

Biological mis(dis)- information in the Internet as a possible Kremlin warfare

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Abstract

Background: Although much emphasis is placed on the foreign intelligence driven disinformation and other associated phenomena, there is almost no attempt to reveal its impact on biological denialism. The article discusses the use of narrations via ICT in biological denialism terms against Europe, particularly Poland, and provides examples of such narratives such as the "Ukrainian biolabs", animal breeders protests, infectious disease among refugees and food insecurity. Means of possible influence of foreign intelligence on European public health and agricultural (mainly animal) production (i.e. by dis(mis)-information in social media) in context of agro/bio-terrorism are attempted. Our goal is to raise awareness among One Health specialists and security managers about empirical symptoms of the Kremlin in fueling the Polish (European) Internet.

Methods: The study employs both qualitative (12 months) and quantitative (5 months) methods to assess digital traditional and social media after 24.02.2022. 1) We assessed qualitatively media releases in Russian about biological weapons and compared them with official documents released by Russia for the Biological Weapon Convention (BWC) meetings. 2) We performed quantitative analysis of the Polish infosphere between 24.02-01.08.2022 to measure the effectiveness of external Russian propaganda on causing anxiety and fear in Polish society the context of biological weapons and food insecurity 3) Additionally we attempted qualitatively material from 01.02.2022-31.01.2023 to understand the potential use of misinformation in the context of biological weapons, food insecurity, infectious diseases among Ukrainian refugees and agroterrorism as a form of propaganda. 4) The study also applies calibrated Grunow & Finke and Agricultural Index epidemiological assessment tools (per analogy of viral information) to animal breeders' protests in the Netherlands and their supporters in Poland.

Results: Due to the lifecycles and content of narration in One Health we can observe adaptive behavior of Russian Intelligence: 0) "Prewar" on refugees diseases; 1) "Fresh" war with the highest interest in all biological concerns with high degree of fear of bioweapon and hunger; 2) "Normalization" phase with the discussion about refugees diseases; 3) "Pre Odessa treaty" phase with intensification of food related issue; 4) "Post Odessa treaty" phase with decrease of all biological narration; 5) "Infection season" phase with returning infections topic and the last 6) farmer protests and food/feed biological quality.

Conclusion: In our opinion, the strategic goals of Russian INFOOPS (information operations) were not achieved (i.e. as we see less and less impact on Polish infosphere after failure of BWC consultation and failure of hunger threats). The "Biolab" disinformation campaign is purely a product of propaganda offices or PR agencies and was without any kind of attention to biological integrity. However, fueling polarization and fear in food insecurity, animal breeders' protest and refugees' health may be interpreted in PSYOPS (psychological operations) dimension, so operational goals of Russian intelligence were satisfied as popularity and social consequences of biological denialism raised in 2022 and continue in 2023 (for instance in context of grains).

Keywords: agroterrorism, bioterrorism, food security, biopolitics, INFOOPS / PSYOPS

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1. Introduction

The aim of this study is to analyze communication processes in a security bio/agro-terrorism perspective. The problems of “food crisis”, “biolabs”, “COVID-19” and other infectious diseases, appearing in the media can be analyzed in two basic dimensions: the INFOOPS (information operations) and PSYOPS (psychological operations) (Marek, 2022a). From the perspective of infodemiology, as we have learned well during the pandemic (Eysenbach, 2020), it is very important to understand potential engagement of foreign intelligence in the discourse on infectious diseases through “bot army”, “troll farm”, influence agents, or ordinary so called “useful idiots” (Kasprzyk, 2022).

Unfortunately, Poland is dealing with a well-prepared and experienced in using the information warfare enemy who might use biological agents for propaganda purposes, because it allows for a low cost populational effect. Hybrid risks pose a threat to the contemporary security environment. Exploration of the methods used by the Kremlin around biological topics in attempts to influence Polish and other European societies (both open and possibly hidden) is a burning issue right now (Pamment, 2022).

Infodemiology and infoveillance

Mis(dis)-information content may be manually or automatically disseminated using social bots, artificial intelligence, trolling and micro-targeted advertising. There are plenty institutes between the EU (de Place Bak et al., 2022) and NATO (Pamment, 2022) to combat biological this disinformation, particularly in the Eastern Partnership countries, by establishing a task force within the framework of the European External Action Service (EEAS) East Strat Com - EUvsDisinfo, aimed at monitoring the pro-Kremlin media and the propaganda they spread, which is currently of particular importance during the ongoing war in Ukraine and intensified information warfare activities at that time.

Nowadays researchers widely used online social media data to investigate the behavioral and affective dynamics of the public during COVID-19 pandemics, however non-English European languages are highly underrepresented and other infectious diseases are not covered at all (Jarynowski, Wójta-Kempa, & Belik, 2020). This approach could offer biomedical description from a deeper socio-cultural context. There is a need for researches directly concerning, which direction biological information security policy should follow upcoming years and present an analysis of official Russian narratives and possible shadowed influence of Kremlin Intelligence.

To do so, analysis of the data collected from Internet social media using state-of-the-art machine learning methods (i.e. quantitative media analysis of secondary data) should be performed. Understanding the importance of biological risk perception (i.e. concepts of risks or attitudes towards prevention and treatment) requires sociological interdisciplinary methods in the area of preventive infectious disease control. COVID-19 pandemic demonstrated, that the veterinarianization or medicalization paradigm where the interactions are described in purely biological terms, have some limits. In particular, actions of human actors, participating in the disease/biological threats discourse, are driven by social dynamics and on the other hand biopolitics - understood after Michel Foucault as all sorts of techniques to intervene in and control populations, especially by medicine (Arnason, 2012). Our approach aims to fill this gap and analyse the social feedback (backlash) leading to biological denialism.

Infodemiology is very useful in understanding social dynamics during epidemics, acting a supplementary role to standard tools as surveys (Eysenbach, 2020; Jarynowski, Wójta-Kempa, & Belik, 2020), infoveillance could be useful for public health decision makers (i.e. in early warning systems of prevalence estimation (Jarynowski, Semenov, Kaminski, et al., 2022) or burden of measures (Jarynowski, Semenov, Kamiński, et al., 2021)), but it should also be remembered, that the COVID-19 pandemic was also a potential area of hybrid activities below the threshold of war. Thus, the COVID-19 pandemic and its related mis(dis)-information have encouraged Western governments and international organizations to introduce media monitoring programs (WHO-World Health Organisation- <https://www.who-ears.com/>, ECDC - European Centre for Disease Prevention and Control <https://github.com/EU-ECDC/epitweetr>) or media regulation (censorship).

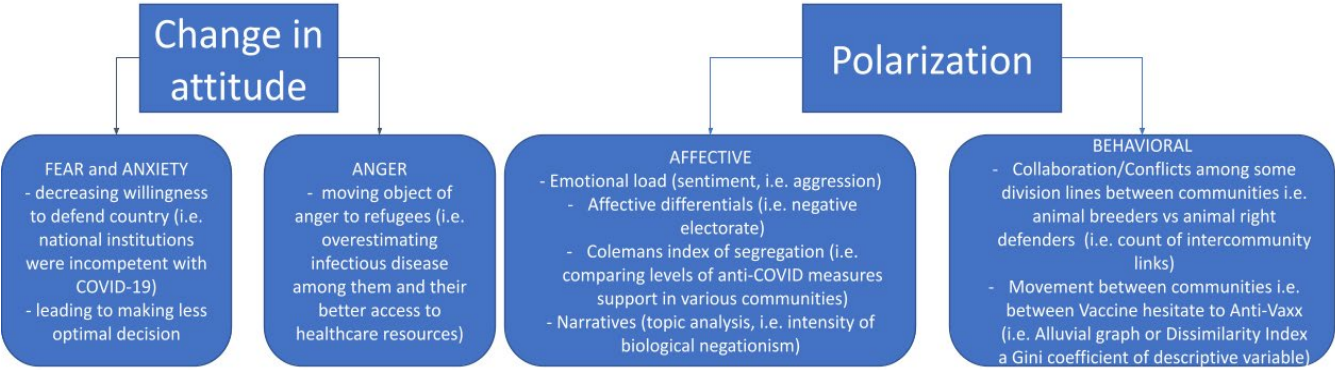


Fig. 1. Theoretical framework for biological driven effects of war propaganda. Adopted and extended from: Jarynowski, Semenov, Wójta-Kempa, et al., 2021.

Classic typology of influence techniques in a broad sense is divided into: propaganda, misinformation, disinformation, and mal-information (Kasprzyk, 2022).

Propaganda is manipulation of populations by pretending communication.

Misinformation in the biological field is inaccurate or misinterpreted information which can propagate as a rumor (Grabowski & Jarynowski, 2016) (i.e. on possible adverse events of vaccines), or a mistake, publishing unverified reports without a purpose to do harm.

Disinformation is strictly deliberate and includes malicious content as fake news, which produce and spread false information (for example on “Ukrainian biolabs”) with a purpose to do harm.

Malinformation is producing and spreading (partly) true information with a purpose to do harm, for instance the danger of infectious diseases of refugees. Contrary to classical propaganda (Legucka & Kupiecki, 2022), mis-(dis) information no longer aims to convince anyone (i.e. that Sputnik V is the best anti COVID-19 vaccine available). Its task is to undermine trust in information (i.e. mainstream media will not tell us any infectious threats coming with refugees), authoritative (i.e. Polish Sanitary Inspection is abusing its power).

Although most of the efforts of researchers and fact-checkers is concentrated on a narrowed form of dis-information, experts from European digital media observatory (de Place Bak et al., 2022) suggest, that concern should be expanded by non-intentionality modified/propagated information, often described as misinformation. Thus, these techniques uses offensive information operations by interfering with the process of achieving situational awareness, and the purpose of which is to evoke in a given population a specific picture of reality (DKWOC, 2022).

To conduct dis/mis-information campaigns, Russia employs a synchronized mix of traditional (TV, radio, newspapers and their digital forms) media and news website aimed to far/left right social media content (often with unclear attribution) with gaining visibility with the use of agent of influence, bots, trolls and useful idiots (Helmus et al., 2018).

How social and traditional media are used as Russian information warfare in biological context?

In order to analyze the external involvement, media monitoring should be used (Jarynowski, 2022c). Moreover, association between pro-Kremlin narration and vaccine diplomacy (Wiśniewska, 2021) and hesitancy (Broniatowski et al., 2018) is not a new phenomenon. As COVID-19 vaccines uptake is promoted in state sponsored media inside Russia, anti-vaccination attitudes are fuelled to the international audience (Kiriya, 2021).

It is worth emphasizing that the rather unusual dynamics of interest in Oxford/AstraZeneca product (Jemielniak & Kremppovych, 2021) and especially in its adverse events (Belik & Jarynowski, 2021) in Europe shows signs of interference by foreign intelligence (potentially Russian (EEAS, 2021)), but also some analysts also point to Chinese (Lipińska, 2021) vaccine diplomacy (Economist, 2021). Russia-sponsored traditional and social media have been marked by the European External Action Service (EU counter disinformation agency) as propagating dis-/mis-information during Covid-19 pandemic in Europe (EEAS, 2020, 2021). According to surveys, the highest “coronasceptic” protest potential was present mainly among the far right and to some extent far left part of the electorate (Lamberty et al., 2022) and a similar mosaic can be found on Twitter (Jarynowski, Semenov, et al., 2020; Jarynowski & Płatek, 2022). Thus, both fractions of the far right and far left side of the European political sphere did not support sanctions issued by the European Parliament on 01.03.2022 against Russia after invasions on Ukraine. Even after the full scale Russian invasion, the medical community was so reluctant to this problem, and there is literally no article published in an indexed medical journal on the link between Kremlin narration and anti-vaccine and anti-lockdown movement in Europe till the end of 2022 (Jarynowski, 2022f). On the other hand, the dis(mis)-information phenomenon in infodemic concepts was carefully studied, but foreign influence was a taboo, at least in Europe. So, the fake-news (a direct element of disinformation) in this war started in 2022 is constructed in very different ways, but all contain most of the elements derived from the fake news construction matrix (Terp & Breuer, 2022).

Biological disinformation vs misinformation

Biological “negationism” or more commonly called “denialism” is the term that describes the use of rhetorical tactics to give the illusion of arguments against the scientific consensus (Hoofnagle & Hoofnagle, 2007). In the "Western world", biological denialism is most often manifested in relation to the occurrence of biological evolution, food safety (which is of greatest importance in the general population), genetically modified organisms, the effectiveness and safety of vaccinations, the impact of obesity on health, the existence of biological sex, the effectiveness of chemotherapy and radiotherapy in oncological treatment, the existence of HIV and AIDS, non-pharmacological strategies for combating COVID-19, combating pests (e.g. bark beetle) and epizootics (e.g. ASF).

The use of informational operations in infectious disease by the Kremlin has already a long history (Leitenberg, 2020). Soviet military scientists have proposed multiple cybernetic frameworks of sociotechniques as reflexive theory by Lefebvre or action theory of Leontiev (Kasprzyk, 2022). Denialism of HIV and AIDS (Field, 2004) by the Easternblock (for internal audience) caused a parallel (para-)medical network of support in these countries in the 1980s (emergence of HIV in USSR was “confirmed” in 1987 and the problem officially had not existed before). Social movements formed resources (i.e. social capital) linked to possession of a durable network of organized relationships in opposition to official government. On the other hand, the Kremlin (for external audiences) ran a disinformation campaign that the US government had synthesized the HIV virus and released it in Africa. Alternative social structures with intellectual capacity and biomedical knowledge existed in communist countries a few decades ago and are still alive in historical memory (Vlassov, 2017). Conspiracy theories are usually a pillar for denialism (Kowalska-Duplaga & Duplaga, 2023). Thus, Russian One Health elites are experienced in creating alternative biology as well as are aware of the consequence of circulation of alternative medical information.

As obvious fake news (i.e. conspiracy theories about vaccines) and obvious engagement of Russia sponsored media (i.e. vaccine diplomacy) are relatively easy to detect due to multiple fact-checking agencies, the emphasis should be placed on the so called “gray area” of intelligence (Kasprzyk, 2022). There is high uncertainty in threats identification, because pro-healthy and biologically correct content is also produced by pro-Kremlin media. There are plenty of possible explanations of this kind of pro-Kremlin engagement in the infosphere. For instance, Mark Owen Jones (Jones, 2022) and David Broniatowski (Broniatowski et al., 2020) are suggesting that one of the tactics of pro-Kremlin agents of influence is mixing opposing content (presenting views of both sides) to get higher reach and cause confusion. Increasing polarization of society in Poland by fuelling biological denialism [Fig. 1], not only affects the One Health security of the country, but also may reduce the defense capabilities (Kuczabski, 2019).

Goals

Current war in Ukraine can be seen as a theater of competing models of social influence (Dolinski & Grzyb, 2022) because it is a powerful tool that governments and other entities use to shape public opinion and gain support for their actions via manipulating the media to decrease (i.e. adherence to biomedical guidelines) or increase (i.e. biological denialism) acceptance of certain narrations. Understanding the nature of use of biological

threats and biological denialism in modern information warfare (hybrid war) on traditional and social media appears to be a key challenge. To measure the impact of Kremlin campaigns, their goals have been anticipated. The substantive scope of the study includes analysis of adaptive narration, which might determine the effectiveness of its impact on the society. We want to understand the scale and main features of Kremlin influence which may lead to assessing questions such as how sanitary, veterinary and food inspectors can detect them and protect the population from manipulation in health promotion campaigns.

In Poland, however, it has long been noticed that certain social media users appear strangely in all discourses, often in positions unusual for them. For instance, in discourses around the coronavirus (Jarynowski, Wójta-Kempa, Płatek, et al., 2020) or lockdowns (Jarynowski & Płatek, 2022) appearing on the right political spectrum, but precisely in the context of combating ASF (african swine fever), they clustered together with the ideological left (Jarynowski et al., 2019). The only pattern linking these attitudes is acting to the detriment of the One Health through biological denialism (Duplaga, 2022).

The officially Kremlin-sponsored Polish-language media has been active in anti-vaccine and anti-lockdown propaganda (EEAS, 2020), however this process was marginal until the activities of these portals were totally blocked after February 2022 (Marek, 2022b). Thus, many researchers suggested that Polish society may be quite immune (Baraniuk, 2021) to obvious biological Russian propaganda/disinformation, however we show that it is not the case for gray misinformation campaigns.

Socio-political environment

The secondary objective of the study was to investigate the multidimensionality of narrations after 24.02.2022 in a security perspective and to systematize selected issues as biolabs in Ukraine, food insecurity and animal breeders protests as crisis and strategic communication.

Biological dis(mis)-information is a tool in cyberwarfare and biopolitics (use of political power to regulate and control biological processes and populations). Biopolitics refers to the ways in which governments and political leaders have used their power to respond to the biological threats (i.e. pandemic, bioterrorism), including measures, which could drive backlash and protest. Making biopolitical decision-making impose the trade-offs between public health and individual freedom and may have significant impacts on individual and collective bodily autonomy. Cyberwarfare may use inference in the local infosphere on biological and digital espionage by foreign governments and intelligence

agencies to disrupt biological/health integrity or social-economic structure, and influence socio-political outcomes in One Health.

Biological disinformation campaigns are carried out to manipulate the information ecosystem for sociological (polarization), economic (cause indirect losses to targeted economy) and political goals. Currently, in the field of agroterrorism, we have two basic acts of international law:

- BWC: Biological Weapons Convention (Leg BWC, 1972) Art. 1. "(...) not to develop, produce, stockpile or otherwise acquire or store: microbes or other biological agents or toxins (...) which are not justified for prophylactic, protective or other peaceful purposes." States party to the Biological Weapons Convention were notified on 07.08.2022 (Lentzow & Littlewood, 2022) that Russia has triggered Art. V and called for a formal meeting (this is the second time in history after the case of Cuba vs. USA in 1997);
- Geneva Convention (Leg Geneva Convention, 1977) Protection of victims of (non-) international armed conflicts – Protocol I (art. 54), II (art. 14). "Starvation of civilians as a method of combat is prohibited. It is therefore forbidden to attack, destroy, remove or render unusable (...) such as foodstuffs, agricultural areas for producing foodstuffs, crops, livestock (...)"

It is known since the XX century that biological weapons have some potential for socio-political influence, as the Russians recently showed with the injected topic of alleged secret US laboratories. „American Biolabs” concept is not new. In 2007 USA was accused in Russian media for introducing ASF to Russia via Georgia (Jarynowski et al., 2019; Trotta et al., 2022). This narration focused on the accuse that “the disease was caused by the Pentagon working out its strategy and tactics of biological war” and the allegations referred even to a possible origin of the virus in the laboratory because of the resilience to a new sylvatic cycle (without soft-ticks as in Africa) which “proves that it was developed in a biological laboratory and that the U.S. military bio-lab in Georgia” (Jarynowski, 2022d). The so-called “conspiracies theories” as role of “Big Pharma” or “bio-weapon laboratories” were discussed in Poland, however to a smaller extent than in Germany for instance (Jarynowski, 2022f).

Rising fertilizer prices in the world, Russia’s war against Ukraine and actions weakening Ukraine’s ability to export agri-food products could affect the global food crisis in short- and medium-term perspective (Radziejewski, 2022). Russia also attacked Ukraine’s transport infrastructure and de facto blocked the Black Sea ports completely from the end of February to the end of July 2022 as since August, under cross-agreements via the UN and Turkey, exports of cereal products from Ukrainian ports were resumed. Although,

hybrid actions below the threshold of the BWC (Leg BWC, 1972) and the Geneva Protocols (for the protection of victims of armed conflict (Leg Geneva Convention, 1977)) by states (e.g. attacks on supply chains or the polarization of food producers) are making it difficult to prove as an act of terrorism (Radosavljevic et al., 2018).

2. Methodology

Measuring the social interest in/around SARS-CoV-2 and COVID-19 in the Internet media arises in terms of technological capacity during the epidemic. Thus, collected material could be analyzed similarly to more popular topics like the elections in order to search for the footprint of foreign intelligence (Zhuravskaya et al., 2020). Quantifying dynamics of interest (demand and supply of content) and discourse patterns.

Internet trace is a digital footprint of social activities (secondary document analysis). Media analysis of the social processes is often performed with the help of SEO-marketing solutions as Brand24, SentiOne, Sentimenti, SoTrender (used by Infodemic management by WHO). OIE/WOAH (World Organisation for Animal Health) and JRC (Joint Research Centre) use MedSYS, FAO (Food and Agricultural Organization) uses PadiWeb (Valentin et al., 2021) mining engines. Media monitoring serves as a complement to longitudinal surveys, allowing to monitor of public perception in real time. The spread of dis(mis)-information is currently one of the main tools of war propaganda (DKWOC, 2022), as well as a tool for the aggressor to conduct destabilizing and destructive actions in cyberspace.

Infodemiology

Traditional and Social (New) media is also becoming a tool for the white intelligence, the so-called “OSINT” (open-source intelligence). The most important material for Military infodemiology can be found (Jarynowski, 2022c) in:

- Google, Yandex trends,
- Social media monitor (mainly Twitter and Telegram, but also TikTok, Instagram),
- Nationwide and local media monitor.

Statistical models of obtaining data can be applied to i.e. classify users (Jarynowski, 2022f; Röckl et al., 2023), ML tools for topic, sentiment analysis, AI tools for bots and trolls as well as audio and vision manipulation detections (Kasprzyk, 2021).

Possible Kremlin activity on the Internet may refer to the formation of European’ (Poles) opinions [Fig. 1] i.e. to induce fear of diseases and also to polarize society (Marek, 2022b). Social media is not only an increasingly popular communication channel, but also one of the arsenals of information warfare as well as one of the theaters of hybrid war.

In Poland, in contradiction to other European countries, Russian state media like Sputnik or RT were not specifically popular, so even when they were banned in EU since March 2022, other less obvious actors (mainly on social media) were and are used by Kremlin (Kościszko Inst, 2022). Thus, social media are seen as the main vehicle for spreading

false information, rumors, and deep fakes during the war in Ukraine (Fredheim & Stolze, 2022). Fake digital images (i.e. related to so-called Ukrainian biological programs) on social media may be an attack tool.

Since the beginning of the war, among these following many Telegram channels and groups (mainly Russian/Ukrainian speaking part of Polish population) along with other social media and traditional news, users spent much time in the Internet (even many hours daily) fulfill the need for information. Thus, media exposure on biological related content in war's news was very high and needed both in the content and impact analysis. For internal biological narration in Russia we focus on data from Telegram, a messaging app and a social media platform with over 500M active users. Telegram has become the most popular social media platform to follow war news both in Russia and Ukraine (Fredheim & Stolze, 2022), and its penetration rate increased from about 30% in 2020 to over 50% in 2022 of the literate population. The leading media platform in Russia is Yandex (search platform as Google) and social media giant VK.com with 70% penetration, however they have recently lost popularity in Ukraine. In Poland, Telegram is a marginal medium for a general population, however an important place to observe evolution of biological conspiracy theories (Jarynowski, 2022c).

We have analyzed the content of produced media (both traditional and new) releases in context of their biological integrity and agenda setting (in context of Poland). In this study, we do not cover Facebook groups (due to data access restrictions) even the overlap of biological denialism and anti-Ukrainian narratives (Demagog, 2022; Marek, 2022a). For biolabs narration also internal Russian discourse was analyzed from Telegram (i.e. channel of Russian Ministry of Defense). To assess an impact, we have attempted to measure the influence of Russian allegations using Buzzsumo, Brand24, Twitter API, EventRegistry, and Google trends content monitors, related to the variations of the keyword biolab / biological weapon, hunger and the food crisis as well as infectious diseases (COVID-19 and HIV) related to refugees.

3. Results

Let us compare different biological denialism narrations since the full-scale Russian invasion on Ukraine. There are some similar aspects of typical narration concerning biological threats. Usually the language of both official propaganda as well as non-professional media is emotional. For all issues a link between war and COVID-19 pandemic is often drawn. Discourse is usually chaotic with linkage to different threads of different orders (war, pandemic, globalism) and to conspiracy theories. There is observed confusion of facts and interpretations (i.e. food insecurity) and fiction (i.e. biolabs). We often see multiplication of source material, for instance literate or machine translation of materials published originally in Russian often with grammatical errors or other stylistic signs of Russian origin (Marek, 2022a). The material is presented multimodality (video-conference, maps, animations, photos, and memes) additionally to text. There is the common motif of grayness (all sides of conflict are partially guilty), according to the narration. However, Russia is trying its best to control the spread of disease and minimize biological and hunger hazard (according to narration). On the other hand, USA and Ukraine are shown as an enemy with historical association (Sobiech et al., 2022) with a concealed threat (often a picture of current issue biolab/food/HIV is shown with historical Western abuses). Poland is seen as a country not taking care about biological hazards for its own population.

Biolabs

Biological weapons have a huge potential for intimidation, as the Russians recently showed when the topic of alleged secret American laboratories in Ukraine began a series of public slots by the Russian Ministry of Defense (Кириллов, 2022) in 2022 (10.03, 14.03, 14.04, 27.05, 17.06, 07.07, 04.08, 03.09-during BWC meeting, 19.09, 26.11, 24.12). It should be emphasized that in each of these presentations there is a constant threat of infectious diseases of animals, mainly concerning ASF and avian influenza. The commander of the radiological, chemical and biological defense forces of Russia Igor Kirillov repeatedly emphasizes that the Russians “obtained” evidence of biological experiments on humans, but also on pigs, wild boar and birds or with insects (Кириллов, 2022). Additionally, at the session of the UN Security Council on 11.03.2022, the arguments between the US and Russia were confronted (Maksymowicz, 2022). In addition, on 07.08.2022, Russia launched Art. V BWC and called for a formal consultation meeting (Lentzow & Littlewood, 2022). According to American analysts, Russia may be

trying to mask the use of biological agents as part of a staged incident or to support tactical military operations in this way (Maksymowicz, 2022). Conspiracy theories about US biological weapons laboratories in Ukraine have been propagating around radical political activists in the USA, Hungary and Poland (Kessler, 2022).

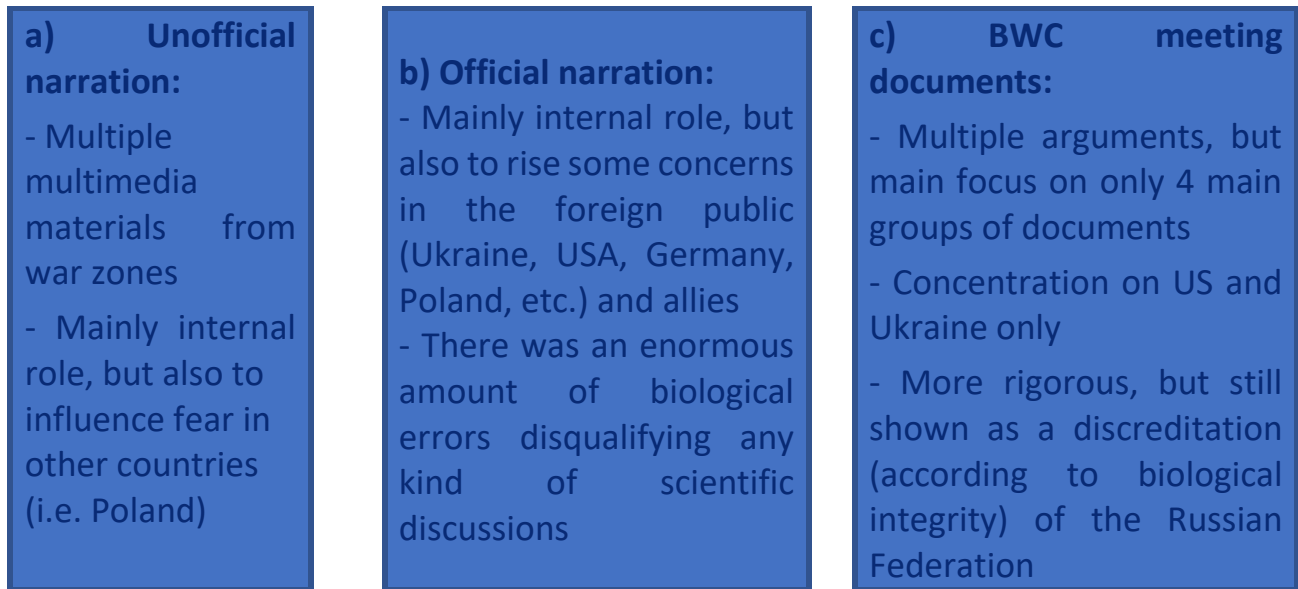


Fig. 2. Three types of narration about Biolabs by Kremlin.

The material can be divided according to targeted groups (as subchapters of the article) into: (i) internal, (ii) Poland and (iii) international organizations as well as by information sender role into: (a) unofficial, (b) official, and (c) deliverables for international organizations (as presented on Fig. 2).

Internal Russian narration (domestic impact)

In internal Russian narration theme (Kiriya, 2021) of the development of biological weapons by Poland has long been present in the media form pseudo-scientific studies. There are:

- Historical anecdotes from the Polish-Moscow wars in XVII-XVIII century;
- Accumulation of charges is based on the “mythical” Polish biological program in the interwar period, developed during and after the Polish-Bolshevik war between WWI and WWII;
- The activity of the Polish Underground State under Soviet and German occupation during WWII.

Thus, it could be natural to a reader that Poland may continue militarization in biological warfare (even if it is forbidden by BWC).

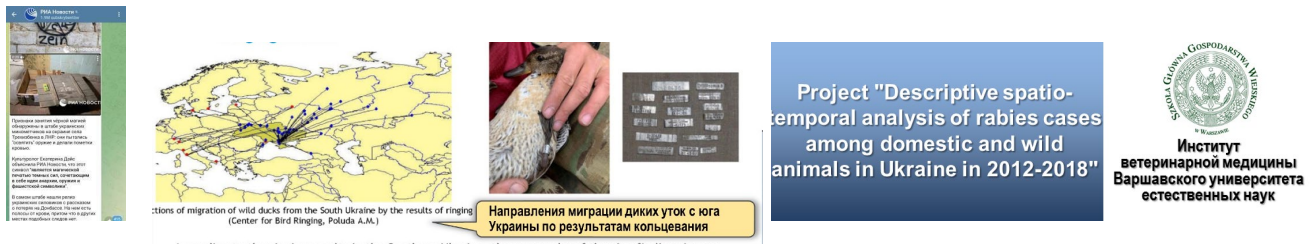


Fig. 3. Examples of news against biological integrity. From left “Magic” Ukrainian forces (source РИА Новости https://t.me/rian_ru), central allegation of birds as vector of pathogens (source Минобороны России https://t.me/mod_russia), a “prove” of Polish-Ukrainian collaboration (source Минобороны России https://t.me/mod_russia).

Since middle of March 2022, a new phase of information and psychological operations (Info/Psy-Ops) began with footage from temporarily occupied territories. Here a narrowed understanding of disinformation was seen as the deliberate dissemination of false information in order to achieve military objectives more effectively and provoke the opponent to take certain actions (Mahda, 2019). Much of what gets broadcast on the constellation of sites that make up the totality of social media (mainly Telegram) depends on the different content policies. There were plenty of documents overtaken by Russian Intelligence i.e. the order to destroy gems in Ukrainian labs or results of inspection on biosecurity levels in Ukraine (Кириллов, 2022). Thus, Americans as well as Poles and other NATO countries were involved, because offensive infection agents were developed with collaboration with them in Ukraine (according to narration). Poland was working closely with the US and Ukraine (according to narration) to develop biological weapons. Moreover, Poland was accused of not respecting international conventions and even its own national laws (Pulawski, 2023).

In both official documents (i.e. video released by the Russian Ministry of Deference) as well in national broadcasting media and famous propaganda leaders one can find claims that “the U.S. was testing biological weapons in the Ukraine and is preparing for a Third World War”. Thus, Russia with “special military operation” preceded the Ukrainian attack on the Donbas with the use of biological weapons (Chawryło, 2022). It's important to notice that in official media established in occupied areas (i.e. Zaporozhsky Viestnik) there was no news distributed about Ukrainian biolabs, which means that the public there was not the target of biological propaganda. There was an enormous amount of biological errors [Fig. 3] discrediting any kind of scientific discussions (i.e. science fiction

like biological mechanism, wrong names of pathogens and diseases), about these problems.

Impact on Poland

We attempt to measure the influence of Russian allegations in order to estimate the effectiveness of the external Russian narration (mainly through Polish-language propaganda channels or channels resonating with Russian propaganda) on causing anxiety and fear in Polish society [Fig. 1] as a technique of causing confusion (EEAS et al., 2018). Some historical allegations about the Polish biological warfare program presented in the previous chapter are also used towards Polish patriots in the Polish infosphere (mainly through Polish-language propaganda channels or channels resonating with Russian propaganda (Marek, 2022)), but this kind of narration circulates only in filter bubbles of the most radical user.

Analysing the content in Polish language between 24.02-01.08.2022 using the Buzzsumo, Brand24, Twitter API, or Google trends content monitors, 65 articles and multimedia were found in traditional digital media with the largest reach and 396 Tweets (representing the interest in in social media) related to the variations of the keyword biolab / biological weapon. 41% of mentions in social media have negative sentiment - which proves the strong emotional character of the discourse (emotions such as user anger towards USA and Ukraine for conducting “illegal” research or fear of an attack on Poland). It is worth noting that the interest of Polish society in biological laboratories and biological weapons (based on queries in Google) was more than twice as high as in Ukraine, and several times greater in Russia or Germany itself [Fig. 4]. The waves of interest closely correlate with the waves of Russian propaganda as the presentation of the general lieutenant Kyrilov (Кириллов, 2022), which was most visible in March 2022.

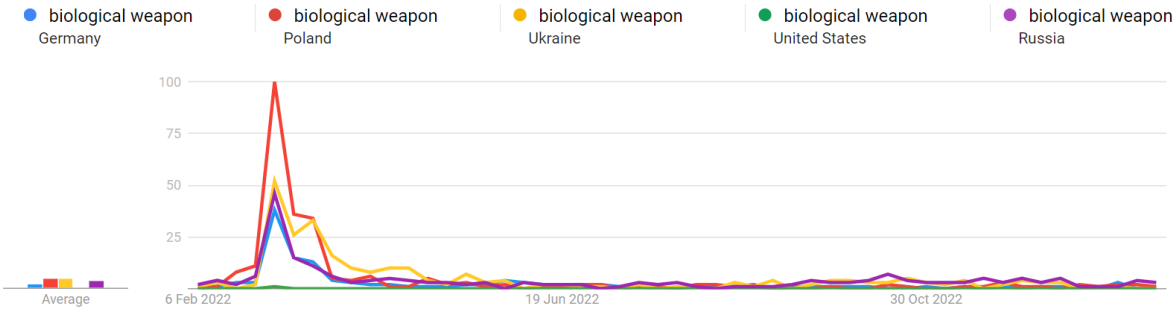


Fig. 4. Google trends of biological weapon keywords across countries
The peak of activity in Polish traditional and social-content media took place between 9-24.03.2022 (which is only 9% of the entire time period), when as many as 72% of Google

queries, 49% of articles and multimedia on internet portals and 43% of Tweets has been posted with multi-million reach (the estimate of the total number of people who see content). It suggests that the Krem'in's influence on Polish society was effective in the sense that it sparked a wave of interest. The Russians biolab conspiracy theory has an effect causing panic in Poland and anti-Ukrainian and anti-American sentiments (main impact on March 2022 [Fig. 4]). On the other hand, disinformation from the Ukrainian side is also a fact (could be planned campaigns or "fog of war"). For instance, a false alarm about a use of CBRN (potentially Sarin) against the Azov regiment in Mariupol posed a huge wave of interest in Ukraine, but also in Poland (Jarynowski, 2022c). On the other hand, Anthrax outbreak (still occasionally among animals in Ukraine) in early Autumn 2022 in Kiev oblast gained much more interest in the international CBRN community (and also started a wave of interest in biological weapons in Russia [Fig. 4]), than locally (Keep & Heslop, 2023). An Anthrax possible case in occluded by Russian areas close to Meritopol caused a huge interest in CBRN community and Poland (Jarynowski, 2023b). It suggests that the tactical goal to create a fear in the particularly Polish population was achieved and for some reason an impact on Poland was a few folds higher than on Ukraine or other European NATO countries, which need further qualitative investigation.

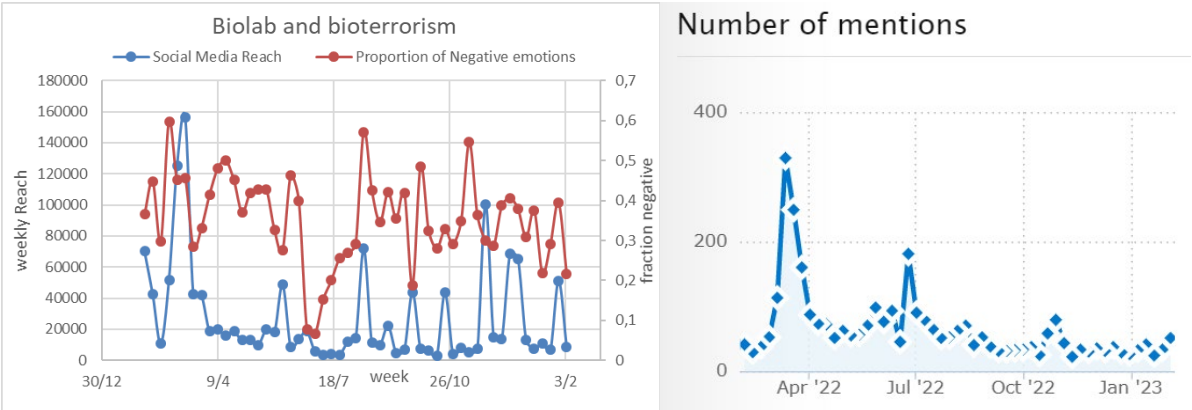


Fig. 5. Sentiment and reach on social media [left] and cumulative number of mentions in both traditional and social media [right] of biolab/bioterrorism/biological weapon keywords in Poland (Brand24).

Biolab discourse has the highest emotional load among all biological negationistic narratives [Fig. 5]. "American laboratories" may influence (according to narration) the alleged biological catastrophe and become the cause of World War III. The above-mentioned narrative is also an element of blaming the USA for Russia's aggression against Ukraine. The ridiculous concept of developing biological weapons that would be spread by specially trained migratory birds targeting ethnic Slavs such as Russians (it's against

genetic knowledge, because Russian population has less so-called „Slavic genes” i.e. haplogroup R1a than other populations i.e. Polish (Underhill et al., 2015)). It is worth emphasizing that the Russians certainly notice how much Polish society is susceptible to conspiracy theories (Jarynowski, Semenov, & Belik, 2022; Jarynowski, Semenov, Platek, et al., 2022) in the area of animal diseases (low agricultural/veterinary literacy among population living in the cities) and concentration of Russian narration on zoonosis and animal host only diseases may show recognition of the field. The Russian side was trying to introduce a narrative to the Polish infosphere about the existence of secret American laboratories, which allegedly not only caused the deaths of many of Ukrainians (i.e. soldiers under experiments or people living in Donbas), but were also one of the reasons for the of the invasion. According to the Russian vision of reality, these animal diseases and zoonosis laboratories are currently located, among others, in the territory of the Republic of Poland (biolabs have been transferred here during the war). The distribution of such messages serves to stimulate anti-American sentiments in Poland, which is part of the efforts to disintegrate NATO.

Narration at BWC meetings

We have analyzed documents of the Biological Weapons Convention (BWC) Formal Consultative Meeting in late summer 2022 to discuss Russian allegations to the USA and to Ukraine concerning the fulfillment of their respective obligations under the BWC in the context of the operation of biological laboratories in Ukraine (UN, 2022a). No consensus was reached regarding the outcome of the Formal Consultative Meeting. Main questions and allegation towards Ukraine were:

- That Ukraine failed to ensure an adequate level of biological protection in organizations and institutions that work with particularly dangerous pathogens;
- How was the US assistance, as implemented, supposed to ensure the sanitary and epidemiological well-being of the population of Ukraine?
- Why were veterinary and not human diseases the object of US-Ukraine collaboration?

The Russians use arguments in the form of (i) international projects dissemination and legal documents, (ii) internal (Ukrainian) reports of stockpiling and on security, and (iii) war documents such as “unmanned aerial vehicles equipped with containers and equipment which can be used to spray bioagents in Kakhovka and Cherson”.

All main documents presented to the international community have been previously used in internal and unofficial narrations (Кириллов, 2022). However, there is an

interesting situation that some of very important documents (previously officially disseminated in the Russian infosphere) were missing:

- From Sanitary-Epidemiological station in Mariupol. This was the most important biological laboratory in the occupied area, which was involved for instance in Cholera and Tuberculosis research;
- Order (by the Ministry of Health Care of Ukraine) to destroy potentially dangerous germs in various Ukrainian research centers from the first days of invasion.

These lack of arguments is very interesting and some explaining hypotheses (i.e. being fake or manipulated) arise.

Above suggests that biolab narration is purely a product of propaganda offices or PR agencies without any kind of attention to biological integrity (which sounds very strange as Russian microbiology and epidemiology scientific level is very high). Moreover, a low level of preparedness by Russian delegates is surprising. There are multiple errors in documents (i.e. Warsaw University of Life Sciences was incorrectly called University of Warsaw in both primary Russian documentation and its English translations), almost no evidence after 24.02.2022 neither from intelligence or captured areas was provided, etc. This led to rather passive orientation of Russia allies such as China or Iran and Cuba (targeting only US biological programs in general), even though they voted in line with Russia. After the BWC meeting no more new biological official allegations were stated (till late November 2022 to prepare the scene for 9th Review Conference), and no massive propaganda operation with biology as threat was observed (since September nuclear threat was „turn on”). We have seen, that between BWC meeting and 9th Review conference (according to open information sources) USA has been keeping helping Ukraine in infectious disease control (human hosts), as for a wartime Ukraine requires increased surveillance of pathogen posing a danger to human health rather than animals as it was the case before (Sabet-Parry, 2022). The Ninth Review Conference (Geneva, 28.11-16.12.2022) was used to continue allegations towards the US (UN, 2022b). For instance, increase the pathogenic qualities of the SARS-CoV-2 by American researchers. Thus, all additional claims from Russia and allies were directly targeted towards the US and biolab topic was accented there. The interest of the media to the outcomes of The Ninth Review Conference was very low.

Veterinary and food related biological issues campaigns

Foreign information manipulation and interference is known to be involved in food problems and animal disease as ASF (Jarynowski et al., 2019; Leitenberg, 2020; Trotta et al., 2022). We should understand biological food terms of narrowed sense as pesticide residues, microbiological contaminations and other organoleptic characteristics, but also all actions on food supply chain. According to Russia's disinformation, the disruption of agricultural production and trade in Ukraine was partially caused by EU sanctions. Moreover, current CBRN threats mainly concern agricultural and health issues (Gawlik-Kobylińska, 2022) and risk of agroterrorism in Europe is the highest since decades (Alleslev, 2021; Jarynowski, 2022a). The most of the of the possible agro-terrorism/crime in last few years in Poland could be related throwing ASF positive wild boar carcasses (Jarynowski, Krzowski, Belik, 2021), poisoning of the river, causing the death of fishes (see Jarynowski 2022d), poisoning bees are strictly affecting animal production (Wiśniewska, 2023). Thus, veterinary inspections should be of the most important player also in next years.

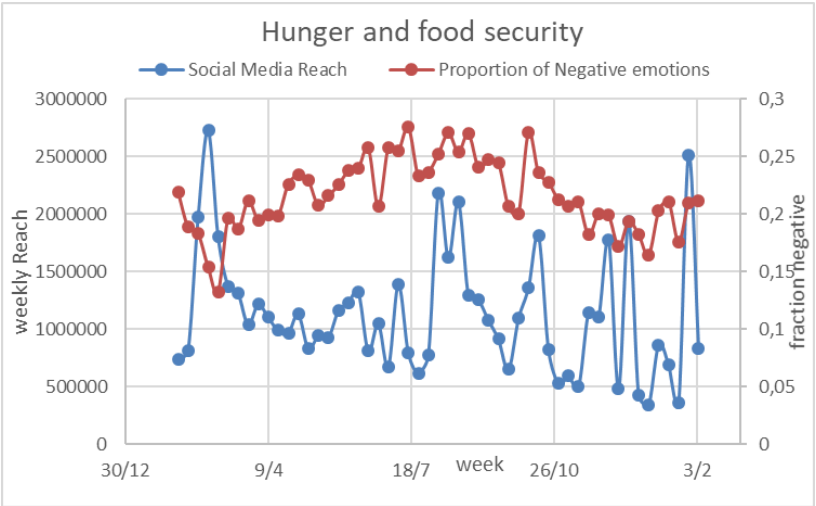
Impact of Food/Hunger Crises on Polish Population

Russian propaganda and disinformation blamed Ukraine and the collective West for "causing the global food crisis". But the most visible effect of media involvement seems to induce fear (i.e. about food price) or polarization (i.e. general population against farmers). For phrases related to hunger and the food crisis, content monitoring was applied during 24.02-01.08.2022. Again, using Buzzsumo, Brand24, Twitter API and Google trends, 958 articles and multimedia in traditional digital media with the greatest reach and 59,453 Tweets were analyzed. Only 33% of the mentions were negative, which may result from many threads of the discussion, such as the positive sentiment of the support of Polish farmers towards Dutch animal breeders' protests (analyzed in the following subchapter) in the summer of 2022 as an international unity (i.e. "EUnitedArgi" initiative) effect among farmers (Jarynowski, Semenov, Platek, et al., 2022).



Fig. 6. Google trends of various food security concepts as Famine, grain price, food price, farmers protests.

In the case of hunger, there is a fairly even distribution of interest. Interestingly, the traditional media noted a slightly increased interest between 24.04-23.05.2022 (e.g. discussions about the export of food products from Ukraine). The most searches on Google took place between 02.24-14.03.2022 (fear related to the beginning of the war), above average interest on internet portals was observed 23.05-24.06.2022 (discussion on Ukrainian grain and the role of Poland in transport). Increased activity on Twitter between 04-14.07.2022 was observed (large contribution of agricultural protests in the Netherlands and negotiations on access to Ukrainian grain in Poland or via unblocking the ports in Odessa), which proves the different dynamics of interest in various media targets.



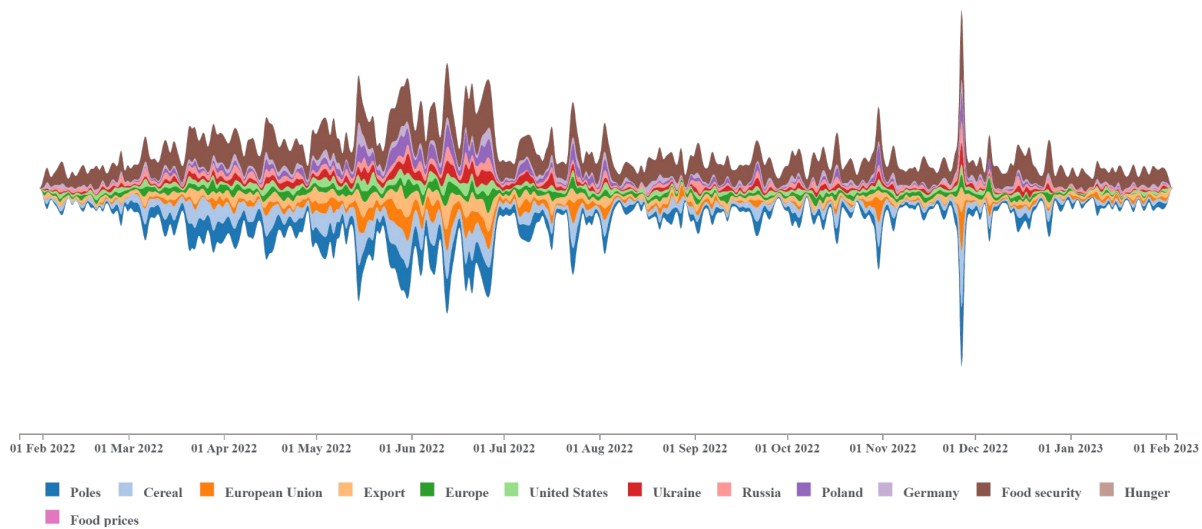


Fig. 8. Topics intensity in time in discussion about hunger/food security in Polish traditional media (EventRegistry).

We can observe dominating cereal and food security topics in professional discourse [Fig. 8] around summer (harvesting time) and in late Autumn 2022 and January 2023 (Polish farmers protest). Food price (which is connected to inflation) seems to be the most important driver of discussion for the general population [Fig. 6, 8]. It's important to keep in mind, that the majority of food related discourse is weakly related to the war and is driven by natural production cycles. We can also see huge differences [Fig. 6-8] in new (mainly driven by the general population) and traditional media (mainly driven by stakeholders). Thus, conflict between the general population (fear of ongoing inflation of food price), farmers (afraid of sustainability of production i.e. due uncontrolled import of food/feed products from Ukraine) and climate activists/animal right defenders aiming at reduction of animal production may be fueled by foreign intelligence [Fig. 1], and biological denialism may be observed among all of these types of agencies. For instance, an obvious disinformation campaign on feed contamination (see a peak of negative emotions and increased interest on social media in early October 2022 on Fig. 7) has been detected and Veterinary Inspection had to intervene and debunk it (Fedorowicz, 2023).

Animal breeder protests

Can one interpret the interference of foreign intelligence on social media as an act of agroterrorism? Let us apply scales used in agroterrorism with biological pathogens for propagation of information (per analogia). Here information can be viral and its seeding or helping to spread may be by deliberative intervention (Jarynowski et al., 2015). Information can also be viral, which we learnt during COVID-19: “just fighting an epidemic; we’re fighting an infodemic” (Eysenbach, 2020), caused by the propagation in social media of conspiracy theories, and mis/(dis)-information about the pandemic. In fact, often the solutions to this problem are similar to “antivirus programs for computers”, which have the aim of identifying the online primary source of affected information to intervene (Kasprzyk, 2022), before other users become “infected”, by blocking accounts or blocking paths (Jarynowski & Płatek, 2022).

Protests of animal breeders taking place very often due to epizootics and the measures of controlling them (Jarynowski, Semenov, & Belik, 2022). There are some pre-existing social conflicting matters of animal production, which may be important to understand the phenomenon. Such a structural configuration facilitates mobilisation of own groups of interest and ends up with conflict between animal breeders, far-right, agricultural parties, Christian organisations as well as opposing: government, mainstream opposition, ecological organisations and far-left (Jarynowski, Semenov, Platek, et al., 2022). COVID-19 crisis and pressures on farmers related to economic and climate challenges cause more and more farmers to withdraw from animal production (Jarynowski, Krzowski, & Belik, 2021). Moreover, Russian invasion on Ukraine during 2022 threatens supplies for fertilizers and some crops, causing increases in animal feed prices (which dropped down due to availability of Ukrainian grains since Autumn 2022) as well as high energy prices (high level of energy consumption in animal products). Moreover, last year's livestock production is changing as well as deanimalization processes speed up. The European Green Deal is projected to affect livestock production by decline between 5% and 15% (Barreiro Hurlé et al., 2021), with the animal breeder's income being the hardest hit among all farmers in the perspective of the next 10 years.

Our object of analysis is a series of protests that were organized by Dutch farmers in Summer 2022 to voice their concerns and frustrations about issues such as government regulations and environmental policies. These protests often involve large convoys of tractors and other farming equipment, as well as marches and rallies in cities and towns throughout the Netherlands and have their digital representation under #Boerenprotest (Jarynowski, 2022g), as interlining between actual physical events with social media

reflection is very important (Domalewska, 2019; Kowalewski, 2020). We could see that the European mainstream media did not get engaged in providing information on farmers' protests. There is much more information in the European traditional media on Sri Lanka farmers protest than Dutch animal breeders protest. On the other hand, animal breeders' protests have been well-represented in social media platforms, where farmers, activists and sympathizers have created groups and pages to share information, organize events and express their views. Social media has also strengthened polarization in this case by creating echo chambers and filter bubbles, because only the exposed part of the population have been discussing this issue (as Polish farmers support protests analyzed in a previous chapter). These groups have been used to mobilize support, coordinate protests, and disseminate news and updates about the movement. Social media has also been used to share photos and videos of protests and events. Some footage from protests on TikTok have >10 million views and this should be alarming if it's a self-organized protest only. Thus, it is worth talking about foreign attempts (Tarafdar & Kajal Ray, 2021), which could have helped to raise awareness about the movement and the polarizing issues it is concerned with.

For differentiating intentional introduction of pathogen/agrophag from natural outbreaks, a risk of bio/(agro)-terrorism can be calculated the weighted averages of the assigned scores (Chen et al., 2019; Jarynowski, Krzowski, & Belik, 2021; Sequeira, 1999). Investigation in determining whether protests are a natural social process or may be deliberative mainly in terms of additional support to grow and have a bigger impact is proposed. Intentional deployment against animal production could serve as destabilization of social order, as a means of degrading food supply, or polarization of populations. Assessment was performed by two independent reviewers who are specialists in epidemiology and have experience in preventing bioterrorism. A mean value they scored has been imputed in Table 1.

Tab. 1) Criteria in agricultural index and the improved Grunow–Finke tools with partial and overall scores.

Criteria	Farmer Protests Summer 2022, NI	
	Raw	Weighted
Biorisk	2	6
Unusual strain	1	3
Geographic distribution	1	1
Environmental concentration	2.5	7.5

Epidemic intensity	1	1
Transmission mode	1	1
Time	0.5	0.5
Unusually rapid spread	1.5	1.5
Population limitation	1	2
Clinical	1	1
Special insight	2.5	7.5
Grunkow-Finke total score (Chen et al., 2019)	32	~40% of agroterrorism
use of non-traditional pathways	1	
increase of the probability of survival of the pest in-transit	0,5	
widespread dissemination of the disease from disparate foci	0,5	
use of highly virulent strains,	1	
high rates of inoculum	0,5	
introduction into remote areas	0,5	
targeting of susceptible production areas	0,5	
targeting of susceptible natural environments	0	
release of multiple species simultaneously	0,5	
precise timing of releases to coincide with maximal colonization potential	0	
Agricultural Index total score (Sequeira, 1999)	5	~30% of agroterrorism

Obtained values [Tab. 1] from the scales (especially Calibrated Gunkow-Finke) are high and suggest that probability of observing such an event naturally (without external influence) is low. This is probably the first use of these biological indexes in the INFOOPS area, thus their results must be interpreted with caution. However, such high

probabilities suggest that careful and deep qualitative and quantitative research is needed for these protests. Moreover, Chinese own TikTok (the main platform of protests' online communication) was banned to be used among civil/military services by The Dutch authorities and a warning was given to the citizens due to being "a source of Russian disinformation" and uncertainty about involvement of Chinese intelligence (Haeck, 2023).

Other infectious diseases

Covid-19 related conspiracy theories have been associated with both obvious fake news and gray mis-information (Engels et al., 2023). With the Monkeypox (M-pox) crisis (timely co-occurring with the second phase of war in Ukraine) it is especially visible how in some countries the conversation shifted from information about how the disease was spread to disinformation about anti-LGBTQ+ narratives targeting the community in a harmful way (Alju et al., 2023). Some of these stigmatizations were seen in Kremlin narration too, as M-pox was considered as God punishment to the Western societies or secret American bioweapon. Thus, Kremlin spin doctors replace COVID-19 (mainly the vaccine) with Monkeypox. However, the strengthening of anti-vaccine sentiments caused the basis for the formation of anti-vaccine protests (of an anti-governmental nature) and we also observed that (Kościuszko Inst, 2022). A lot can be inferred from German data on potentially pro-Kremlin accounts in the war narrative and overlapping (over 50 times greater chance of involvement) with the discourse of anti-sanitarian and anti-vaccine protests (Jarynowski, 2022d). Thus, quite a lot can be deduced from the dynamics of social media discourse in the context of combating contagious diseases (also of animal hosts). Thus, pro-Kremlin agenda among users engaged in biological fallacy discourse (Jarynowski, 2022f) is different in each society, as in German speaking population fossils (oil, gas, coal, etc.) and liberty are the main frame of concern, in English speaking world anti-Western attitudes are highly present (Jones, 2022) when in Polish infosphere the Ukrainian genocide on Polish population during WWII and anti-refugee attitude may be amplified (Demagog, 2022). Especially, as this topic seems to be under-investigated in Western Europe in comparison to Eastern Europe or Anglo-American countries. However, Pro-Kremlin users' motivation to engage in anti-vaccination/anti-lockdown communities may be either internal (to promote their own agenda) or external (to spread pro-Russian propaganda), but it is untraceable. There are multiple portals and several social media fan pages/channels that are not openly pro-Russian, but are the source responsible for

introducing misinformation content to the Polish Internet space. The Polish public's reaction vis-à-vis the Ukrainian refugees in the first month of the war was driven mainly by a decreasing wave of Omicron COVID-19 variants (Jarynowski, 2022e). Thus, refugee infectious disease could be weaponized by the pro-Russian media ecosystem for gaining the ability to interfere with attitudes of the Poles after February 2022 – especially in the field of Polish-Ukrainian relations.

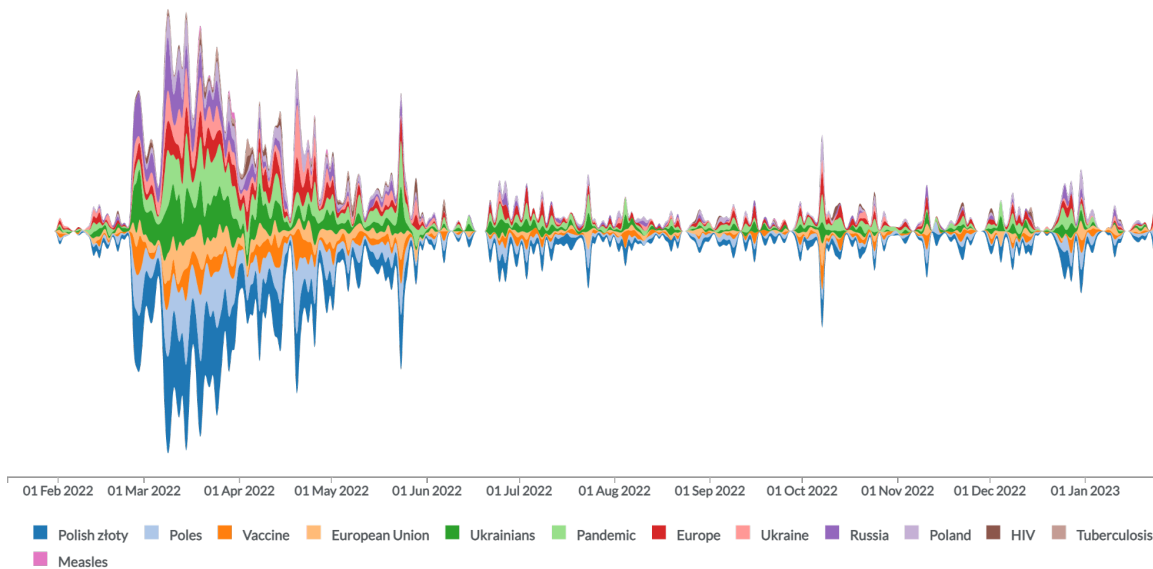


Fig. 9. Topics intensity in time in discussion about infectious disease of refugees in Polish traditional media (EventRegistry).

The activities of alternative portals and social media channels permanently involved in the distribution of biological denials were concentrated on the following directions (Marek, 2022b):

- Stimulation of anti-sanitarism narration protests, mainly till-lifting the state of epidemic in Poland in middle of May 2022 (including building a positive image of protesters actively disobeying the COVID restrictions);
- Building a negative image of the Western vaccines (spreading anti-vaccine attitude by overestimating adverse events and underestimating cost-effectiveness (Jarynowski, 2022b) and lobbying for a positive image the Russian Sputnik V and Chinese Sinovac-CoronaVac/Sinopharm);
- Noticing that Ukrainian refugees have lower COVID-19 vaccination coverage (Jankowski & Gujski, 2022) and were not forced to vaccination, in the end conflicting them with Poles who felt pressure on vaccination [Fig. 9];
- Undermining trust in country medical and veterinary institutions (lack of effectiveness in managing COVID-19, ASF, HPAI (Highly Pathogenic Avian Influenza)) and mainstream media;

- Building perception of unequal rights (better for refugees) to limited healthcare access due to for instance high cost and non-legal ambulatory TB (Tuberculosis) treatment not available for native population as according to regulation, that TB infectious case must be hospitalized in 2022;
- Stigmatization of Tb and/or HIV positive Ukrainian population (Jarynowski & Belik, 2023a) and propagating anti-refugees narratives targeting the community in a harmful way [Fig. 10].

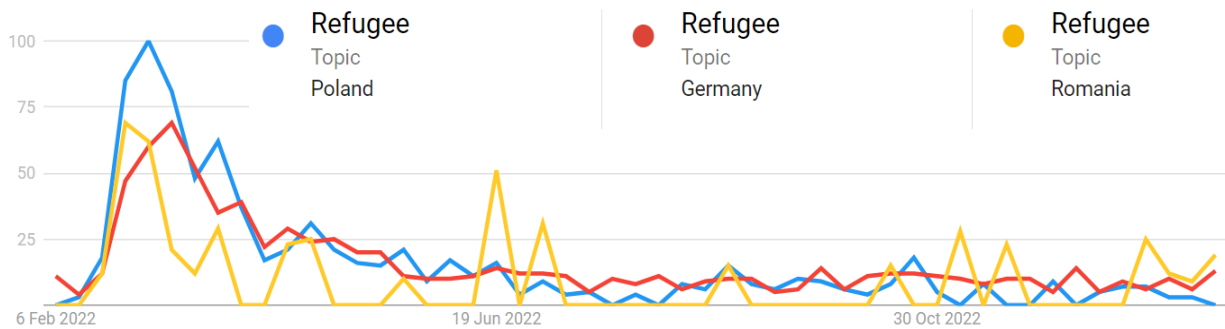


Fig. 10. Google trends of infectious disease related to refugees’ keywords across countries.

This induced fear, confusion and polarity can also lead to social stigmatization and discrimination against individuals perceived as being at high risk for infectious diseases.

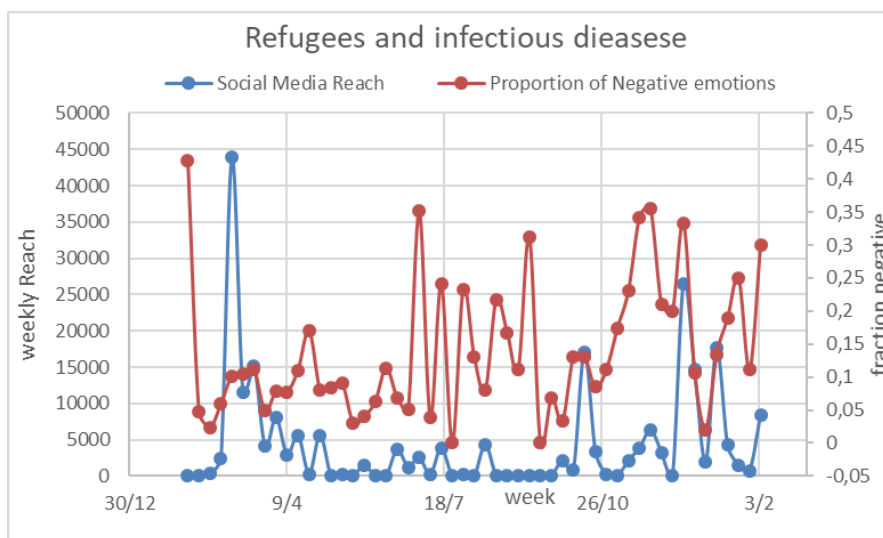


Fig. 11. Total Sentiment and reach on social media for infectious diseases associated with refugees’ keywords in Poland (Brand24).

The massive discussion in social media stigmatizing refugees mainly due to higher than in native population prevalence of HIV [Fig. 11] in Autumn 2022 didn’t percolate into the general public to such an extent (we observe only a small peak of interest in Google [Fig. 10]).

Summarizing trajectories of interest

The time series of interest suggests the adaptability of Russian information warfare to contemporary conditions (Baraniuk, 2021; Legucka & Kupiecki, 2022). We show that Poland was at the epicenter (in terms of impact on the general population) of Russian disinformation and propaganda about biological weapons. Poland and other European countries supporting Ukraine politically and militarily, were also targeted in infectious disease and food insecurity misinformation campaigns (Koćiuszko Inst, 2022). We can observe that the same media platforms or users accounts are reproducing misinformation on COVID-19, vaccines and food insecurity (which is just a continuation of conspiracy theories being live in Polish infosphere before the full-scale war) or refugees disease status, as well about as disinformation about biolabs (but in less extent).

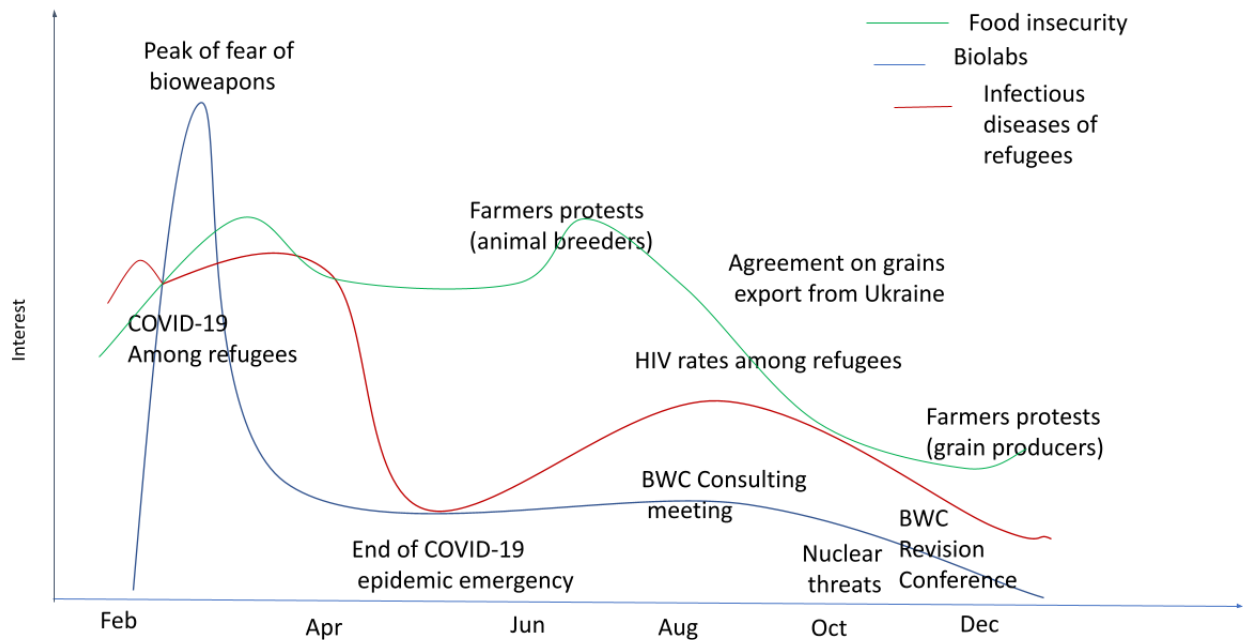


Fig. 13. Simplified time series of interest in different biological narration since full scale Russian aggression.

We can differentiate some phase of narrations in Poland in 2022:

- 0) 01.02-23.02 “Pre” war situation with high interest in health of migrant (on Polish-Belarusian border) and Covid-19;
- 1) 24.02-31.03 “Fresh” war with the highest interest in all biological concerns with high degree of fear of bioweapon and hunger;
- 2) 01.04-30.05 “Normalization” phase with the discussion about refugees’ diseases;
- 3) 01.06-31.07 “Pre Odessa-treaty” phase with intensification of food related issue;

-
- 4) 01.08-30.10 “Post Odessa treaty” phase with decrease of all biological narration;
 - 5) 01.11-31.12 “Infection season” phase with returning infections topic and farmer protests;
 - 6) 01.01.2023- “poisoned/contaminated grains” increase rumors about pesticidal residuals and microbiological contamination of Ukrainian grains.

These activities were not devoid of purpose [Fig. 12], but they were probably paving the way (see phase “0” building negative pictures of refugees with the fear of infectious diseases) for a wider strategic or tactical plan of a hybrid war. Phase “0” and sharp increase of interest of biolabs during phase “1” may suggest that biological INFOOPS have been started even before the actual full-scale war as a preparatory activity for Russia’s invasion on Ukraine.

Moreover, Russian spin doctors have observed reactions of Polish infosphere on given stimulus and with lessons learnt may be able to induce wanted emotions and attitudes if needed (in selected areas).

4. Conclusions, discussions and recommendations

Biological threats are constituting a kind of involvement in the public discourse on the war. The empirical findings and ad hoc analysis of digital traces in this study contribute to our understanding of Polish information security and how biological denialism gains popularity in Europe. A multi-dimensional approach is needed when it comes to combating Russian propaganda and dis(mis)-information in the biomedical field. We learnt that the narration is a clear fake (such from the beginning to the end), then its chance of propagation outside the niche conspiracy theory media (biolab case) is very low and large reach can be generated only in the "gray" area of mis-information (i.e. food insecurity). In Poland, it is not possible to separate the pro/anti-Kremlin narrative as easily as in Germany for instance, where users openly support the Russian invasion, and in Polish case it is "grayer" (IBIMS, 2022), which requires much more work of services such as the Internal Security Agency (ABW) or the Military Counterintelligence Service/Cyber Defense Forces (SKW/WOC). We also endorse the application of the interdisciplinary social and media science methodology, supplemented by Big Data analysis and related information technologies to detect mis- and dis-information efficiently and understand its impact.

It is worth emphasizing that the modus operandi of Russian propaganda differs depending on the country or medium, so as a rule Polish services should focus more on their own empirical analyzes (Jarynowski, 2022f), rather than insisting only on international literature (especially American (Broniatowski et al., 2020)). Anthroposophical concepts are usually conflicting with mitigation or control strategies, which we see for instance in COVID-19 pandemic or ASF epizootic, so they are susceptible for external influence (Jarynowski et al., 2019). According to the adopted NATO StratCom COE typology of Kremlin agents in the media (Szwed et al., 2016), the most common category is "blame the US conspiracy trolls" which propagate narratives of distrust (for instance about American biolabs), next one are "bikini trolls" who engage in discussion with the general population contesting of all kind of official information (e.g. about HIV and measles among refugees), "aggressive trolls" attacking governmental i.e. sanitary institutions in the Internet (as Konfederacja Korony Polskiej of Mr Braun (Kościuszko Inst, 2022) contesting in social media Polish Sanitary Inspection, National Institute of Health or Physicians Associations, etc.), and "attachment trolls and bots" to repeatedly link to pro-Kremlin news platform content. Amount of work done by NGOs, civil and military

institutions (Kozłowska, 2012) as well as Polish history (half of century under de facto Soviet occupation) suggests that Polish infosphere is better known and more immune to Russian influence than other Western European countries. Thus, each medium (traditional as press, video or sound news and blogs; content as Google or Wikipedia; social as Forum, YouTube, Twitter, Instagram, TikTok, Facebook, Telegram) and each topic (in this article only related to biological denialism are investigated) has a different ecosystem and frequencies of given group of agents. For instance, “bikini trolls” agencies seem to be more frequent in infectious disease related discourses than in war discourses (Helmus et al., 2018).

Biolabs in Ukraine

Biological weapons and bioterrorism threats have a huge potential for media coverage and disinformation campaigns. Poland was clearly a target of a PSYOPS. Trajectory of the interest suggests that the Kremlin's influence on Polish society was efficient in threatening the society in the middle of March 2022. However, acceptance of Russian narrations about biolabs didn't leave pro-Kremlin filter bubbles. Thus, we could speculate that some kind of CBRN action was considered by Russians and a Polish society was tested on how it could react to it. Russian military and intelligence operatives are also known to have deployed unconventional weapons against political targets in Ukraine and elsewhere in Europe. However, the decision on use of CBRN was not taken and after the Russian failure of the BWC meeting and 9th review conference topic died out. Therefore, “biolabs” can be treated purely as the PSYOPS, which was tactically successful in March 2022 (by creating a fear), but defeated strategically in INFOOPS due to failure of the BWC meeting.

Animal breeders, food insecurity and epizootics

Social media success of animal breeders protests in 2022 may be partially an effect of foreign intelligence. Acceptance and positive sentiment among Internet society of multiple acts of agroterrorism performed by animal right defenders and climate activists (with multiple crime acts happening after 24.02.2022) in Europe need further investigation (Jarynowski, 2022a).

Food issues were the most popular during the war period (among all biological denialisms), so this problem is the most likely to be targeted by foreign intelligence to destabilize society in 2023/2024, but a good communication strategy could minimize this attempt. The strategic goals of the campaign to destabilize food security were not

achieved, but on the tactical level polarization between farmers and the general population and ecologists increased. These tensions will probably be further explored by Russian intelligence to minimize the food producing capacity of Poland in a longer perspective. This should be point that not only the production chain can be attacked by the Russians, but the EU's weak place can be seen in tensions between food producers and other stakeholders of the system (e.g. the movement to combat climate change). The Kremlin may be trying in 2023 to take advantage of the existing cereal problem with an emphasis on health issues (i.e. pesticides residues in grains) to polarize Polish society and to generate disputes between Poland and Ukraine and the EU (Jarynowski & Belik, 2023b; Jarynowski, 2023a). Tracking the events of biological quality of food and feed not only allows to detect their impact, but also to predict the next steps in the field of public health and agricultural security.

[This is how our study managed to predict the problem of food biosafety and bioterrorism that appeared in April 2023.](#)

Other (human) infectious diseases

The anti-sanitarian, anti-vaccine and anti-refugee narration (in context of infectious diseases) was the successful PSYOPS strategically due to promotion of unhealthy (anti-scientific) behavior and on operational/tactical level because of polarization society as sanitarian vs antivaxxers and stimulating conflict between Polish people and Ukrainian refugees. In case of escalation of the war and further waves of refugees, access to limited healthcare resources will be used to destabilize the social order.

Recommendations and future works

The threat of Kremlin intelligence in biological infosphere is currently greatest the beginning of the 3rd Republic of Poland (with possible huge role of media to escalate the effect or hidden the source of agroterrorism). Our main recommendation is:

- A system of traditional and social media listening (for One Health settings) should be developed in order to detect in real-time the potential impact of Kremlin propaganda and actors resonating with it;
- Awareness campaigns (with gathered Evidence Based material) among One Health specialists in Poland (and also in other EU or NATO countries) about involvement of foreign intelligence in promoting biological denialism may be organized;
- More attention should be put into “gray” high-volume anti-vaccine, anti-refugees, food insecurity discourse than obvious fakes (i.e. biolab);

- Some particular questions need further investigation within international diplomacy framework, as why "decree of the Ministry of Healthcare of Ukraine (24.02.2022) for emergency destruction of pathogen collections has reinforced our concerns about possible violation of the BWC requirements" was not include in BWC argumentation, but was used for official Russian narration?
- The use of calibrated tools for the epidemiological assessment of Grunow&Finke or the Agricultural Index should be popularized, which should be applied to agricultural events (i.e. in the social media) that took place in Europe after the Russian invasion on Ukraine;
- More topic-specific or oriented to local communities' analysis (as here on biological denialism) should be performed, as we have multiple institutions which parallel projects on general infoveillance.
- Incorporation of cybernetic models of the society (Jarynowski, 2014) with possible external influence in public health studies.

We show that Kremlin biological disinformation (INFOOPS) does not need to propagate well in Polish infosphere (see biolabs case), but more sophisticated misinformation (PSYOPS) campaigns, with use of unconscious users, may be more successful (food insecurity and infectious diseases). Moreover, Russian "spin doctors" seem to be very adaptive, by adjusting repertoire of topics, sentiments and channels to archive their goals [Fig. 13]. However, these campaigns are often uncoordinated, so it's more likely that Russian socio-techniques will be used to fuel existing conflicts, rather than creating a totally new threat (Marek, 2022b). In order to better understand and measure effectiveness of foreign intelligence campaigns, mainly through Polish-language propaganda channels or media resonating with Russian propaganda, on causing anxiety, fear and anger in Polish society as well as detecting hybrid use of INFOOPS/PSYOPS following direction of future research is suggested:

- To monitor jumps of pests (agrophages) or invasive/animal pathogens on the disease-free areas (surveillance of local media and forums/groups on Facebook i.e. monitoring of seeds sent to plant owners);
- To investigate local outbreaks of human diseases in context of CBRN use (surveillance of Google trends, local traditional and social media);
- To better understand animal breeders and animal right defenders' activists protests and actions (analysis of Twitter and other social media);
- To search of digital footprints of foreign intelligence in coronascepticism and anti-vaccination engagement in the Internet (analysis of Telegram and TikTok);

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- To investigate the image of refugees on the Internet based on Google trends, traditional media and social media in topic of infectious diseases (e.g., HIV, COVID-19, Measles, TB);
 - We need a better understanding of the relationship between actors, content (field) and channels (traditional and social media) in biological discourse;
 - Attempt to analyze Chinese biological propaganda (Legucka & Szczudlik, 2023);
 - To discuss if parts of the liberal scripts activated during COVID-19 pandemic in European societies (i.e. the Polish speaking population) could be used and played by foreign intelligence;
 - To monitor kitchen/do-it-yourself biology and biohacking society (bioterrorism) or ecological activism society for possible radicalization (agroterrorism and agro-crimes).

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