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Links between law enforcement and veterinary animal health: a case study of the United Kingdom and the United States of America

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Summary
The anthrax attacks carried out in the United States of America in the latter part of 2001 served as a clarion call to most law enforcement agencies among developed countries as, until this time, they had not recognised the threat posed by the criminal use of pathogens and/or toxins. Law enforcement agencies include the local and federal police, Customs, Immigration and any other agencies that perform a law-enforcing role. That a criminal or terrorist group could commit such an act was considered nearly inconceivable, even though biological weapons had been used against humans and animals in warfare many times over the last several hundred years. Similarly, it is without doubt that the terrorist threat to all societies changed after the events of 11 September 2001 during which the clear intention had been to cause as many fatalities and casualties as possible. As a result, the biological threat to human health became a focus for many governments.

Keywords
Agroterrorism – Biological terrorism – Biological weapons – Bioterrorism – Federal Bureau of Investigation – Interpol – Law enforcement – United Kingdom – United States.

Introduction

Biological weapons have been used in warfare against humans and animals countless times over the centuries (1). Before the anthrax attacks of 2001, the United States (US) had already developed countermeasures to mitigate the impact of attacks involving biological agents. In 1998, the Federal Bureau of Investigation (FBI) introduced the Federal Select Agent Program, as a direct result of the actions of Larry Wayne Harris, a trained microbiologist with neo-Nazi links, who was convicted of illegally obtaining plague bacteria (2). The Program oversees the possession, use and transfer of select biological agents and toxins, which have the potential to pose a severe threat to public, animal or plant health, or to animal or plant products. It regulates a list of 65 agents and toxins, which is reviewed at least every two years to determine if agents need to be added or deleted (3).

The United Kingdom (UK) implemented a similar architecture, the Anti-Terrorism Crime and Security Act 2001 (ATCSA), to control the use of biological agents after a significant outbreak of foot and mouth disease (FMD) in 2001. As a result of the rapid response to the event and the subsequent robust epidemiological investigation, criminal/terrorist acts were ruled out as the cause of the virus's introduction early on during the outbreak.

However, unlike the FMD outbreak in the UK in 2001, the US did have immediate concerns that the anthrax mailings that took place in the autumn of 2001 could be the result of a terrorist incident. It was for this reason that new legislation was introduced, under Title 42 of the Code of Federal Regulations, Part 73 (Select Agents and Toxins) (4), to criminalise the unlawful use of pathogens and toxins against humans (but not animals or plants). This legislation also included strict security protocols for those institutions wishing to hold dangerous pathogens and toxins.

To implement and enforce ATCSA in the UK, significant numbers of law enforcement personnel had to be trained in laboratory security and the techniques required to investigate crimes in which biological agents had been used. Such efforts at training law enforcement staff continued with vigour for more than a decade. However, as time has passed, it would appear that the UK Government's commitment to fund this work has diminished. This has probably been caused by the perception of a reduced risk, due to a lack of criminal acts in which dangerous pathogens or toxins have been used.

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Despite the existence of intelligence highlighting the desire of some terrorist groups to commit attacks involving biological pathogens, these plans have targeted human health directly, rather than indirectly (such as attacking the food chain). Thus, for the present at least, there appears to be no compelling argument that would encourage law enforcement agencies to train personnel in identifying and investigating an attack against livestock. Since all the relevant expertise exists within the animal health community, it makes economic sense that law enforcement agencies should only be on 'standby', to assist animal health experts in an investigation, as opposed to law enforcement agencies being the lead agency in the prevention, preparedness, identification of and response to a disease outbreak caused by an animal pathogen.

In the UK, animal health is an issue that has always been dealt with by agencies other than law enforcement. Even after two devastating outbreaks of FMD, UK law enforcement bodies do not train personnel in how to deal with animal health issues, although they would always be available to conduct an investigation into an incident, if the criminal use of a pathogen was suspected. Police would add their expertise in collecting forensic evidence and the submission of a prosecution file to the unique specialisations of animal health professionals, such as epidemiology.

The US has taken a different route, with the FBI actively training a network of specialised coordinators in the joint investigation of animal and plant health issues. FBI agents work alongside animal or plant health experts to conduct joint epidemiological investigations, until the outbreak has been identified as due to natural causes or the result of an accident. Protocols between the FBI and other key agencies have been set down within memoranda of understanding.

Many countries around the world appear either oblivious to the threat and potential impact of an attack, or they do not have the expertise and finances to boost their own capacities. This is gradually being improved upon in regions such as South-East Asia, through the support of the Group of Seven (G7) Global Partnership. This work is usually carried out by international organisations such as the International Criminal Police Organisation (Interpol) and the World Organisation for Animal Health (OIE), as well as international funding bodies, such as the US Civilian Research and Development Foundation Global, a non-governmental organisation (www.crdfglobal.org) which supports such work, guided by a recognised international body, such as the G7 Global Partnership (5).

The OIE and Food and Agriculture Organization of the United Nations have the best understanding of any global impact that a terrorist attack against animals or plants may have. A strong case needs to be made to the heads of Interpol, the World Customs Organization and others, pointing out the relevance of such attacks to the law enforcement role that they perform. At this point in time, law enforcement agencies focus mainly on human health issues and can be blind to the economic, and long-term impacts on human health, that a terrorist attack against animals or plants could cause.

Biosecurity in the United Kingdom

In quick response to the terrorist attacks in New York and Washington, DC, in 2001, followed by the anthrax mailings across the US during the autumn of that year, the UK Government created the Anti-Terrorism Crime and Security Act 2001 (6). This, as it stands today, is a wide-ranging piece of legislation aimed at tackling the many challenges brought about by the new form of international terrorism (7). Within the Act, Part 7 (8) sets out the provisions that make it necessary for a laboratory containing dangerous pathogens and toxins to have adequate security. If a facility fails to follow the instructions given by a police officer to improve its security, this is punishable by criminal law.

The Act concludes with a number of Schedules which are appended to particular Parts of the Act. Schedule 5 (9) covers the list of dangerous pathogens and toxins of concern. When first published, the list consisted of all the pathogenic agents, also contained within the 'Australia List' (10), and toxins to be subjected to import and export controls. Although zoonotic diseases were included, no animal or plant pathogens were listed. Schedule 5 was therefore reviewed by a group of experts named the 'Salisbury Group' (11). By 2007, Schedule 5 was amended by Parliament (12) to become a more targeted list of agents of security concern regarding their potential terrorist use, with the inclusion of animal pathogens.

For law enforcement agencies within the UK, ATCSA provided a very new challenge, particularly for police, who had not previously been required to make security assessments of research, hospital and academic environments involving laboratory security. A new national police team, called the National Counter Terrorism Security Office (www.gov.uk/government/organisations/national-counter-terrorism-security-office), was established to implement the legislation (as well as to carry out other duties focused on the security of hazardous materials, such as radiological sources and chemicals). To implement the work nationally, each police service was provided with funds by the Home Office to employ dedicated staff, known as 'Counter Terrorism Security Advisers' (CTSAs) (13).

The CTSAs then had to be provided with training on how to deliver security advice to the staff of laboratories

(and elsewhere) and on what to expect and look for when assessing a laboratory. During its early stages, training and development related to the project were enhanced by a significant input from the UK Health and Safety Executive (HSE) Biological Agents Unit (BAU) (14). This team brought with it essential expertise and knowledge, as its members had been inspecting microbiology laboratories for many years, and were aware of the challenges the CTSAs would face. The BAU would also assist the CTSAs to contact those sites registered through legislation, and advise them on the planning and execution of their inspections.

In the same year that the first amendment of Schedule 5 of ATCSA 2001 became law (2007), there was a significant outbreak of FMD in Surrey (15), England. As soon as the outbreak had been identified, several government agencies joined forces to consider the challenges that lay ahead and to implement an investigation, led by the HSE BAU, to determine the source of the outbreak.

The Assistant Chief Constable of Surrey Police (16) immediately became involved, owing to the fact that it was undetermined as to whether the outbreak had occurred naturally, by accident or was a deliberate act by a person or persons unknown. For law enforcement agencies, this was a new challenge as, during the outbreak of 2001, only the army had been called in by animal health experts, to assist with the destruction and disposal of livestock.

During the initial investigation, HSE BAU took the lead, as its personnel were the ones best qualified to identify the source of the outbreak. Police assumed a supportive role and were provided with regular updates as to the possible cause. If, at any point, the outbreak had been identified as a deliberate act, the local senior police commander would have taken charge of the investigation and procedures would have been put in place to gather evidence and prosecute offenders.

It is now common knowledge that the outbreak was caused by several issues, including a faulty pipe (17) running to an effluent tank and ongoing ground works being conducted on site at the location that was eventually identified as the source. The site in Surrey had two adjacent institutions, which either conducted research on FMD or manufactured vaccinations to prevent FMD.

Law enforcement agencies continue to inspect laboratories registered under the requirements of Part 7 of ATCSA, and the list of pathogens and toxins has been further updated under the recommendations of the Lightfoot Review (18). Police also remain prepared and equipped to deal with the deliberate use of an animal pathogen, but the consensus is that other government agencies, such as HSE and the Department for Environment Farming and Rural Affairs (Defra) (www.gov.uk/government/organisations/department-for-environment-food-rural-affairs), are better equipped to assess an initial outbreak of an animal or plant pathogen.

It should be noted that, in the UK, many agencies are involved in risk reduction strategies to ensure that the threat posed by the use of pathogens and toxins against humans or animals is minimised. These bodies include the Department of Health, Public Health England, Defra and the Ministry of Defence.

Global biosecurity for law enforcement

Interpol (www.interpol.int), established its Bioterrorism Prevention Unit (19) in 2005, with the support of significant funding from the Alfred P. Sloan Foundation. After an initial international conference of experts in Lyon, France, a small team established a work stream of regional conferences, table-top exercises and 'train-the-trainer' sessions, which operated until 2011.

Interpol relied heavily on the support of other international experts to develop and deliver these activities. As the focus was on acts of terrorism, as opposed to the use of bio-weapons by states, this initial stage was focused on human health only. Law enforcement agencies across the globe were advised and encouraged to collaborate with human health agencies within their own countries.

In 2008, Interpol published its first edition of the *Biological Incident Response Guide* (*BIRG*), which was updated in 2010. Neither the first nor the second edition of *BIRG* is available to the public. Copies are only issued by Interpol to law enforcement agencies. This guide was intended to assist law enforcement agencies across the globe to identify a possible future attack where a biological agent had been weaponised, and how to respond to it. Again, there are no indications in the guide as to how to identify an attack against animals or crops, and the training which accompanied the guide made no mention of law enforcement agencies collaborating with animal health professionals, border control personnel or the agricultural community.

Interpol's work on animal health

Although Interpol devoted no efforts towards animal health in relation to a deliberate disease release until 2015, the organisation possesses a significant and very effective 'environmental crimes' sub-directorate (20). As well as examining issues such as the illegal dumping of toxic waste, the team also conducts a considerable amount of work

related to anti-poaching methodologies and the protection of endangered species. So it would be unfair to say that Interpol had not committed any resources to the issue of animal health prior to 2015.

Some may argue that the protection of wildlife is not an issue to be dealt with by law enforcement agencies but, in regions such as Africa, it is a major focus of the police and park rangers. Interpol has achieved some notable successes in coordinating projects in these regions, which have resulted in the prosecution of offenders and many tonnes of illegal ivory being seized.

After close collaboration with other international agencies, Interpol's BioTerrorism Prevention Unit held a two-day workshop in 2015, examining the role of law enforcement and the potential terrorist use of pathogens to attack livestock. The project was given the title of the Law Enforcement and Veterinary International Conference (21). As with the eradication of smallpox, concerns were growing in light of the recent eradication of rinderpest (22) that vaccinations were no longer taking place. Since its eradication in 2011, rinderpest has been viewed as a significant risk, along with smallpox, because there are no longer any vaccination programmes in existence. A fresh outbreak could cause global devastation. A need was identified for Interpol to work more closely with the OIE (www.oie.int), as it already does with the World Health Organization (www.who.int).

The workshop drew a small number of experts from around the world, with the intention of producing a roadmap for future international cooperation between law enforcement and animal health agencies. A crucial message immediately identified was that human and animal pathogens do not have borders, and that some regions of the world are far more vulnerable than others. This message seemed appropriate in its timeliness, given that the workshop was being held during the worst outbreak of Ebola in history (West Africa), and the reoccurrence of Middle East Respiratory Syndrome (MERS) Coronavirus (in the Middle and Far East).

Though this work continues to progress, it should be noted that it has taken over a decade for Interpol to convince some of its 190 Member Countries that the threat from bioterrorism against humans is a credible one, let alone the potential impact of an attack against animals. During the workshop, it was immediately clear that some countries saw the engagement between animal health professionals and law enforcement as a priority, whereas others did not see the potential threat to their country or region, and felt, therefore, that any investment in building capacities between law enforcement and animal health experts would not be worthwhile.

The approach of the United States of America

The FBI formed its Weapons of Mass Destruction Directorate (WMDD) in 2006 (23). The agency had already accumulated a significant amount of investigative, scientific and analytical expertise. The WMDD mission includes prevention and preparedness, representing a paradigm shift away from the basic response to such incidents that followed the 2001 anthrax mailings. Additionally, the WMDD countermeasure units have built partnerships with bodies that have not traditionally worked with law enforcement agencies, such as Health and Human Services, the US Department of Agriculture (USDA) Animal Plant Health Inspection Service (APHIS), etc.

The UK's initial response prioritised the security of pathogens and toxins, whereas the US focused on preparedness and response, but this was soon followed by the introduction of biosecurity requirements, which enforced new US legislation – the Federal Select Agent Program, set out within the newly published USA Patriot Act of 2001 (24). Each state within the US with an FBI field office employed a single point of contact known as a WMD coordinator, who was trained and informed by the WMDD.

One of the FBI's most significant projects has focused on law enforcement and public health staff training and working together to investigate incidents where biological materials have been used. This joint training, referred to as the 'Joint Criminal Epidemiological Course', has produced guidance documents for both national (25) and international (26) training programmes.

Within the last three years, the FBI WMDD has started to invest time and resources into developing capabilities for preparedness and response to a deliberate attack in which animals or plants are targeted. This work focuses on the timely identification of an unusual disease outbreak, followed by a joint investigation. Law enforcement investigators would work alongside animal or plant health experts to establish whether the outbreak had been caused deliberately, or happened accidentally or was an act of nature.

This proactive response to the possible threat to animal health posed by criminal or terrorist behaviour is further supported by the development of a memorandum of understanding between the FBI and USDA APHIS. Such an agreement is vital if government agencies are to be able to share data and intelligence in order to quickly identify if an outbreak is a deliberate act during a joint epidemiological investigation.

The trouble with law enforcement and animal health

Many countries across the world place different emphasis on animal health issues, depending on their economic and geographical make-up. Law enforcement agencies in Africa commit many resources to combating poachers and the overall protection of wildlife, as this is crucial to the economic well-being of African nations. Similarly, in the Middle East, millions of sheep are ceremonially slaughtered each year during the Hajj pilgrimage (27). Their health and well-being before their slaughter is a priority and extra efforts are made to ensure that they do not fall victim to a disease outbreak. So, law enforcement agencies can be called upon in specific cases to assist in animal health issues but this is not common.

History does give us evidence, however, of animal diseases being weaponised during times of war, from a siege in northern France in 1340, when the corpses of dead horses were catapulted towards the enemy (28), to the use of diseases to try to cripple armies and their livestock during the First World War (29). Military tacticians have long recognised the effectiveness of using animal diseases, either to bring about an early end to a siege, or to inflict severe damage on the mobility of an army dependent upon horses. Since the Biological and Toxin Weapons Convention of 1972 (30), the US, the UK and Canada have invested in reducing the threat within their own countries (and assisting less-prepared countries in high-risk regions of the world) from the development of biological weapons, either by states or terrorist groups.

It has been observed by Interpol that law enforcement agencies play a wide range of roles within the animal health spectrum. Countries within Africa, which have law enforcement agencies working against poachers and others who exploit wild animals, tend to see the relevance of protecting livestock and other animals against an attack in which pathogens or toxins are used. There is a greater understanding of the potential economic impact, whether caused by the loss of a food source or the longer-term damage to an economy that is reliant upon tourism.

In 2001 and, to a lesser degree, in 2007, the UK suffered first from a natural and then an accidental outbreak of FMD virus. Though the immediate effects of the outbreaks were significant, in terms of impact on agricultural livelihoods, tourism, the environment, etc., the economic effects were eased by an affluent government. So, how great is the incentive to invest billions of pounds in preventing and responding to the deliberate use of an animal pathogen? The UK Government appears to have adopted a policy of risk acceptance, considering that it is probably cheaper to deal with such incidents in isolation.

In recent years, intelligence has been gathered and examined to successfully uncover several plots to use pathogens and toxins against humans. These included a plan to make hand grenades containing bubonic plague in 2014 (31), and a noted anthrax plot uncovered by Kenyan police (32) in early 2016. With the Ebola outbreak in West Africa still fresh in our memories, law enforcement agencies can easily be persuaded to see the threat posed by the illegal use of pathogens and toxins against humans. This is not generally the case with animals, especially in less economically advanced countries.

To protect global food sources, which include animals and plants, there needs to be a coordinated effort by the global community to bring law enforcement and animal health specialists together. It is important for agencies to work together and establish protocols and understanding before an event takes place. As a colleague once said to the author of this paper 'sitting on the edge of a bomb crater is not a good time to exchange business cards with people you have never met, but now rely upon'.

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Liens entre les services chargés de l'application des lois et ceux en charge de la santé animale : études de cas au Royaume-Uni et aux États-Unis d'Amérique

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Résumé

Les attaques à la fièvre charbonneuse perpétrés aux États-Unis d'Amérique à la fin de l'année 2001 ont lancé un signal d'alerte à la plupart des agences chargées de l'application des lois des pays développés, qui n'avaient jusqu'alors pas pris conscience des menaces posées par l'utilisation criminelle des agents pathogènes et/ou des toxines. Les agences chargées de l'application des lois sont notamment les forces de police locales et fédérales, les services des douanes, les services d'immigration et toute autre agence gouvernementale chargée du maintien de l'ordre et de la justice. Il était pratiquement inconcevable qu'un groupe criminel ou terroriste puisse commettre un tel acte, même si des armes biologiques avaient déjà été utilisées contre les populations humaines et animales au cours de certains conflits armés des siècles précédents. De même, il va sans dire que la menace terroriste pesant sur les sociétés dans leur ensemble a pris un nouveau visage après les événements du 11 septembre 2001, dont le but était clairement de faire le plus de victimes possible et de tuer le plus grand nombre de personnes possible. En conséquence, la menace biologique pesant sur la santé publique est devenue un domaine central d'attention pour nombre de gouvernements.

Mots-clés

Agro-terrorisme – Arme biologique – Bioterrorisme – Bureau fédéral d'investigations – États-Unis – Forces de l'ordre – Interpol – Royaume-Uni – Terrorisme biologique.

Vínculos entre los cuerpos de seguridad y los Servicios de sanidad animal: estudio monográfico en el Reino Unido y los Estados Unidos de América

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Resumen

Los ataques con la bacteria del carbunco perpetrados en los Estados Unidos de América a finales de 2001 marcaron un antes y un después para la mayoría de los cuerpos de seguridad de los países desarrollados, que hasta la fecha no habían advertido la amenaza que planteaba el uso de patógenos y/o toxinas con fines criminales. Forman parte de los cuerpos de seguridad las fuerzas de policía local y federal, los cuerpos de aduanas, inmigración y demás instituciones cuya función consiste en velar por el cumplimiento de la ley. Que un grupo delictivo o terrorista pudiera cometer semejante acto era algo prácticamente inconcebible, aun cuando en los últimos siglos hayan menudeado los ejemplos de utilización de armas biológicas contra la población humana o animal como instrumento

de guerra. Análogamente, no cabe duda alguna de que la amenaza terrorista que planea sobre todas las sociedades cambió a partir de los acontecimientos del 11 de septiembre de 2001, en los que la intención era claramente de causar tantos muertos y heridos como fuera posible. A resultas de aquello, las amenazas biológicas para la salud humana pasaron a ser una de las preocupaciones cardinales de muchos gobiernos.

Palabras clave
Agroterrorismo – Armas biológicas – Bioterrorismo – Cuerpos de seguridad – Estados Unidos – Interpol – Oficina Federal de Investigación – Reino Unido – Terrorismo biológico.

References

1. eMedicineHealth (2016). – Topics related to biological warfare. Available at: www.emedicinehealth.com/biological_warfare/article_em.htm (accessed on 14 August 2016).

2. Stern J.E. (2000). – Larry Wayne Harris: the talkative terrorist. *In* Toxic terror: assessing terrorist use of chemical and biological weapons (J.B. Tucker, ed.). MIT Press, Cambridge, Massachusetts, 320 pp. Available at: http://hestories.info/larry-wayne-harris-the-talkative-terrorist1.html (accessed on 11 August 2016).

3. United States Centers for Disease Control and Prevention b & United States Department of Agriculture (2017). – Federal Select Agent Program: select agents and toxins list. Available at: www.selectagents.gov/SelectAgentsandToxinsList.html (accessed on 17 August 2017).

4. Cornell Law School Legal Information Institute (2017). – Code of Federal Regulations, Title 42, Chapter 1, Subchapter F, Part 73: Select agents and toxins. Available at: www.law.cornell.edu/cfr/text/42/part-73 (accessed on 16 December 2016).

5. Nuclear Threat Initiative (2016). – Global partnership against the spread of weapons and materials of mass destruction. Available at: www.nti.org/learn/treaties-and-regimes/global-partnership-against-spread-weapons-and-materials-mass-destruction-10-plus-10-over-10-program/ (accessed on 14 August 2016).

6. Islamic Human Rights Commission (2016). – Publications: briefings: Anti-Terrorism, Crime and Security Act 2001. Available at: www.ihrc.org.uk/publications/briefings/7057-briefing-anti-terrorism-crime-and-security-act-2001 (accessed on 8 August 2016).

7. Oxford University Press (2017). – Home: British & World English: terrorism. *In* Oxford Living Dictionaries: English. Oxford University Press, Oxford. Available at: https://en.oxforddictionaries.com/definition/terrorism (accessed on 16 December 2016).

8. Government of the United Kingdom (2001). – Anti-Terrorism Crime and Security Act 2001, Part 7. Available at: www.legislation.gov.uk/ukpga/2001/24/part/7 (accessed on 8 August 2016).

9. Government of the United Kingdom (2017). – Schedule 5 of the Anti-Terrorism Crime and Security Act 2001. Pathogens and toxins. Available at: www.legislation.gov.uk/ukpga/2001/24/schedule/5 (accessed on 8 August 2016).

10. The Australia Group (2017). – List of human and animal pathogens and toxins for export control. Available at: www.australiagroup.net/en/human_animal_pathogens.html (accessed on 16 December 2016).

11. Walker C. (2011). – Research into the development of counter-terrorism legislation. *In* Terrorism and the law. Oxford University Press, Oxford, 452.

12. Newcastle University (2016). – Pathogens and toxins guidance. Anti-Terrorism, Crime and Security Act 2001, Schedule 5, Order 2007. Guidance on Notes 1a–d of Schedule 5 to the Anti-Terrorism, Crime and Security Act 2001 (Modification) Order 2007 (2007/929). Available at: www.ncl.ac.uk/ohss/assets/documents/ATCSApathogensandtoxinsguidance.pdf (accessed on 9 August 2016).

13. Government of the United Kingdom (2014). – The Counter Terrorism Security Advisers network information: promotional material: working with counter terrorism security advisers. Available at: www.gov.uk/government/publications/counter-terrorism-support-for-businesses-and-communities/working-with-counter-terrorism-security-advisers (accessed on 9 August 2016).

14. Health and Safety Executive (HSE) of the United Kingdom (UK) (2017). – Biosafety and microbiological containment. HSE, Liverpool, UK. Available at: www.hse.gov.uk/biosafety/ (accessed on 9 August 2016).

15. BBC News (2007). – Pirbright: labs at centre of outbreak. Available at: http://news.bbc.co.uk/1/hi/uk/6931830.stm (accessed on 9 August 2016).

16. Wikipedia (2016). – 2007 United Kingdom foot-and-mouth outbreak. Available at: https://en.wikipedia.org/wiki/2007_United_Kingdom_foot-and-mouth_outbreak (accessed on 9 August 2016).

17. Anderson I. (2008). – Foot and mouth disease 2007: a review and lessons learned. Stationery Office, London, 138 pp. Available at: www.gov.uk/government/publications/foot-and-mouth-disease-2007-a-review-and-lessons-learned (accessed on 18 August 2017).

18. Government of the United Kingdom (2016). – Impact assessment of the recommendations made by the Lightfoot Review. Amendments to Schedule 5 of the Anti-Terrorism, Crime and Security Act (2001). Available at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/157977/impact-assessment.pdf (accessed on 9 August 2016).

19. Interpol (2016). – Connecting police for a safer world. Bioterrorism. Available at: www.interpol.int/Crime-areas/CBRNE/Bioterrorism (accessed on 9 August 2016).

20. Interpol (2016). – Connecting police for a safer world. The Interpol Environmental Crimes Directorate. Available at: www.interpol.int/en/Crime-areas/Environmental-crime/Environmental-crime (accessed on 9 August 2016).

21. Interpol (2015). – Addressing threat of agroterrorism focus of Interpol meeting, 29 April 2015. Available at: www.interpol.int/en/News-and-media/News/2015/N2015-048 (accessed on 9 August 2016).

22. World Organisation for Animal Health (2016). – Rinderpest Portal 2011. Global freedom from rinderpest. Available at: www.oie.int/en/for-the-media/rinderpest/ (accessed on 14 August 2016).

23. Federal Bureau of Investigation (2016). – Weapons of mass destruction. Available at: www.fbi.gov/investigate/wmd (accessed on 9 August 2016).

24. United States Congress (2017). – The USA Patriot Act: preserving life and liberty. Available at: www.justice.gov/archive/ll/highlights.htm (accessed on 11 August 2016).

25. Federal Bureau of Investigation (FBI) & United States Centers for Disease Control and Prevention (USCDC) (2015). – Joint criminal and epidemiological investigations handbook: 2015 domestic edition. FBI, Washington, DC; USCDC, Atlanta, Georgia, 65 pp. Available at: www.fbi.gov/file-repository/criminal-and-epidemiological-investigation-handbook.pdf/view (accessed on 9 August 2016).

26. Federal Bureau of Investigation (FBI) & United States Centers for Disease Control and Prevention (US CDC) (2016). – Joint criminal and epidemiological investigations handbook: 2016 international edition. FBI, Washington, DC; US CDC, Atlanta, Georgia, 55 pp. Available at: www.fbi.gov/file-repository/criminal-and-epidemiological-investigations-handbook-2015-international-edition-2.pdf/view (accessed on 9 August 2016).

27. Wikipedia (2017). – Hajj. Available at: https://en.wikipedia.org/wiki/Hajj (accessed on 16 December 2016).

28. NOVA Online (2016). – History of biowarfare: medieval siege. Available at: www.pbs.org/wgbh/nova/bioterror/hist_nf.html (accessed on 11 August 2016).

29. Shaw M. (2014). – World War One. Animals and war. British Library. Available at: www.bl.uk/world-war-one/articles/animals-and-war (accessed on 11 August 2016).

30. United Nations Office for Disarmament Affairs (UNODA) (2017). – Biological weapons: the Biological Weapons Convention: Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction. UNODA, New York. Available at: www.un.org/disarmament/wmd/bio/ (accessed on 16 December 2016).

31. Doornbos H. & Moussa J. (2014). – Found: the Islamic state's terror laptop of doom. *Foreign Pol.* Available at: http://foreignpolicy.com/2014/08/28/found-the-islamic-states-terror-laptop-of-doom/ (accessed on 9 August 2016).

32. BBC News (2016). – Kenya police 'foil anthrax attack' by 'IS-linked group'. Available at: www.bbc.co.uk/news/world-africa-36198561 (accessed on 9 August 2016).