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A review on epidemiology, global prevalence and economical losses of fasciolosis in ruminants

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ABSTRACT

Fasciolosis is an important plant borne trematode zoonosis in ruminants caused by the *Fasciola hepatica* and *Fasciola gigentica*, It is classified as a neglected tropical disease and found in more than 50 countries especially where sheep and cattle are reared. Fasciolosis is a serious animal health problems in many rural and urban areas of world, causing significant financial losses due to decrease in production and viscera condemnation in animals. Accurate diagnosis of fasciolosis is always remained a challenging task for the field practitioners. There is no comprehensive summary on the occurrence and distribution of the infection at international level. Therefore, we intended to provide a complete overview on the prevalence and epidemiology of fasciolosis in farm animals from a global prospective. It includes to map the global distribution of fasciolosis in different areas of the world to identify the endemic regions which may be a source of potential disease outbreak. The financial liability related to fasciolosis on the livestock production has also been addressed. For this purpose, the published data during 2000–2015 (15 years) on fasciolosis was reviewed and collected by electronic literature search of four databases including Google, PubMed, Science Direct, and Web of Science. Data presented are contemplated to enhance our current understanding of the parasite's geographical distribution, host range, and economic losses. Information provided would be useful for the application of more effective control strategies against fasciolosis in different geo-economics regions of the world.

Contents

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1. Introduction

Animals are involved in a dynamic role regarding human nutrition and socio-economic evolution. Milk, meat and eggs are an important source of protein, energy, calcium and micronutrients, furnishing 28% of protein and 13% of calories worldwide [1]. Livestock is not only a methodical origin of protein but also work as straight source of earning and employment in under-developed countries. These animals are not only source of crop production through supplying of traction power and manure but also work as capital strength for future investment [2]. During last four decades, in developing countries due to increase in number of occupants and income growth, per capita utilization of animal protein, with universal meat consumption forecasted to rise by nearly 73% by 2050 [1]. Catching these ensuing needs is becoming a demanding mission which will predominantly depend upon enhancing the efficiency of components such as production system, pasture management, food chains and markets and lastly but not least, animal health [3].

Infectious diseases have been serious threat for animal health and productivity in developing countries [4–8]. Fasciolosis is a zoonotic problem belonging to plant borne trematodes, convey to definite hosts, humans as well as other herbivore mammals via contaminated water or green vegetables mostly watercress [9]. Liver flukes are the important tissue parasites, which engendering terrible pathology in sheep and cattle intercontinental and economic losses in agribusiness. They have composite life cycle which involves snail as an intermediate host. Snails have divergent geographical distribution and chiefly found in and around water bodies acting as intermediate host. Once an animal is polluted with fasciolosis, it will pass eggs from the feces. The eggs hatch into miracidia on entering water. The miracidia point water snails by chemotaxis. Rediae coming from sporocysts may fabricate second generation of rediae. From snails cercariae emerge out and encystment of cercariae on vegetation occurs at the edge of water. While grazing sheep and cattle become infected by ingesting metacercariae [10]. Eventually there is release of thousands of cercaries into snail's water habitat. Infectious metacercariae attached to vegetation or floating plants taken up by grazing animals and development continued. In touching with stomach acids, encysted parasite becomes activated and excysts in small intestine then penetrates gut wall and enters liver capsule after migration through body cavity towards liver. The juvenile enters into liver parenchyma and damage considerable amount of tissue before migrating to bile ducts as an adult [11].

Annually 2000 million dollars are lost because of ceased production due to helminthic infection [12]. Notable, economic losses take place due to infection of animals with fasciolosis. The worldwide losses in animal production were predicted approximately over 3.2 US$ billion/year by liver fluke infection. Furthermore, fasciolosis is recognized as emerging disease in humans. The World Health Organization has anticipated that 180 million people are at risk of infection and 2.4 million people are infected with fasciolosis [13].

We evaluated and encapsulated epidemiological data globally published from 2000 to 2015 on fasciolosis in ruminants. For inclusion in review published paper with English abstract were considered. Data in this review is contemplated to expand current understanding about Fasciolosis, geographical distribution, global prevalence, and economic losses furnish by this problem. This information will be helpful for designing and implementation of more effective control action plan against fasciolosis.

2. Fasciolosis in ruminants in Africa and economic impact

Fasciolosis is a re-emerging disease in several parts of world, mainly in Africa, caused by *F. hepatica* (temperate zones) and *F. gigantica* (in tropical zones) [14], and its incidence in farm animals increased after a period of high rainfall [15].

Fasciolosis is supposed to be a common health problem in mobile pastoralist animals near south eastern Lake Chad area [16]. In coastal region of Kenya it is caused by *F. hepatica* and has been considered a major limitation in ruminants and causes high mortalities in calves and small ruminants [17]. Long rainy season at Middle Awash River Basin facilitates the survival of parasite. Furthermore, flood areas have a significant role for *F. hepatica*

Table 1
Global Prevalence range (%) of Fasciolosis in ruminants reported in different continents from 2000 to 2015.

Sr. No	Continent	Name of countries	No. of Countries	No. of studies	Range of prevalence in different ruminant species (%)			
					Sheep	Goats	Cattle	Buffalo
1	Africa	Chad, Egypt, Ethiopia, Kenya, Nigeria, Sudan, Tanzania, Tunisia, Uganda, Zambia, Zimbabwe	11	31	0.19–73.7	0.28–68.4	1.2–91.0	9.73–33.7
2	America	Argentina, Brazil, Colombia, Mexico, Peru	05	10	8.87–100	24.5–100	3.0–66.7	11.4–24.4
3	Asia	Bangladesh, Cambodia, China, India, Iran, Iraq, Japan, Korea, Nepal, Pakistan, Saudi Arabia, Turkey, Vietnam	13	41	0.35–31.4	0.0–47.0	0.71–69.2	2.08–68.0
4	Australia/Oceania region	Australia, Papua New Guinea	02	03	5.5–52.2	(18.2)	26.5–81.0	–
5	Europe	Belgium, Denmark, England, Germany, Ireland, Italy, Poland, Spain, Sweden, Switzerland, Wales	11	23	3–83.3	0.0–0.8	0.12–86.0	–

(): just single study no range is available.