African Swine Fever Awareness in the Internet Media in Poland – exploratory review

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Abstract

   Aim. African Swine Fever (ASF) is a viral infection in domestic pigs and wild boars. It is estimated that ASF causes more than one billion EUR losses in Eastern Europe every year. In Poland, after initial outbreaks in 2014, almost 90% of pig farms stopped their production (in regions affected up to June 2017) due to restrictions (Jarynowski, Belk, 2019). In November 2019, the ASF virus has been confirmed in a wild boar in the Wschowa poviat, just 30 km from the pig production hub in Wielkopolska (the so-called "swine district"). Recent rapid propagation of the ASF from East to West of Europe encouraged us to prepare analysis of the Internet media awareness in Poland reflecting the above mentioned social dynamics.
   Methods. Using computational techniques we analyse agents and events in the Internet media. The intensive control measures against ASF in the European Union significantly transform biosecurity, trade, sanitary, environmental regulations and ethical standards causing protests of various social groups of interest: 1) farmers (who are not ready to apply

biosecurity measures), 2) ecologists (who do not agree with governmental policy of wild boar depopulation) and 3) hunters with public administration (that have to take control on wild boar population).

Results. In particular, we have reviewed possible ways of public opinion's influence using Twitter, Facebook and mainstream websites's data of selected groups of interest. We identify two main frames of events: 1) Culling of wild boar to minimize ASF spread and the risk of transmission to domestic pigs caused massive protest among ecological associations in Poland, due to opposition of some experts in beginning of 2019; 2) jump of the virus to Western Poland caused intensive discussion and lobbying of farmers postulates at the turn of 2019/2020.

Conclusions. We claim that reliable analysis of the perception of the ASF is important to understand possible conflicts and issues. We have provided analysis of usability of available Internet resources as Secondary Data Digital Footprints.

Key words: The Internet media, Social Media, Risk perception, African Swine Fever, ASF, Digital traces, Veterinary Public Health.

Epidemiology

ASF is an infectious viral disease of pigs and wild boar, which does not affect people. Its impact on the economy, however, might be significant due to the market value of the pork industry (about 20 billion PLN (Wnet, 2019)) in Poland. ASF generated 300M PLN (Journal of Laws of the Republic of Poland, 2019) in 2018 and 580M PLN (Farmer, 2020) in 2019 direct losses and much more indirect costs (Jarynowski, Belik, 2019).

Due to the lack of threat to human health, interest in this subject is low despite visible changes in the economy (e.g. population of pigs in Ukraine has decreased two fold since ASF introduction, global shortages in the supply of pig product based drugs (Vilanova, et al., 2019)), social (e.g. protests in Eastern Europe) or cultural (e.g. since 2020 pork will probably no longer be the most consumed meat (FAO, 2019)) aspects. ASF "is probably the most serious animal disease the world has had for a long time, if not ever" claimed Dirk Pfeifer, veterinary epidemiologist (Nurmile, 2019). In November 2019, there was a long jump of ASF to poviat wschowski (ASF is in January 2020 just 30 km from the so-called "swine district"), 320km away from the closest previously affected area (Figure 1). We prepared a computational model for Poland (human activity, wild boar movement, pork supply chain, etc.) (Jarynowski, Belik, 2017) and predicted arrival times of ASF to the Polish swine production hub to be less than one year (Jarynowski, Belik, 2020)[1].

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1   Arrival time estimator for Poland is publicly available: http://interdisciplinary-research.eu/index.php/asf.
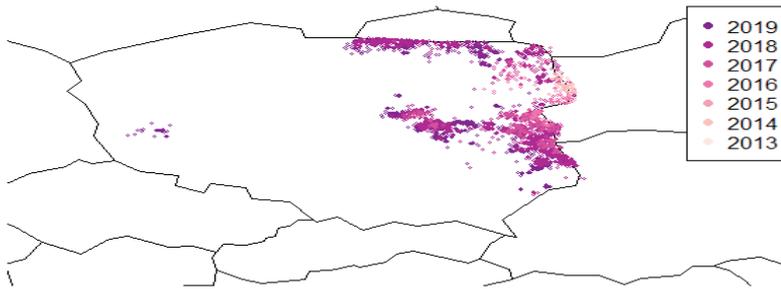
Fig. 1. ASF notifications in Poland (and surroundings) till January 2020.
Source: Own contribution from data from OiE.

Awareness

Awareness of biomedicine related issues such as pollution (Jarynowski, Buda, 2018) or infectious diseases (Jarynowski, et al., 2017; Jarynowski, Belik, 2018) in society is usually high, because it concerns matters of people's personal health. Animal diseases, even causing such an economic impact as ASF, have not attracted attention in the general population yet. The topic of ASF in the Polish media had been hardly known between the introduction of the disease till the presentation to the public of the problem of wild boar and ASF in the open letter of Polish scientists in January 2019 (Figure 2) regarding the planned reduction of the wild boar population (Interdisciplinary, 2019). This open letter to the prime minister was signed by a few thousand scientists (*Nauka dla Pzyrody*, 2019).
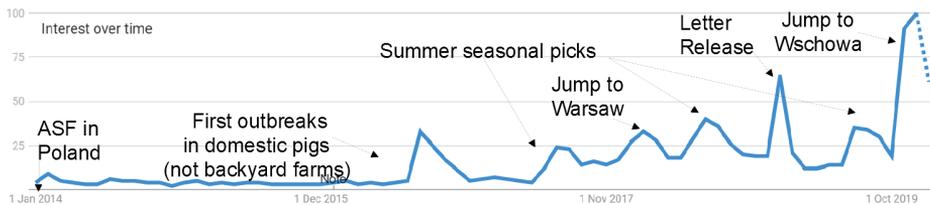

Fig. 2. Google query search trends till January 2020 with scientists' letter release and jump to Wschowa (ASF in Poland).
Source: Adopted from Google Trends.

The impact of this letter caused a commotion and conflicts between farmers (rural) and ecologists (urban) where hunters and public authorities appeared in the middle (Conversation, 2019). This social dynamics was reflected on the

Internet. Therefore this project may give answers and practical recommendations as our quantitative analysis helps to understand the details of the conflict between different stakeholders of the investigated system.

The jump to poviat wschowki (Figure 2) in Western Poland (close to the production hub in Wielkopolska region) in November 2019 more than 300 km from recently affected area changed social perception significantly. Massive expectations from farmers forced decision makers to take some actions. One of the well discussed issues is a new administrative law (Journal of Laws of the Republic of Poland, 2020) to adjust hunting procedures to epizootic situation.

Data analysis and methodology

Due to the fact that different agents perceive risks related to ASF differently (extremely different are opinions hardly supported by professional investigations), perception analysis is inevitable and this is the main goal of this project. Currently, there are just few related social projects as interviews among hunters (Schulz, et al., 2019) and farmers (Chenais, et al., 2019) from participatory epidemiology perspective as well as a newly developing ethnological approach so-called "veterinary anthropology" (Broz, 2020). The research material is going to be verified for suitability for analysis in terms of "digital footprints" (Jarynowski, et al., 2019B) – entries in the Internet/social media across the entire spectrum of social dimensions – e. g., interpersonal/institutional relationships, the activities of social movements, or the ideological climate in a given community. Secondary data (here Internet sources) comprises various sectors of social life. This material from selected categories of agents (Pabjan, 2004) should be carried out within the social field theory (Diani, 2015; Platek, & Plucienniczak, 2017). This theory assumes that the social movement constitutes the decisions of the actors that form a network of cooperation or conflict. To explore motives for protesting and how these affect participation in interactions, we can adopt Action – Network Theory (Latour, 1996). We propose mixed-method research methodology with priority to quantitative analysis, but accompanied by qualitative analysis (Crossley, 2010). Our aim is to apply particular kinds of triangulations approach of Internet research (Digital Footprint) in dimensions of (Surda, & Gwara, 2015):
- techniques (quantitative such as data mining, network analysis and qualitative such as discourse analysis);
- data (Social Media such as Twitter, Facebook and Mainstream Media as EventRegistry);
- researchers (Social Scientists, Data Analysts and Veterinary Practitioners);
- theories (Social Field Theory, Interactionism and Theory of Agents Participation).

Selected agents

As a result of polarisation of public opinion about the ASF, protest movements (agents of the system or stakeholders) can be categorised as:

1. pig breeders (the most active subcategory of farmers) represented mainly by the Agrounia (https://www.facebook.com/projektAGROunia/) organization active in social media (e.g. Facebook), which organises mass protests in the mild form in the style of happenings (e.g. "throwing meat" (Figure 3 left) as well as hard - road blocking (Figure 3 right).

Fig. 3. (Left) photo from the action of throwing meat organized, among others by Agrounia 13.03.2019.
Source: https://www.youtube.com/watch?v=a_ZX1_sFOVI.
(Right) Road blocking, 12.12.2018, Warsaw, A2.
Source: https://natemat.pl/257723,koniec-protestu-rolnikow-z-agrounia-na-autostradzie-a2-kolo-brwinowa.

2. animal rights defenders (the most active subcategory of ecologists), protest movement without an indicated main player, active especially on Twitter and having influencers in the form of bloggers or streamers. They operate 'en masse' in the area of digital space (e.g. protest letters) and to a lesser extent in a particularly involved manner (e.g. hunting obstructions and demonstrations (Figure 4 left)).

Fig. 4. (Left) Logo of the protest organised, among others by the green party 09.01.2019.
Source: https://www.facebook.com/events/1225356047605827/.
(Right) – Protest Mem.
Source: https://www.facebook.com/pages/category/Author/Maciej-Maćkowiak-Rysunki-102301089955333/.

3. hunters and environmental/veterinary services, movements professio-nally involved in the problem of ASF, but engaged in conflict compulsorily often against their will (as hunters implementing government-determined wild boar depletion contingents, or underfunded veterinary services, which get new responsibilities (Figure 5)). They organise themselves mainly on major social media platforms like Facebook, Twitter or closed online forums.

Figure 5. Protest of Veterinary Inspection in June 2019.
(Left) Photo from protest on 14.06.2019.
Source:https://www.facebook.com/ozzpiw/photos/rpp.1712742662149503/2276597295764034
    /?type=3&theater.
(Right) Poster of protest.
Source:https://ozzpiw.pl/2019/06/protest-pracownikow-iw-zaostrzenie-protestu-10-czerwca-2019
    /?fbclid=IwAR3kdK45ahhkDRchC-RBdLlmkMqGt_UkyQGKvGNPDwBk_K6QAb0U54Wqy-U.

The concept of field is defined as a space of potential alliances that may establish more permanent connections through the penetration of members of various organisations, resources or political ideologies (Diani, 2015). Diani has been interested in detecting the entities (activists) in social movements that engage in cooperation, distributing resources or entering into conflict, delineating clear boundaries. According to this perspective, we will examine the Internet footprint in the concept of "distant reading" of agricultural, ecological and hunting movements, namely:
- interaction with the social and political environment;
- organisational changes networks (Mondani, 2018);
- the problem of conflict, the presence of counter-protests and anti-system functions (Platek, 2014).

Possible Data Resources

In this paper, we have reviewed available data resources to apply computational social sciences (Jarynowski, et al., 2014; Szaniawski, 1971) and digital humani-

ties (techniques initialised in this project) which might provide a better explanation and prediction of human behaviour.

Data Resources on ASF in Polish Media used in review:
- 812 Tweets with #ASF in Polish language and geolocalised in Poland in time period December 2018-April 2019 collected from Twitter website (tweets selected by Twitter algorithm of visibility).
- Facebook accounts and forums in time period December 2018-June 2019: "Forum Inspekcji Weterynaryjnej" [*Veterinary Inspection Forum*], „Trzoda Chlewna okiem rolnika" [*Pigs' eye of the farmer*], "Czarna Lista Organizacji Prozwierzęcych" [*Black List of animal organizations*], "Pracownia na rzecz wszystkich istot" [*Workshop for the benefit of all beings*], „Lubię myśliwych" [*I like hunters*], „Agrounia", „PZŁ - Polski Związek Łowiecki" [*PZŁ - Polish Hunting Association*], „Greenpeace Polska", „Pracownik Inspekcji Weterynaryjnej" [*Employee of Veterinary Inspection*].
- 433 news in mainstream Media from EventRegistry (http://eventregistry. org) 15.12.2019-15.01.2020 as gazeta.pl, TVN24.pl, niezalezna.pl, rp.pl.

Preliminary Results

The communication dynamics and the conflict relations between movements are reflected in competing dynamics (e.g. Animal Right Defenders attacking hunters, see Figure 4) and attempts for cooperation (e.g. Farmers supporting veterinary inspection protest).

Capacity Analysis of Twitter

Twitter in Poland has low popularity (~3 million registered users) and is mainly used by foreigners, journalists, cosmopolitans and politicians (Sotrender, 2019). Twitter provides API available to a general public. This allows one to analyse not only tweets themselves, but their context (following, retweeting, commenting, etc). We consider the following selected twitter users / accounts (with number of tweets in this sample) as follows: PSL (Agricultural political party) – 129, Zieloni (Green Party) – 14, PiWet and WIW (Vet Services) – 13, Government (Ministries) – 67, Local Governments (Voivodships) – 14, TVP (national TV) – 19, Farmer_pl (agricultural journal) – 29, Radio Maryja (St. Mary Radio) – 61, Nauka w Polsce (science in Poland) – 30, AgroPolska (agricultural journal) – 41, PZŁ (hunters association) - 1. As we see, political parties are overrepresented. Media accounts (e.g. Radio Maryja produces the biggest amounts of tweets in the whole Polish Twitter (Sotrender, 2019)) as well as governmental bodies in the given sample. Farmer associations are hardly visible and hunter associations are extremely underrepresented.

Capacity Analysis of Facebook

Facebook in Poland has reached the highest penetration rate among all social media with a share of ~17 million users and its dominating in almost all demographic categories (age/gender/education/place). However, Instagram is the most popular social media among teenagers below 15 y.o. (Mobirank, 2018). All of the initially selected agents are on Facebook and the ASF is a primary topic within farmers associations and veterinary inspection. Some interesting discussions about ASF belong to secured/closed Forums of Veterinary Inspection and Hunter association members for registered users only with limited access. Animal rights defending organisations are more open and also very active (some produce hundreds of posts daily in their discussions). However, the ASF topic is not the first topic of interest there.

Capacity Analysis of Electronic Media

We have chosen EventRegistry as a search engine, because it has a high coverage of Internet journals representing various political sides. Moreover, it gives priority to digital versions of other broadcasting channels including TV, radio or paper newspapers.

Content from Twitter and Facebook

Some interesting conflicting issues were selected as case studies (Table 1).

Table 1.
Selected topics and threats in Social Media for main actors.

Farmers associations	Animal Right Movements	Veterinary Inspection and hunters
"Pejsak, Jurgiel, 2 bratanki, koniec Polskiej Gospodarki" - farmers blamed veterinary inspection for ASF propagation and even claim that National Veterinary Institute makes business (Source – *Agrounia/* Facebook) *"Komu zależy na likwidacji gospodarstw rodzinnych?"* - Small farmers blamed big international farming corporation (Agrounia, 2019) (Source – *Trzoda Chlewna okiem rolnika* /Facebook) *„ustawa o ogrodzeniu Białorusi i Ukrainy ? to trzeba było robić duuuużo, duuuużo wcześniej"* Discussion on fencing in Polish Eastern border (Source – *Trzoda Chlewna okiem rolnika* /Facebook)	*„Walka z #ASF w praktyce:Psy myśliwych brudzą się we krwi dzików i jedzą surowe mięso, zanim wrócą na wieś, gdzie rolnicy trzymają świnie. Krew zostaje też w terenie, jako rezerwuar wirusa. Właśnie dzięki temu mamy problem"* Twitter accounts, already potentially classify as "Foreign Trolls" (Oko, 2019) were also propagating anti-government content which fueled animal right movement. (Source: *Albert301271/* Twitter)	*„Wrogiem jest dzik, Wrogiem lokalne koło łowieckie, Wrogiem Inspekcja Weterynaryjna. Wrogiem jest sąsiad, który ma lepiej i sobie jakoś radzi"* – attacks on veterinary inspection and hunters (Source - *Pracownik Inspekcji Weterynaryjnej/*Facebook) *„Polska Inspekcja Weterynaryjna najtańsza w Europie!"* Median salary in Polish Veterinary Inspection is 10 fold smaller than in Ireland, 3 holds smaller than in Romania and 50% smaller than in Latvia (Source - *Pracownik Inspekcji Weterynaryjnej/*Facebook)

Source: own contribution based on data from social media.

Mainstream Media

According to http://eventregistry.org the most frequent topic (for the searching term ASF) in Polish Media between 15.12.2019-15.01.2020 was "odstrzał sanitarny" (sanitary hunting), "wezwanie o podjęcie działań w zakresie zwalczania ASF" (asking for taking action in the fight against ASF), „płot na granicy Polski i Niemiec" (fence on the border between Poland and Germany), „specustawa/Lex Ardanowski" (administrative act). In general, the information coverage shown to the wide public, would rather present an objective illustration of the situation by reporting more facts than opinions.

Resources capacity for research purposes

We apply secondary data evaluation criteria (Table 2) adopted for socio-ecological systems (Maczka, et al., 2016). According to this, the perfect database for analysis may be found on Facebook. Unfortunately, Facebook pursues a very restrictive API policy on their platform making the analysis difficult (Facebook, 2019). Due to its accessibility, Twitter can be used with caution due to a significant limitation of low penetration rate and huge bias towards professional journalism and politics.

Table 2.
Analysis of usability of available Internet resources as Secondary Data Digital Footprints.

Dimension\Medium	Twitter	Facebook	Mainstream Media
Accuracy	low	high	Very high
Timeliness	Very high	Very high	high
Accessibility	Very high	Extreme low	medium
Contextual Comparability	low	Very high	high
Temporal Comparability	medium	Very high	high
Coherence	high	Very high	low
Credibility	medium	Very high	low
Amount	low	Very high	high

Source: own contribution.

Agents and interactions

Our null hypothesis assumes that there is a main conflict line between farmers and ecologists (sensu lato) or pig breeders and animal rights defenders (sensu stricte). However, there are more visual stages of conflicts involving veterinarians and hunters (Figure 6). We found that this interaction graph evolves in time and reacts to changing environment. For instance, cooperation between farmers (mainly pig breeders) and hunters is quite new, because there has been a significant conflict between them due to damage to the crops done by WB (in not-ASF context (Okarma, 2018)). Moreover, farmers claim that hunters have

not been hunting efficiently. However, massive attacks concentrated on hunters from ecological associations and the jump of ASF to Western Poland, caused the support from farmers due to economic interest. The results of this capacity explanatory study showed that there might be a few categories of repertoires (Table 5), attributes (Table 4) and values (Table 3) characterizing groups of main agents.
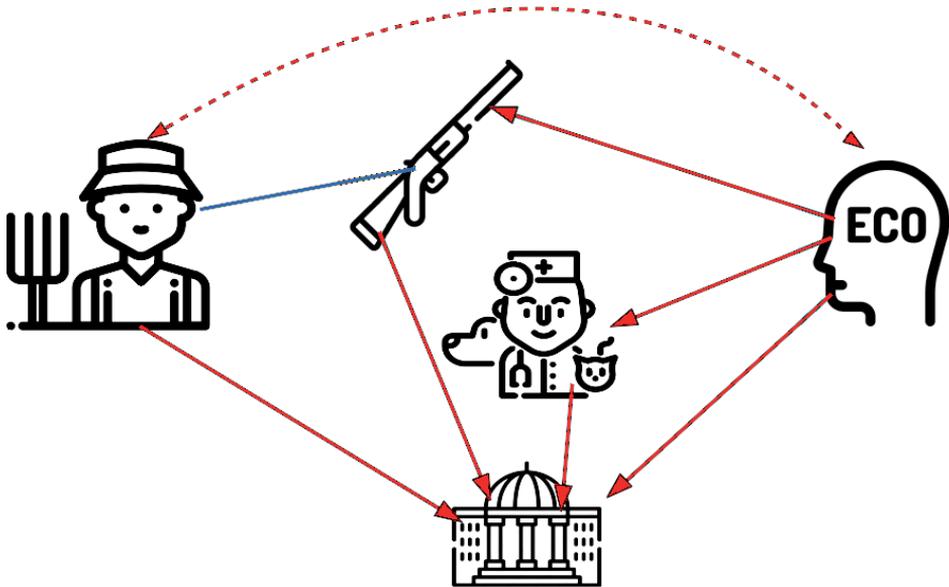

Fig. 6. A schematic zero approach to potential interactions between agents in a wider definition in the context of ASF (farmers, ecologists, hunters, vets, public administration) with red – conflicting and blue – cooperative. Solid lines are direct and dashed are indirect.

Source: own contribution.

The agents can vary significantly even within the same main category. There are differences between animal rights defenders and climate change fighters due to various value priorities. For example, animal rights defenders would be most concerned by the intention to decrease pig production harming animals, but climate change fighters would be most concerned about reduction in greenhouse gas emission, attributes and repertoires, even though they all belong to the ecologists category.

Table 3.
Possible values of conflicted agents.

Value	Farmers (mainly pig breeders)	Ecologists (manly animal rights defenders)
Subjectives	Family and Church (eg. big role of Radio Maryja broadcasting radio)	Society, sustainable farming
Politics	Nationalism and Patriotism	Egalitarianism
Acceptance of Aggression	high in verbal and physical sense	high in verbal (but more discussion) and moderate in physical sense
Objectives	Anthropocentric	Biocentric

Source: own contribution.

The ideological self-identification between "we" and "others" went so far, that during a conference "Shades of Ecology" organized by Radio Maryja almost every talk has started with inclination that "only we are the real ecologists" and "others only usurp right to be called ecologists" (Radio Maryja, 2020).

Table 4.
Possible attributes of conflicted agents.

Attribute	Farmers (mainly pig breeders)	Ecologists (manly animal rights defenders)
Place	Rural	Urban
Politics	Conservative	Liberal
Diet	Meat	Vegetarian
Religion	Christianity	Antispeciesism, Ecologism

Source: own contribution.

Repertoires used by agents are also changing over time (Table 5). Arrival of the disease to Western Poland caused a more strategic response of pig breeders. For instance, conflict potential between farmers and hunters has been reduced, and in fact farmers started to be more organised and asking hunters for help.

Table 5.
Possible repertoires of conflicted agents.

Repertoire	Farmers (mainly pig breeders)	Ecologists (manly animal rights defenders)
Conspiracy	Negation (ASF does not exist, and it is use to destroy Polish pig industry)	Negation (ASF does not exist, and it is used to get rid of natural sights)
Active action	Blocking roads	Blocking hunting
Organisation	Western organised, Eastern disorganised	Well-organised, well-financed
Main enemy	Attacking administration	Attacking hunters

Source: own contribution.

Capacity explanatory analysis allows us to post central measurable research questions:

- What are the main players (by identifying most influential agents by frequencies and impact measures such as network centrality) and what are their main repertoires (by topic analysis and modeling)?
- How interactions between agents change in time and adopt certain external impulses (by analysing chains of events)?
- Can one observe the influence of foreign intelligence (by examining agents polarising opinion the most)?
- Which mitigation strategies are most acceptable by the society (by measuring sentiments of given topics)?

CONCLUSIONS AND DISCUSSIONS

The aim of the article was to verify available resources for the quantitative analysis of new protest movements taking into account the following social agents: 1) Pig breeders 'organisations' or farmers in general; 2) animal welfare organisations or ecologists in general; 3) hunters' organisations and veterinary organisations as well as public administration. Quantitative investigation of characteristics of social movements around ASF epidemic in Poland could be the basis for similar models applications in other countries. The ASF is propagating further to the West, the disease is currently creating social tensions in Central and Eastern Europe, and it will soon embrace Germany and other countries of the western EU. Introduction of ASF to disease free territory should be considered from both natural or intentional perspective (Jarynowski, et al., 2019A). Since November 2019 ASF has got very close to the pork production hub in Wielkopolska and the introduction of ASF there may cause strong protests. The awareness about social dynamics is of great importance, for example in the developing of protection policies (Sitek, 2017) in the area of risk management and adequate education of citizens and stakeholders identified in Poland. Moreover, since January 2020 Social Media are providing information and misinformation (Kasprzyk, 2019) on another human infectious disease (SARS Cov-2) around the world at unprecedented speeds, fueling panic and creating an "infodemic" damaging whole states as Italy (Guardian, 2020). This was not observed at this scale yet, and tech giants like Google, Twitter, Facebook promised to deploy fact-checkers for information filtering. At the end of the day, computational analysis (as ours on ASF) would be even more biased due to media platform algorithms involvement in the discourse, even if amount of digital trace (even for Poland) is tremendous (Interdisciplinary, 2020).

Current ASF mitigation programs, biosecurity principles and wild boar depopulation policy (hunt for carcasses) are already causing controversy and generate mass protests (Vicente, et al., 2019). Based on the analysis of social media, European authorities could have a reliable assessment of the perception of the problem to prepare and manage the conflicts in an optimal way. This project also fills the

gap in sociological research on collective action that may explain the influence of contagious livestock diseases on the economy.

Future works

As part of the project, we plan to conduct a statistical analysis of digital footprints in social media in order to create a sociological image of protests around ASF in key dimensions: organisational forms and activities (e.g. number and nature of events); symbolic conceptual schemas (e.g. sentiment and conceptual fields); opportunity structures (e.g. the influence of the external field). The longitudinal and quantitative nature of the study will allow a measurable tracking of time-related processes that will be unique, because these movements in Poland still have not been investigated well yet. We need to improve definitions/operationalisations of the agents, because currently we consider a broad concept only. For example, in the case of hunters' activity, agricultural farmers usually have different opinions than pig breeders. However, this difference could be missing from our model. Moreover, external contexts are influencing conflicting lines. For instance, global climate change (and its perception) is fueling ecological movements (by demanding limiting meat consumption (Le Monde, 2019)), which created a new subcategory of non particularly animal right defenders.

Natural language processing methods (Jarynowski, et al. 2016) could be used to some extent to measure a number of latent variables, e.g. sentiment analysis and topic modeling (Jarynowski, Rostami, 2013) for Twitter but not for Facebook as this would violate its policy (Facebook, 2019). Social network analysis could be performed both for Facebook and Twitter (with much better interface for this kind of analysis) to understand the relationship structures of process agents, the communication dynamics and the conflict relations between movements. The data would be examined for questions of type What and How many (Duvanova, et al., 2015)? Additionally, narrative, ethnographic approach (interviews + journal/blog entries) and non-participatory observations will allow us to answer questions of type Why and How.

Acknowledgement

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