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An Epidemiological Status of Prevailing Diseases in Livestock Population of District Quetta, Pakistan

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Authors' contributions

This work was carried out in collaboration between both authors. Author KBA was the primary researcher, conceived the study, designed, participated in data collection, conducted data analysis and drafted the manuscript for publication. Author MAS assisted in data collection and preparation of first draft of manuscript. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Livestock population is affected by various infectious and non-infectious diseases which can lead to huge economic losses to the farmers in terms of reduced growth, production performance and mortality.
Aims: To investigate the prevalence of infectious and non-infectious diseases of livestock in Quetta, the northwestern district of Balochistan province of Pakistan.
Place and Duration of the Study: Study was conducted in District Office of Livestock & Dairy Development Department Quetta between February and March, 2017.
Methodology: Clinical cases reported at fifteen different veterinary hospitals and dispensaries of District Quetta from January 2015 to December 2016 was used for this study. Diagnosis of disease was made on the basis of owner's statement, general examination, clinical signs, postmortem findings and/or laboratory results which were extracted from the clinic record books. Data was analyzed to determine prevalence disease in livestock population with respect to specie and season.
Results: Diagnosed diseases were grouped into six major categories i.e. endo-parasitic, ecto-

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parasitic infestations, metabolic, systemic, non-contagious and infectious/other diseases. The statistical analysis of the pooled data for two years shows that the parasitic infestation was the main problem (70%) followed by infectious / other and non-contagious diseases (12% each), systemic and metabolic diseases (3% each). A significant effect ($P<0.05$) of livestock species was found on the incidence of lung worm, wireworm, liver fluke, mange and tick infestation. Statistically significant ($P<0.05$) effect of livestock species was also noticed on the incidence of non-contagious, metabolic, systemic and infectious diseases as well.

Conclusions: This study provides valuable insight to design and implement priority based research on specific diseases. Further studies are needed to see the effect of these diseases on economics of farms, wholesomeness of available livestock and their by-products. Various diseases including parasitic infestation may have their zoonotic effects accompanied with their detrimental effects on animal productivity. Zoonotic nature of these diseases makes it vital to investigate the species of parasites, communicable to human being and devise strategies to counter them.

Keywords: Prevalence; seasonal; livestock; parasites; infectious disease; Quetta.

1. INTRODUCTION

Provincial Livestock and Dairy Development Department is the major player in provision of veterinary services to the animals of livestock farmers in the province. District Quetta has also a vast infrastructure under this department comprising of five veterinary hospitals and ten veterinary dispensaries headed by the Deputy Director along with its staff who manages and control all livestock related activities including animal health coverage and husbandry. Livestock in this area is affected by various diseases which greatly affect the economy and public health. It is observed that data are regularly being added in the record but in the absence of an analysis system it is not proving beneficial.

Absence of pathological data scrutinizing system affects disease detection, prevalence as well as trends of pathologies in order to make rational decisions. Consequently a system is needed to develop a Provincial Animal Health Monitoring System (PAHMS) which uses productive, economic and sanitary data gathered from all livestock production sectors. Development of health information systems, together with other aspects regarding animal production, serves in the use and interpretation of data for efficient planning and livestock policy management. Implementation of database is a prerequisite before devising successful sanitary and epidemiological systems. These systems will help to determine livestock disease prevalence and to identify possible risk factors for better control strategies. The aim of this study was to describe, characterize and analyze the principal livestock diseases affecting animals of various classes of livestock in the district Quetta, Pakistan.

2. METHODOLOGY

2.1 Study Area and Period

District Quetta, located in South East of Pakistan on 30.20 latitude and 67.01 longitude. Its elevation from sea level is 1682 meters above. It has a semi-arid climate with an average annual precipitation of 261 mm [1]. It has enormous potential for raising livestock, which provides livelihood to many poor families. Livestock farming is a traditional activity in the district and comprises mostly goats, sheep, cattle, buffaloes, camels and ass rearing, while sheep constitutes the major proportion of livestock population in the district. Livestock raising has vital role in the living of these farmers and often it is the only source of income for rural and the most marginal people of the area. The study was performed by using data collected from the office of Deputy Director Livestock & Dairy Development Department District Quetta and fifteen veterinary services outlets including veterinary hospitals (05) and dispensaries (10) of sub-location (Tehsil / Sub-tehsil) from January 2015 to December 2016.

2.2 Disease Diagnosis

All diseases were diagnosed on the basis of general physical examination of animals, clinical signs/symptoms, postmortem examination, microbiology/serological tests and gross pathological procedures. During animals general physical examination his body condition, behavior, posture, gait, locomotive disturbance,

pulse, respiration, temperature, abdominal distension, defecation etc. were observed and recorded; while for examination of different body parts and systems of sick animals procedure of palpation, percussion, auscultation, needle puncture and walking of animals was checked. History from the owner was also taken into account during general physical examination of sick animal. Breed, sex, age etc. of an animal was also recorded in record book. Specific bacterial, viral, and fungal diseases were diagnosed on the basis of specific clinical signs and gross lesions [2]. Results on diagnosis of diseases, postmortem examination, microbiology and / or serological test were extracted from the clinic record books. A case was defined on the basis of history, clinic findings, postmortem findings and/or laboratory results in District Quetta. Interviews from area veterinary personnel were also conducted, to get the complete information.

2.3 Data Analysis

In order to have a meaningful interpretation, the records of clinical cases were grouped into six major categories i.e. endo-parasitic infestations, ecto-parasitic infestations, metabolic diseases, systemic diseases, non-contagious and infectious/other disease. Descriptive statistical analysis along with ANOVA of MS Excel [3] was used to analyze the collected data with the aim to validate the seasonal and species effect on the occurrence of these diseases in corresponding years. It was expressed as proportion with 95% confidence interval (CI). Results were expressed in percentage with P-value and significance was determined when $P<0.05$. The influences of specie and season on the prevalence of diseases were also analyzed.

3. RESULTS

The analysis of the pooled data for both years suggested that parasitic infestation was the main problem (70%) in farm livestock of the district, followed by infectious/other and non-contagious diseases (12% each), systemic and metabolic diseases with 3% each (Fig. 1). A significant effect ($P<0.05$) of livestock species was found on the incidence of lung worm, wireworm, liver fluke, mange and tick infestation. Statistically significant ($P<0.05$) effect of livestock species was also noticed on the incidence of non-contagious, metabolic, systemic and infectious diseases as well. The findings suggested that various diseases including parasitic infestation have their zoonotic effects accompanied with their detrimental effects on animal productivity as well.

3.1 Parasitic Infestations

The statistical description of collective data of endo-parasitic infestation (lung worm, wire worm and liver fluke) and ecto-parasitic infestation (mange and tick infestation) in animals of District Quetta during 2015 and 2016 are presented in Table 1. The mean values along with their statistical significance are shown in Table 3 and Table 4 for endo and ecto parasites, respectively. The revelations regarding each are elaborated as under:

3.1.1 Lung worm infestation

The highest number of cases was recorded for sheep with mean $\pm$ SEM values of 3411.96 ± 213.63 while a range of 4068 was observed with minimum values of 1566 and maximum value of 5634 cases. The lowest number of cases were reported in buffalo with mean $\pm$ SEM values of 37.38 ± 9.04 while a range of 154 was observed with minimum values of "0" cases and a maximum of "154" reported cases. No significant effect of different seasons was found on lung worm infestation. A statistically significant effect ($P<0.05$) of species was found on the lungworm infestation between different livestock species, with higher mean values of 20472 and 12186 cases in sheep and goat whereas 849 and 224 for cattle and buffalo respectively. The number of cases reported in cattle and buffalo were although lower than sheep and goat but within themselves the noted difference was found statistically non-significant.

3.1.2 Wire worm infestation

The highest number of cases was recorded for sheep with mean $\pm$ SEM values of 2150.33 ± 155.56 while a range of 3603 was observed with minimum values of 1228 and maximum value of 4831 cases. The lowest number of cases was reported in buffalo with mean $\pm$ SEM values of 10.38 ± 6.45 while a range of 155 was observed with minimum values of "0" cases and a maximum of "155" reported cases. A statistically significant effect ($P<0.05$) of species was found on wire worm infestation between different livestock species with higher mean values of 12902 and 12066 cases in sheep and goat whereas 809 and 62 respectively. Number of cases reported in cattle–buffalo and sheep–goat within themselves was found statistically non-significant.

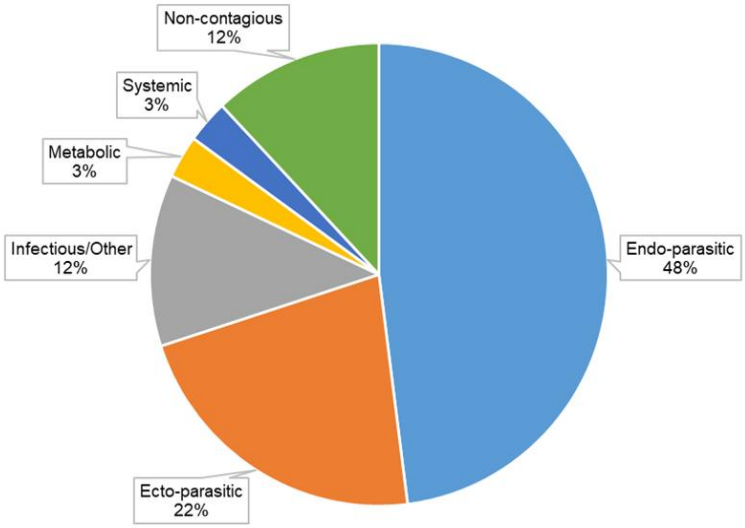

Fig. 1. Proportional incidence of various livestock diseases in District Quetta reported during 2015 and 2016 (pooled data)

3.1.3 Liver fluke infestation

The highest number of cases was recorded for sheep with mean ± SEM values of 2513.58±161.86 while a range of 2984 was observed with minimum values of 998 and maximum value of 3976 cases. The lowest number of cases was reported in buffalo with mean ± SEM values of 31.96±7.36 while a range of 133 was observed with minimum values of "0" cases and a maximum of "133" reported cases. No-significant effect of different seasons on liver fluke infestation was noted. A statistically significant effect ($P<0.05$) of species was found on liver fluke infestation between different livestock species, with higher mean values of 15082 and 7036 cases in sheep and goat whereas 1013 and 192 for cattle and buffalo respectively. However, disease occurrence cases reported did not reveal any significant difference among cattle and buffalo.

3.2 Ecto-parasitic Infestations

3.2.1 Mange infestation

The highest number of cases was recorded for sheep with mean ± SEM values of 1517.83±120.42 while a range of 1971 was observed with minimum values of 595 and maximum value of 2566 cases. The lowest number of cases was reported in buffalo with mean ± SEM values of 14.42±5.41 while a range of 120 was observed with minimum values of "0" cases and a maximum of "120" reported cases. A statistically significant effect ($P<0.05$) of species was found on the mange infestation between different livestock species, with higher mean values of 9107 and 7388 cases in sheep and goat whereas 883 and 87 for cattle and buffalo respectively. The number of cases reported in cattle and buffalo were although lower than sheep and goat but within them the noted difference was found statistically non-significant.

3.2.2 Ticks infestation

The highest number of cases was recorded for sheep with mean ± SEM values of 1558±154.67 while a range of 3625 was observed with minimum values of 417 and maximum value of 4042 cases. The lowest number of cases was reported in buffalo with mean ± SEM values of 66.08±39.68 while a range of 914 was observed with minimum values of "0" cases and a maximum of "914" reported cases. No significant effect of different seasons was found on tick infestation. A statistically significant effect ($P<0.05$) of species was found on ticks infestation between different livestock species, with higher mean values of 9351 and 7949 cases in sheep and goat whereas 1882 and 397 for cattle and buffalo respectively. Number of cases reported in cattle–buffalo and sheep–goat within themselves was found statistically non-significant.

3.3 Occurrence of Various Diseases

The statistical description of collective data of various diseases (Non-contagious, metabolic, systemic and infectious/others) in animals of

Table 1. Statistical attributes for occurrence of internal / external parasitic cases reported during 2015 and 2016 in various livestock species of District Quetta

S. No.	Particulars	Internal parasites						External parasites			
		Lung worms		Wire worms		Liver fluke		Mange infestation		Tick infestation	
		Range	Mean ± SEM	Range	Mean ± SEM	Range	Mean ± SEM	Range	Mean ± SEM	Range	Mean ± SEM
1.	Sheep	1566–5634	3411.96±213.63	1228–4831	2150.33±155.56	992–3976	2513.58±161.86	595–2566	1517.83±120.42	417–4042	1558±154.67
2.	Goat	1044–3244	2030.96±111.29	775–3062	2010.92±115.49	397–1903	1172.71±96.75	270–2006	1231.25±100.27	278–2998	1324.88±119.17
3.	Cattle	22–457	141.50±22.55	8–443	134.88±23.64	22–540	168.88±25.51	1–388	147.08±23.83	18–1543	313.63±64.01
4.	Buffalo	0–154	37.38±9.04	0–155	10.38±6.45	0–133	31.96±7.36	0–120	14.42±5.41	0–914	66.08±39.68

Table 2. Statistical attributes for occurrence of various disease cases reported during 2015 and 2016 in various livestock species of District Quetta

S. No.	Particulars	Non-contagious		Metabolic		Systemic		Infectious/other	
		Range	Mean ± SEM	Range	Mean ± SEM	Range	Mean ± SEM	Range	Mean ± SEM
1.	Sheep	531–2486	1567.79±104.89	17–1653	317.96±77.50	182–3545	1637.96±173.42	182–3545	1637.96±173.42
2.	Goat	710–2555	1418.21±95.61	18–1265	295.67±65.60	117–3034	1532.96±156.64	117–3034	1532.96±156.64
3.	Cattle	43–895	367.58±43.97	19–737	100.75±29.93	61–1695	397.75±69.71	61–1695	397.75±69.71
4.	Buffalo	2–166	31.50±7.14	0–252	36.58±12.20	1–124	28.04±5.95	1–124	28.04±5.95

Table 3. Mean values and their significance level for occurrence of internal parasite infestation cases reported in animals of District Quetta

Mean values for number of reported cases			
Season/Species	**Lung worms**	**Wire worms**	**Liver fluke**
Winter	7636	5618.5	4838.75
Spring	8590	7827.5	5717.25
Summer	7761	6167	6150.25
Autumn	9745	6226	6616.5
Sheep	20472[a]	12902[a]	15082[a]
Goat	12186[b]	12066[a]	7036[b]
Cattle	849[c]	809[b]	1013[c]
Buffalo	224[c]	62[c]	192[c]

Means values in a column, bearing the different superscript are significantly different at P>0.05 SE= Standard error of means

Table 4. Mean values and their significance level for occurrence of external parasite infestation cases reported in animals of District Quetta

Mean values for number reported cases		
Season/Species	**Mange infestation**	**Tick infestation**
Winter	3620.25	4038
Spring	3652.75	3782
Summer	4249.5	4142
Autumn	5941	7616
Sheep	9107[a]	9351[a]
Goat	7388[b]	7949[a]
Cattle	883[c]	1882[b]
Buffalo	87[c]	397[c]

Means values in a column, bearing the different superscript are significantly different at P>0.05 SE= Standard error of means

Table 5. Mean values and their significance level for occurrence of non-contagious, metabolic, systemic and infectious / other disease in animals of District Quetta

Mean values for number of reported cases				
Season/Species	**Non-contagious diseases**	**Metabolic diseases**	**Systemic diseases**	**Infectious/ Other diseases**
Winter	4765	597	1076	5113
Spring	5564	1631	1422	4421
Summer	4521	1243	938	5315
Autumn	5461	1036	1914	6732
Sheep	9407[a]	1908[a]	2219[a]	9828[a]
Goat	8509[b]	1774[a]	2406[a]	9198[a]
Cattle	2206[c]	605[b]	510[b]	2387[b]
Buffalo	189[d]	220[b]	214[b]	168[c]

Means values in a column, bearing the different superscript are significantly different at P>0.05 SE= Standard error of means

District Quetta during 2015 and 2016 are presented in Table 2. The mean values along with their statistical significance are shown in Table 5. The revelations regarding each are elaborated as under:

3.3.1 Non-contagious diseases

The highest number of cases was recorded for sheep with mean ± SEM values of 1517.83±120.42 while a range of 1955 was observed with minimum values of 531 and maximum value of 2486 cases. The lowest number of cases was reported in buffalo with mean ± SEM values of 31.50±7.14 while a range of 164 was observed with minimum values of "2" cases and a maximum of "166" reported cases. No significant effect of different seasons was found on non-contagious diseases. A statistically significant effect (P<0.05) of species was found on the non-contagious diseases between different livestock species, with higher mean values of 37627 and 34037 cases in sheep and goat whereas 8822 and 756 for cattle and buffalo

respectively. The number of cases reported in cattle and buffalo were although lower than sheep and goat but within themselves the noted difference was found statistically significant.

3.3.2 Metabolic diseases

The highest number of cases was recorded for sheep with mean ± SEM values of 317.96±77.50 while a range of 1636 was observed with minimum values of 17 and maximum value of 1653 cases. The lowest number of cases was reported in buffalo with mean ± SEM values of 36.58±12.20 while a range of 252 was observed with minimum values of "0" cases and a maximum of "252" reported cases. No significant effect of different seasons was found non-contagious diseases except for sheep-goat which was found significant. Statistically significant effect ($P<0.05$) of species was found on the metabolic diseases between different livestock species, with higher mean values of 1908 and 1774 cases in sheep and goat whereas 605 and 220 for cattle and buffalo respectively. Number of cases reported in cattle–buffalo and sheep–goat within themselves was found statistically non-significant.

3.3.3 Systemic diseases

The highest number of cases was recorded for sheep with mean ± SEM values of 369.75±35.06 while a range of 747 was observed with minimum values of 96 and maximum value of 843 cases. The lowest number of cases was reported in buffalo with mean ± SEM values of 35.71±12.75 while a range of 306 was observed with minimum values of "0" cases and a maximum of "306" reported cases. No significant effect of different seasons was found on systemic disease cases. A statistically significant effect ($P<0.05$) of species was found on the systemic disease cases between different livestock species, with higher mean values of 2219 and 2406 cases in sheep and goat whereas 510 and 214 for cattle and buffalo respectively. Number of cases reported in cattle–buffalo and sheep–goat within themselves was found statistically non-significant.

3.3.4 Infectious / other diseases

The highest number of cases was recorded for sheep with mean ± SEM values of 1637.96±173.42 while a range of 3363 was observed with minimum values of 182 and maximum value of 3545 cases. The lowest number of cases was reported in buffalo with mean ± SEM values of 28.04±5.95 while a range of 123 was observed with minimum values of "1" cases and a maximum of "124" reported cases. No significant effect of different seasons was found on infectious / other disease cases. A statistically significant effect ($P<0.05$) of species was found on the systemic disease cases between different livestock species, with higher mean values of 9828 and 9198 cases in sheep and goat whereas 2387 and 168 for cattle and buffalo respectively. Number of cases reported in sheep–goat within themselves was found statistically non-significant.

4. DISCUSSION

Our findings suggested that parasitic infestation is a major health problem (70%) in our livestock population. These parasites include both external as well as internal parasites. This problem was then followed collectively (30%) by infectious, non-infectious, metabolic and systemic diseases. Our findings were consistent with the major trends as reported by [4]; who revealed that parasitic infestation was the major issue (81%) in all reported cases followed by others (19%) including all types as described earlier. However our findings were not in line with findings of [5], who reported general clinical disorders as the most prevailing followed by parasitic infestation. This seems to be mainly upon the etiology particular to the environments and associated factors.

Internal worm cases included lungworm, wire worm and liver fluke infestations. The trends observed in the occurrence of internal worm infestations seems to be due to season and life cycle of these worms. Generally the magnitude of parasite pressure in a range / pasture varies with season and management. Parasitic burden peaks during the spring and is lowest during the hot, dry summer months [6]. Clinical onset of symptoms depend itself on the vigor of animals, plane of nutrition and prevailing weather conditions.

External parasites group covered the cases of mange and ticks infestation. Ticks are the most important vector in the spread of zoonotic diseases and health/production losses inflicted on the host animals. They suck the host blood throughout the length of their attachment with the body of the host animal (usually 7–14 days). This may be extended depending upon the species of the ticks and unique host association. Tick

prevalence is usually higher in autumn [7] season with the least observed in summer and spring. However the clinical manifestation may be highest from summer onwards due to the activity of certain species of adult ticks.

Mange population is also reported to increase in autumn with the most severe problem occurring both in autumn and spring. The trend lines in our cases showed agreement with the reported data about the occurrence of these problems. The clinical incidence of other three groups was although small but their significance cannot be denied. However all of these groups are manageable if proper veterinary care is followed along with standard preventive measures where applicable. The trend lines suggested a linear trend with high R^2 for internal parasitic infestation, external parasitic infestation, systemic disease incidence and infectious diseases cases occurrence with relative R^2 values of 0.71, 0.75, 0.39 and 0.33 respectively. This suggested that variability in number of reported cases was affected to a great extent by variation in seasons and thus the prediction regarding the occurrence of these diseases in various seasons can be achieved with a reasonable degree of precision. On the other hand very low R^2 values found along with the fitted trend lines for non-contagious diseases case incidence (R^2=0.01) and metabolic diseases case incidence (R^2=0.01) suggested that the named diseases were not affected by the variability in the seasons and thus their prediction from fitted models was not achievable.

5. CONCLUSION

The incidence of parasitic diseases in such a large magnitude, as noted in the current study carried out in district Quetta, warns serious economic and zoonotic consequences. Occurrence of these parasites; affects the productivity and quality of livestock products on one hand and the spread of various infections from livestock to human being on the other hand. Grazing animals are always exposed to parasites and are thus constantly being re-infested in chain reactions mode. Several worldwide reports have suggested that the parasitic diseases inflict severe economic losses on the livestock industry. These diseases affect the health, weight gain, feed conversion efficiency and reproduction of animals in an adverse manner. *Fasciolosis* in livestock inflicted heavy economic losses worth US $ 3.2 billion per annum worldwide (8). The problem associated with parasitic infestation also points the opportunity in terms of economic gains and improved wholesome animal products if an effective parasite eradication program is devised and implemented in the area. Furthermore, there are several zoonotic diseases that can be transferred from livestock to human beings. These diseases cause mild to severe symptoms and are a definite concern for farmers, their families and associates / consumers of these livestock and their products. While some of the diseases are rare and some have more prevailing effects. The potential of such diseases with devastating outcomes makes it necessary to identify and publicize them along with precautions.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Where is Quetta, Pakistan? / Where is Quetta, Pakistan Located in The World? / Quetta Map - WorldAtlas.com [Internet]. [cited 2017 Aug 28].
   Available:http://www.worldatlas.com/as/pk/ba/where-is-quetta.html
2. Susan E, Aiello MAM. Veterinary manual [Internet]. 12th August 2016. 2016 [cited 2017 Aug 28]. p. 3325.
   Available: https://www.msdvetmanual.com/
3. Microsoft Office 2013 - Download [Internet]. [cited 2017 Aug 28].
   Available:https://microsoft-office.en.softonic.com/?ex=DSK-173.1
4. Khan KNM, Rehman A, Munir M, Khan BR. Incidence of internal parasites of sheep in upland districts of Balochistan. Research Report No. 18,. The MART/AZR Project, ICARDA, AZRC, PARC, Quetta Balochistan; 1988.
5. Juli MSB HMBAHM. Bovine diseases at Dinajpur district of Bangladesh: Epidemiological status with relation to age and season. Ann Vet Anim Sci [Internet]. 2015;2(3):55–63.
   Available:http://www.scopemed.org/?mno=239714
6. Shane Gadberry and Jeremy Powell. Presky Parasites without careful management, parasites can be costly. 2015;3. Available from: herford.org

7. Mbati PA, Hlatshwayo M, Mtshali MS, Mogaswane KR, De Waal TD, Dipeolu OO. Ticks and tick-borne diseases of livestock belonging to resource-poor farmers in the eastern Free State of South Africa. Exp Appl Acarol [Internet]. 2002;28(1–4):217–24.
Available:http://www.ncbi.nlm.nih.gov/pubmed/14570134

8. Spithill TW, Smooker PM, Copeman DB. Chapter 15. *Fasciola gigantica*: Epidemiology, control, immunology and molecular biology. In: Dalton, J.P. (Ed.), Fasciolosis. (CAB International Publishing, Wallingford, Oxon, UK,). 1999;465–525.

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