1 **Animal health discourse during ecological crisis in the media. Lessons learnt from**

2 **the flood in Thessaly from the One Health perspective – preliminary results**

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16 **Abstract**

17 Due to the increasing risk of extreme events caused by climate change (i.e. floods, fires,

18 hurricanes) or wars, European veterinary public health may need some improvement. Utilizing

19 a mix of qualitative (participatory observation) and quantitative methods (using internet

20 mining), we analyzed Greek media responses to the millennial flood in Thessaly (September

21 2023), focusing on animal health (including wild, companion animals and livestock) and public

22 sentiment towards epizootic/epidemic threats. The study revealed a gap in crisis management

23 plans regarding veterinary-related issues, emphasizing the need for comprehensive emergency

24 response strategies. Our findings show how: (i) lay-referral system is projecting perception of

25 epidemic threats in the population; (ii) emotional load of animal carcasses is misused by media

26 creators aiming for big audience; (iii) pets owners are creating on-line communities for

27 searching and treatment of their pets. Our results stress the importance of integrating crisis

28 communication in consecutive phases of the discourse:(i) weather change; (ii) acute flood; (iii)

29 recovery; (iv) outbreaks; into veterinary practices to better prepare for such disasters.

30

31 **Introduction**

32 During disasters such as floods, livestock, wild and companion animals can face significant

33 challenges and dangers. Crisis management plans mainly concern agricultural and human

34 health issues (Gawlik-Kobylińska 2022) and veterinary-related issues are less covered. Even

35 though there are guides for veterinary and humanitarian professionals to plan emergency

36 responses for the care and welfare of animals for various topics on disasters, such as principles

37 of disaster management, operation planning, team deployment (Verma and Prem 2022), the

38 European perspective seems to be missing. Our experience from the disasters in Thessaly' 2023

39 (early summer fires and late summer flood), and other events such as the Oder river disaster

40 (Jarynowski 2022), showed that the communication is of a big concern and must be taken into

41 account. According to the Crisis Coordination Center in Larissa (https://www.e-

42 agrotis.gr/2023/09/61786-19355-5306-123810.html) over 200k animals (61786 sheep and

43 goats, 19355 pigs, 5306 cattle, and 123810 birds) have vanished due the storm Daniel (5-

44 8.09.2023) in Thessaly mainly during the first wave of flood (8-12.09). Most of them drowned,

45 since animals unable to find higher ground or to safely escape became submerged and drifted

46 away from rising waters. To mitigate the impact of floods on animals also in the One Health

47 context, multiple efforts were taken. This includes providing proper shelter, securing food and

48 water supplies, and having sophisticated evacuation plans in combinations with intelligent

49 monitoring systems. Precision farming is widely used by Greek farmers. This allows us to

50 monitor the impact of the Daniel storm on crops and livestock (He et al. 2023). We also analyze

51 human gastroenterological disease dynamics using real-time syndromic surveillance systems

52 (Kostoulas et al. 2021).

53

54 **Methods**

55 Our study employs both qualitative and quantitative methods to assess Greek digital traditional

56 and news media in September 2023. We collected 13873 mentions (Oelke et al. 2023) related

57 to the flood by Brand24 (supply of information) and Google queries (demand of information).

58 The goal of this analysis is to investigate the social reaction (Alexander 2014) to the threat

59 (bottom up approach), regarding animal health (Jarynowski et al. 2022). For the sake of method

60 triangulation, a participatory observation (by EM and AJ) perspective was included.
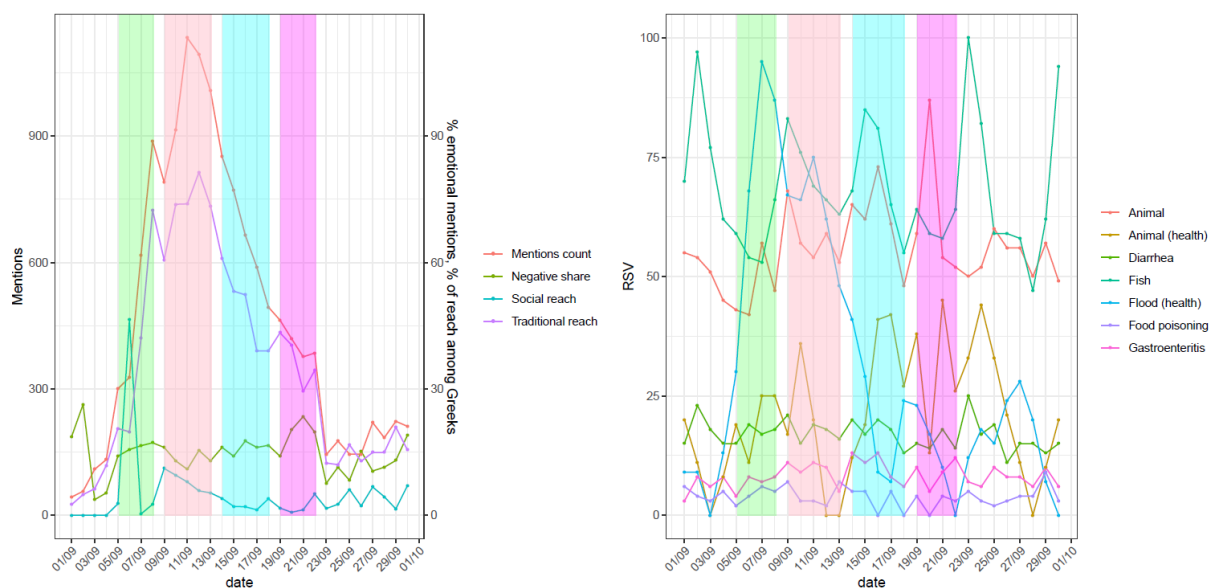
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62 **Results and Discussion**

64 Fig. 1. (Left) The flood in traditional and social media daily (extracted using Brand24). Daily

65 mentions number (left axis), social and traditional reach (right axis) and the corresponding

66 sentiment (right axis). (Right) Google search queries in normalized daily values.

67

68   Fig. 1 (Left) shows, for the period of time when the Daniel storm occurred in Thessaly, Greece,

69   the number of flood-related mentions, sentiment (percentage of negative mentions), the related

70   social and traditional media reach. The latter is measured as the percentage of the Greek

71   Internet user's population. E.g. 100% would mean that on average every inhabitant of Greece

72   was exposed to flood information at once. Fig. 1 (Right) describes flood, animal and health

73   (human and animal)-related google queries in RSV (Relative search volume). It is evident that

74   a peak occurs during the period of the storm and most of the news have a "negative" sentiment,

75   since they describe the response ("rage") of the people who (i) got affected by the storm and

76   (ii) were observing the situation via the mentions. There is no clear increase in discussion on

77   animal and epizootic related issues in Google trends (with slight peak of searches on animal

78   health after the first wave of flood). Based on the inspection of the sources, health and animal-

79   related discourse (only 1330 mentions being 9.6% of sample) is secondary to topics such as

80   government incompetence, which is similar to other studies (Jarynowski et al. 2022). In Greece

81   livestock (sheep, goats, cattle, pigs) farmers are usually cultivating land too for example corn

82   (animal feed) and cotton (as an extra crop) production. Early October is harvest time, thus many

83   acres of crops ready to be harvested were destroyed.

84

85   The observed negative sentiment related to the situation can be attributed to the fact that

86   Greece, since 2012 is experiencing a financial crisis. To this end, many discussions about

87   farmers income and also tax happened. Also, public authorities; related also to insurance

88   organizations, do not have the ability to intervene and compensate the losses to the farmers

89   (long tail of negative emotions after the flood).

90

91   Table 1. Characteristics of discourse in main animal related topics

Topic	Standard characteristics	Nontrivial Observations

Missing and Displaced Animals	Focus mainly on missing companion animals shared on social media. Limited discourse on displaced farming animals.	Uncommon absence of wild animal discussion compared to other catastrophes.
Dead Animals	Articles may not mention animals in the text but use emotionally charged images of carcasses. On the other hand, discussion on dead animals was often included in calculation of economic losses. Farmers lost not only their livestock but also the equipment (building, machinery) and animal feed	Use of dead animal images for emotional impact (clickbait) despite lack of relevant content in mentions. Loss of animal related accessories (feed and tools) more important to farmers that livestock.
Infectious Diseases and Health Issues	Multiple discussions on epidemiological and epizootiological threats post-flood topics include human and animal gastroenterological diseases, food/feed contamination, and water pollution concerns. Animal owners exchanged information about animal treatment. Many mentions refer to the extent of the damage and also point out the importance/need for a proper management of the situation, given that is a major public health concern.	Broad coverage of health threats, but sophisticated discussions on potential risks (e.g., West Nile, Leptospirosis which incidences raised after flood or possible re-emerging disease such as Cholera, Malaria, Dengue) not widely acknowledged by the general population, which was interested in gastroenterological diseases and acute treatment of their animals only. Mentions about incompetence of authorities are seen in post-acute phases of flood.

92

93 We observed an information gap between veterinary epidemiologists' opinions on and the

94 interest among the general public [Tab. 1] for various visible ailments. This gap might be

95 explained by the concept describing the behavior of patients, known as the lay-referral system.

96 It is the process by which people seek health care advice and treatment from non-professional

97 sources, such as family, friends or community members – whom they trust – as opposed to a

98 professional system in which the trust is limited (Freidson 1960). Patients tend to be guided by

99 their own subjective perception of ailments. It is similar to the perception of epidemic threats,

100 which could be classified as imaginable and visible threats. The latter might fade out (cognitive

101 dissonance) threats that are difficult to imagine. The lay-referral system is a network of

102 informal relationships that people use to obtain health care information and advice. For this

103 reason, we see that it is particularly important to properly inform citizens about actual threats,

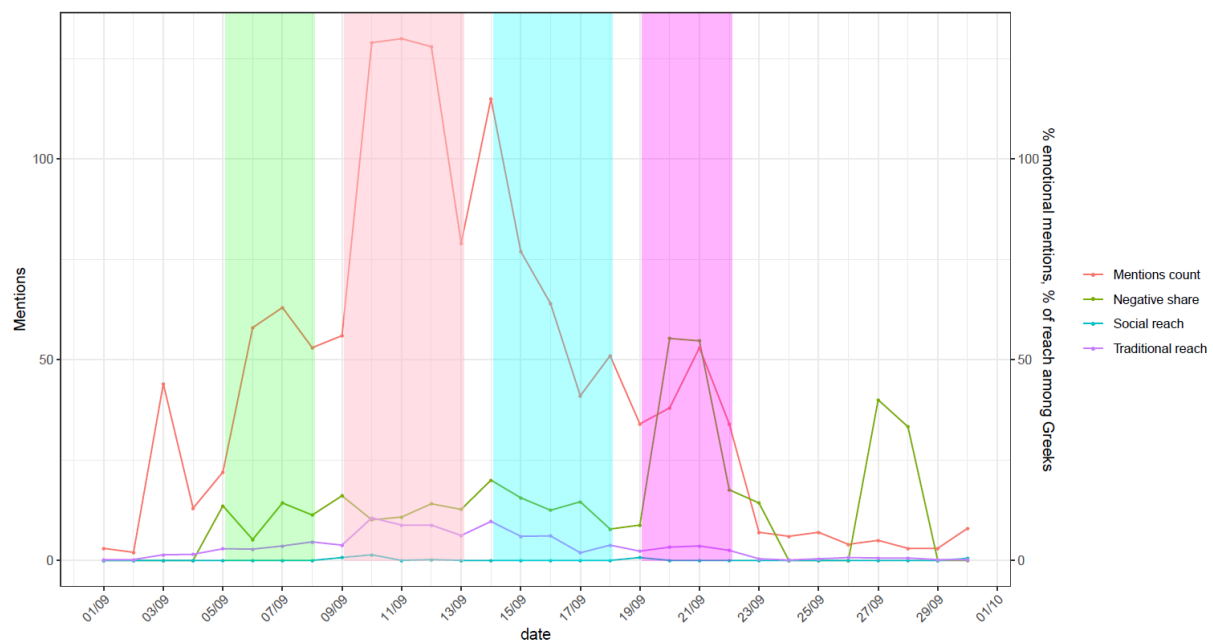104 thus eliminating the impact of mistakes generated by the lay system.

Fig. 2. Interest on the Internet for human and animal diseases (i.e. diarrhea) related to the flood as measured by count of mentions as well as their social and traditional reach/sentiment.

We can distinguish the following phases (Kaniasty and Norris 1995): (i) Daniel storm phase (discussion on weather, little concern on animals and diseases [Fig. 1, 2, green]); (ii) acute flood phase (when animal rescue actions were going on with massive flow of information without the emotional load [Fig. 1 left, pink]), (iii) recovery phase (when carcasses where removed and losses calculated [Fig. 1 left, 2, blue]), (iv) flood related outbreaks phase with peak on 21.09 related to animals disease after feeding on flooded areas [Fig. 1 right, 2, purple].

Conclusions

Due to climate change (Reichstein et al. 2021) and anthropological impact (WAP 2022) Europe is expecting more and more threats for One Health (with focus on veterinary issues) in the future. We demonstrated where information gaps may appear between veterinarians and the general public (e.g. concerning complex associations between flood and diseases). To mitigate the impacts of disasters on livestock and companion animals, it is essential for the authorities

122 in charge to not only have emergency plans in place, but also to possess crisis communication

123 skills and action plans for the local communities in this matter. This includes early warning

124 systems or media monitoring activity during the catastrophic event. Because local veterinary

125 authorities, animal welfare organizations, and animal breeders may play a crucial role in rescue

126 and relief efforts during disaster events, the aforementioned issues should be included in the

127 veterinarian curriculum.

128 Data (https://zenodo.org/doi/10.5281/zenodo.10451064) and tutorial to use media listening for

129 veterinarian is available https://github.com/ajarynowski/flood.

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