, but geostrategically acting very cautiously towards Russia, such as the Netherlands, France, Italy, Germany and Spain, agroterrorism supported by dis- and misinformation can be used to trigger waves of social unrest urging the governments of these countries to pressure Ukraine to end the war. Unfortunately, with the potential escalation of the situation in the Middle East and the threat of Islamic fundamentalism in Western Europe, attacks using so-called kitchen microbiology (agroterrorist agents seem to be the best means for small organisations and lone wolves in this case) are possible. On the other hand, in countries openly supporting Ukraine, such as Poland, the Baltic and Nordic countries, the Czech Republic, Slovakia, Moldova, Romania and the UK, a more important target could be the undermining of food security and the long-term reduction of food production capacity. China's capabilities and objectives in a hybrid war against the US and its allies should also be watched closely, as its

raport) (Eng. Terrorism in Poland and trends in its development. Survey results (summary report)), "Terrorism - studies, analyses, prevention" 2022, no. 2, pp. 335-363. <https://doi.org/10.4467/27204383TER.22.022.16342>.

¹⁰⁷ S. Maksymowicz, *Atak biologiczny i agroterrorystyczny na Polskę...*

¹⁰⁸ A. Jarynowski, *Katastrofa na Odrze ukazała dysfunkcjonalność działania instytucji państwa* (Eng. The disaster on the Oder river has demonstrated the dysfunctionality of state institutions), *Nowa Konfederacja*, 22 VIII 2022 r., <https://nowakonfederacja.pl/katastrofa-na-odrze-ukazala-dysfunkcjonalnosc-dzialania-instytucji-panstwa/> [accessed: 7 VIII 2022].

¹⁰⁹ A. Jarynowski, *Disconnecting the Kaliningrad oblast and new threats from Polish perspective*, "Bre Reviews" 2022, no. 3, <https://sites.utu.fi/bre/disconnecting-the-kaliningrad-oblast-and-new-threats-from-polish-perspective/> [accessed: 7 VIII 2022].

development in biotechnology has increased there in recent years, and in an even more decisive way in bioinformatics (through machine learning and artificial intelligence¹¹⁰). In a way, biotechnological progress was forced by previous epidemic outbreaks experienced in China (e.g. SARS-CoV-1 in 2002-2003, A/H5N1 influenza in 2003-2006).

Medium-term perspective (next few years)

The COVID-19 pandemic has contributed to a large increase in knowledge and development of technologies designed to combat infectious diseases, but at the same time, the same knowledge and technologies can be used to deliberately introduce pathogens. Until now, bioterrorism has been the domain of organisations with adequate financial resources and, above all, specialists and laboratories, as well as highly intelligent individuals capable of constructing a home laboratory¹¹¹. Today, the threshold is much lower, as there has been a revolution in the availability of information and technology. Biological agents have acquired the status of “weapons of mass destruction for the poor”, due to the ease of acquisition (knowledge of basic microbiology and pathogenesis), verification of the infectious agent (access to diagnostics) and introduction (knowledge of basic epidemiology, such as transmission routes).

It is interesting to note the paradox of Poland as a country where employment in the agri-food industry (15%) and food services or food trade (10%) reaches a total of 25%¹¹², and the level of interest in and knowledge of infectious animal or plant diseases is among the lowest in the EU (e.g. in the specific case for which international data are collected, i.e. knowledge of antibiotics¹¹³). This means that, on the one hand, specialist

¹¹⁰ V. Bergengruen, *Tech Leaders Warn the U.S. Military Is Falling Behind China on AI*, Time, 18 VII 2023, <https://time.com/6295586/military-ai-warfare-alexandr-wang/> [accessed: 15 VIII 2023].

¹¹¹ M. Dąbrowski, *Koronawirus, broń biologiczna a wojsko (opinia)* (Eng. Coronavirus, biological weapons and the military (opinion)), Defence 24, 15 III 2020, <https://defence24.pl/sily-zbrojne/koronawirus-bron-biologiczna-a-wojsko-opinia> [accessed: 8 VIII 2022].

¹¹² M. Kędzierski, *Integracja czy połączenie...*

¹¹³ For example, the Q5 series of questions in: *Special Eurobarometer: Antimicrobial resistance (in the EU)*, Directorate General for Communication, European Union, 2018, https://data.europa.eu/data/datasets/s2190_90_1_478_eng?locale=en [accessed: 26 VI 2023].

knowledge is being built up separately about bioterrorism and food security, but an interdisciplinary approach to agroterrorism in its broad sense - biological, agricultural, social, economic or political - is lacking. The situation with the environmental catastrophe on the Oder river in the summer of 2022 showed the services of other countries what are the weaknesses of One Health security in Poland¹¹⁴, allowing the creation of attack scenarios demonstrating the inefficiency of Polish services¹¹⁵. In the fight against the spread of diseases threatening One Health, early identification and rapid alerting of any unusual event are of paramount importance. The Oder disaster highlighted that rapid diagnosis and response appropriate to the threat may be a weakness of regional One Health inspections (i.e. State Sanitary Inspectorate, Veterinary Inspectorate, Plant Protection and Seed Inspection, Pharmaceutical Inspectorate, Environmental Inspectorate).

This poses a whole new challenge to the deployment groups¹¹⁶, because until now bioterrorism could only be chosen by a small percentage of radicals, but now the number of people who have acquired the relevant competences can be even an order of magnitude higher. Actually, it is not competence that is now a barrier, but motivations. Consequently, the recommended monitoring of specialist communities (including biomedical personnel as before), carried out for example by the intelligence of NATO countries, seems no longer sufficient and it is necessary to expand this group to include veterinary, agricultural and other communities (especially as it is not clear how the war in Ukraine will end), as completely new non-professional actors have acquired sufficient potential to carry out a successful introduction of the infection into a new area. In the case of hybrid threats from states such as Russia, soft targets may be chosen (as Islamic organisations have typically done) rather than critical infrastructure or military facilities, as has been the case to date¹¹⁷.

¹¹⁴ A. Jarynowski, *Katastrofa na Odrze...*

¹¹⁵ M. Piekarski, *Możliwe scenariusze zagrożeń terrorystycznych...*, p. 80.

¹¹⁶ A. Kołodziejczyk, J. Maciejewski, P. Pieńkowski, *Grupy dyspozycyjne w dobie pandemii Covid-19* (Eng. Deployment groups in the era of the Covid-19 pandemic), XVIII Sociological Convention, Warszawa 2022, <https://zjazdpts.pl/grupy/grupy-dyspozycyjne-w-dobie-pandemii-covid-19/> [accessed: 2 XI 2022].

¹¹⁷ M. Piekarski, *Możliwe scenariusze zagrożeń terrorystycznych...*, p. 84.

However, there are still issues and factors that condition the face of agroterrorism in Poland and the European region that are not written about in this article. With regard to the phenomenon of agroterrorism, compensatory measures are being taken (e.g. operational measures by the services against overtly pro-Kremlin media propagating biological denialism or cracking down on radical circles) and competitive processes are taking place (e.g. with the passage of time, knowledge acquired during a pandemic is forgotten, and therefore competence capital may decrease). Countries and organisations have set their sights on acquiring resilience and will be more prepared to combat infectious diseases (and the infodemic phenomenon that may accompany them)¹¹⁸. On the one hand, the development of knowledge and technology favours the phenomenon of bioterrorism, but on the other, it allows better protection against it. The future will show which processes will occur faster.

Summary and recommendations

Depending on the method used, agroterrorism can achieve a tactical objective (e.g. to provoke protests) or an operational objective (e.g. to inflict heavy damage on the economy). This ‘weapon of mass destruction for the poor’ can be used by a small group of terrorists or even by a single determined person who has an agricultural, veterinary or biomedical background or has acquired basic microbiological-epidemiological knowledge during a pandemic and is able to understand scientific articles and information published on the internet and apply this knowledge in practice¹¹⁹. The weapon is only the combination of the biological agent with the means of its delivery or transport, and in the case of lone wolf operations living in an area where they want to carry out an attack, advanced engineering and technical knowledge is often not needed. In view of the importance of biosecurity (as demonstrated by, inter alia, the COVID-19 pandemic) and food security (especially as food exports contribute significantly to Poland’s GDP) sensu largo (along with PSYOPS and INFOOPS), these issues should be taken into account when working

¹¹⁸ *Germany open Hub for Pandemic and Epidemic Intelligence in Berlin*, World Health Organisation, 1 IX 2021, <https://www.who.int/news/item/01-09-2021-who-germany-open-hub-for-pandemic-and-epidemic-intelligence-in-berlin> [accessed: 12 VIII 2022].

¹¹⁹ A. Jarynowski et al., *ASF jako zagrożenie biologiczne w Polsce...*

on the next editions of the National Security Strategy of the Republic of Poland¹²⁰.

The most important conclusions and recommendations from the conducted analysis are as follows:

1. The deliberate introduction of animal or plant pathogens into a disease-free area used to be relatively simple, and has now become even simpler¹²¹.
2. Due to the food crisis and the war in Ukraine, the threat of agroterrorism is now at its highest since the signing of the Biological Weapons Convention. After the Odessa ports were unblocked, the threat has diminished, but if they are blocked again the problem could return - both in real and media terms.
3. Poland, the Nordic countries, the Baltics and the UK appear to be the most vulnerable to action by the Kremlin, and Germany and France to action by ISIS (so other introduction scenarios may apply).
4. The vigilance of food producers and veterinarians or plant protection specialists and their interest in potential agroterrorist threats should be increased (especially in the coming years).
5. It is worth conducting exercises and simulations on the basis of likely introduction scenarios (e.g. introduction of ASF in the Netherlands, FMD in Greater Poland or apple agrophages in the Lublin region) in a hybrid action paradigm¹²², using ready-made introduction scenarios¹²³.
6. A system of constant observation of traditional and social media should be developed to monitor the potential impact of Kremlin propaganda and to detect actors resonating with it in real time¹²⁴.
7. A system should be set up to monitor the risk of radicalisation in

¹²⁰ *Strategia Bezpieczeństwa Narodowego Rzeczypospolitej Polskiej* (Eng. National Security Strategy of the Republic of Poland), https://www.bbn.gov.pl/ftp/dokumenty/Strategia_Bezpieczenstwa_Narodowego_RP_2020.pdf [accessed: 13 III 2023].

¹²¹ A. Jarynowski, Ł. Krzowski, *BIO (AGRO) Terrorism/Crime in post-Covid era...*

¹²² A. Jarynowski, Ł. Krzowski, V. Belik, *Afrykański pomór świń...*

¹²³ M. Piekarski, *Możliwe scenariusze zagrożeń terrorystycznych...*, p. 80.

¹²⁴ A. Jarynowski, *Dyskurs antyszczepionkowy i koronascptyczny a prokremlowska propaganda w niemieckim Twitterze* (Eng. Anti-vaccine and coronascptic discourse and pro-Kremlin propaganda on German Twitter), Public Health Blog, 22 V 2022, <https://izp.wnz.cm.uj.edu.pl/pl/blog/publikacja-dyskurs-antyszczepionkowy-i-koronascpetyczny-a-prokremlowska-propaganda-w-niemieckim-twitterze/> [accessed: 7 VIII 2022].

the veterinary and agricultural professions and among the new category of post-pandemic professionals.

8. The use of reliable risk assessment tools, i.e. based on scientific evidence¹²⁵, e.g. the Grunow & Finke tool (GFT)¹²⁶ or the Agricultural Index¹²⁷ should be promoted.

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¹²⁵ A. Jarynowski, *Agro/bio-terrorism in Europe?...*

¹²⁶ X. Chen, A.A. Chughtai, C.R. MacIntyre, *Recalibration of the Grunow–Finke assessment tool to improve performance in detecting unnatural epidemics*, “Risk Analysis” 2019, vol. 39, no. 7, pp. 1465–1475.

¹²⁷ R. Sequeira, *Safeguarding production agriculture and natural ecosystems against biological terrorism: A U.S. Department of Agriculture emergency response framework*, “Annals of the New York Academy of Sciences” 1999, vol. 894, no. 1, pp. 48–69. <https://doi.org/10.1111/j.1749-6632.1999.tb08043.x>.

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