Technical Note

Reemergence and Complementation of Two Ancient Zoonoses

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INTRODUCTION

Although emerging and reemerging diseases are more likely to be regarded as present day conditions, they have been occurring uninterruptedly since the end of World War II. Ever since, a pathogen has emerged or reemerged each year, globally. Several zoonoses are included in the list, and their global extent is alarming (Chatterjee, Bhaumik, Chauhan and Kakkar, 2017).

Some elements of the two, which represent a real hazard to human and animal health care, are presented below. This has been taking place, in spite of years of research, particularly because of the way they complement each other.

DEVELOPMENT

Tuberculosis

It is one of the oldest documented diseases. *Mycobacterium bovis*, or a very similar predecessor, is said to be one of the first entities that crossed over the species boundaries by infecting humans who began to domesticate cattle. Then, other species emerged, namely one pathogenic and more adapted species to humans: *M. tuberculosis*, described by German physician Robert Koch, on March 24, 1882 (Forbes, 2017).

This genus is made of 170 species, though the four species of *Mycobacterium tuberculosis* (MTC-*Mycobacterium tuberculosis* complex): *M. tuberculosis, M. bovis, M. africanum*, and *M. microti*, stand out. The first one is associated to humans, in particular. *M. bovis* is the causal agent of bovine tuberculosis, whose target is cattle, though it can also infect other domesticated and wild species, causing 10-25% losses. Humans are no exception; infection has become a serious health issue in industrial countries (Verma, Tiwari, Chakraborty, Saminathan, Dhama, and Singh, 2014). This condition has worsened in scenarios where people and animals share the same habitat (Saminathan, Rana, Ramakrishnan, Karthik, Malik, and Dhama, 2016). Although countries like Canada, Australia, and most of the USA have eradicated the disease; others like the UK, Ireland, and New Zealand, have undergone increase and persistence (Claridge *et al.*, 2012).

One important way of acquiring the disease both for lactating animals and people, is the milk (unpasteurized) from infected females. Another hazard is posed by sick or carrier wild animals. Since it is a slow progression disease, several years may elapse before the infected people or animals die. A single individual is able to transmit the disease to the rest before the first symptoms are observed (Verma *et al.*, 2014).

Fasciolosis

Fasciolosis is one of the most commonly occurring parasitic diseases in domestic ruminants. It causes $ 3 200 million annual losses in animal production. Around 90 million people are exposed, and 2.4-17 million suffer from the disease. This reemerging tropical zoonosis has been overlooked for years, which is one of the reasons why it persists and leads to outbreaks, endemics, and epidemics worldwide (Beesley *et al.*, 2017).

Two types of trematodes cause the disease: Worldwide spread-out *Fasciola hepatica* (2-3 cm) and larger *Fasciola gigantica* (4-10 cm), which is more limited to Africa, the Middle East, East Europe, and East Asia (Silva, Freitas, Dutra, and Molento, 2016). The former was discovered in 1379 (Abrous, Rondelaud, and Dreyfuss, 1999).

In Cuba, two diagnostic types are performed: *post mortem*, to establish the presence of young or adult trematodes in parenchyma, biliary conduits, and biliary vesicle; and coprological diagnosis, which is performed in the same way as for other parasitosis. Both are simple, quick, cost-effective, and low sensitivity

analyses. Moreover, some ELISA (*Enzyme-Linked Immuno Sorbent Assay*) variants are used to detect the presence of more sensitive *anti-Fasciola* immunoglobulins, which are important tools for this type of diagnostic (Silva, Freitas, Dutra, and Molento, 2016).

Why these two zoonoses?

The infection with *F. hepatica* is probably an element that interfered with the efficiency of control and eradication programs to approach bovine tuberculosis. In that case, the trematode interferes with the inflammatory response of individuals with tuberculosis when the intradermal tuberculin test (one of the most frequent screening tests) is performed, producing false negatives (Claridge *et al.*, 2012).

Caprine farmers surveyed in the province of Ciego de Ávila did not refer to the presence of tuberculosis, but mentioned the existence of respiratory diseases, miscarriages, etc. The farmers had no access to trained personnel for prevention and control of diseases, or sent any samples to the laboratory for confirmation of the agents involved (Barreto, Rodríguez, Delgado, and Bidot, 2017a). Is the tuberculin test performed to these animals? Concerning the high presence of the parasite in cattle and ovine-caprines, no further comments.

On almost all the dairy farms, milk is not pasteurized or boiled, due to energy-saving and general costs, time saving, and even taboos which stigmatize such critical procedures (Barreto, Bidot, Rodríguez, and Delgado, 2017b).

A more effective control of these two zoonoses and their interactions will only be effective through joint efforts of the public and animal health systems toward better diagnostic, education, and collective awareness.

CONCLUSIONS

The facilities built to treat wastes are insufficient and their exploitation is faulty.

Liquid wastes from swine farms are disposed of with contaminant concentrations exceeding volumes set by (NC: 27, 2012), and may potentially pollute soils, surface and ground waters.

REFERENCES

ABROUS, M.; RONDELAUD, D. y DREYFUSS, G. (1999). *Paramphistomum daubneyi* and *Fasciola hepatica*: influence of Temperature Changes on the Shedding of Cercariae from Dually Infected *Lymnaea truncatula*. *Parasitology Research*, *85* (8-9), 765-769.

BARRETO, G.; BIDOT, A.; RODRÍGUEZ, H. y DELGADO, R. (2017b). *Microorganismos autóctonos multipropósito en las producciones caprinas*. Camagüey, Cuba: Ediciones Universidad de Camagüey.

BARRETO, G.; RODRÍGUEZ, H.; DELGADO, R. y BIDOT, A. (2017a). Aspectos de salud detectados en 20 granjas caprinas de Ciego de Ávila. *Revista Ciencia y Tecnología Ganadera, 11* (1), 49-52.

BEESLEY, N. J.; CAMINADE, C.; CHARLIER, J.; FLYNN, R. J.; HODGKINSON, J. E. y MARTÍNEZ-MORENO, A. (2017). *Fasciola and Fasciolosis in Ruminants in Europe: Identifying Research Needs. Transbound Emerg. Diseases.* Retrieved on January 20, 2018, from https://doi.org/10.1111/tbed.12682.

CHATTERJEE, P.; BHAUMIK, S.; CHAUHAN, A. S. y KAKKAR, M. (2017). *Protocol for Developing a Database of Zoonotic Disease Research in India (DoZooRI)*. Retrieved on January 20, 2018, from http://bmjopen.bmj.com.

CLARIDGE, J.; DIGGLE, P.; MCCANN, C. M.; MULCAHY, G.; FLYNN, R. y MCNAIR, J. (2012). *Fasciola hepatica is Associated with the Failure to Detect Bovine Tuberculosis in Dairy Cattle*. Retrieved on January 20, 2018, from http://www.nature.com/naturecommunications.

FORBES, B. A. (2017). Mycobacterial taxonomy. *J. Clin. Microbiol., 55* (2), 380-383.

SAMINATHAN, M.; RANA, R.; RAMAKRISHNAN, M. A.; KARTHIK, K.; MALIK, Y. S. y DHAMA, K. (2016). Prevalence, Diagnosis, Management and Control of Important Diseases of Ruminants with Special Reference to Indian Scenario. *J. Exp. Biol. Agric. Sci., 4* (3), 338-367.

SILVA, A. E.; DA COSTA FREITAS, C.; DUTRA, L. V. y MOLENTO, M. B. (2016). Assessing the Risk of Bovine Fasciolosis using Linear Regression Analysis for the State of Rio Grande do Sul, Brazil. *Veterinary parasitology*, *217* (1), 7-13.

VERMA, A. K.; TIWARI, R.; CHAKRABORTY, S.; SAMINATHAN, M.; DHAMA, K. y SINGH, S. V. (2014). Insights into Bovine Tuberculosis (bTB), Various Approaches for its Diagnosis, Control and its Public Health Concerns: An Update. *Asian Journal of Animal and Veterinary Advances*, *9* (6), 323-344.

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