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Farmers Knowledge and Control Practices on Gastrointestinal Parasites of Horses in Maseru District, Lesotho

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Abstract | In spite of the increasing importance of horses in Lesotho, they are constantly confronted with several health threatening factors among which gastrointestinal parasites (GIPs) play a central role. The occurrence of GIPs is influenced by among other factors the husbandry practices which are assumed to be influenced by variation between agro-ecological zones (AEZs). The objective of this study was to assess the influence of AEZs on farmers demographic and socio-economic profile, knowledge and control of GIPs of horses. The structured questionnaire and focus group discussions were used to collect data on 144 farmers representing the three AEZs. The findings revealed that horses were mainly owned by men with grade 7 as the highest level of education. Infection by GIPs represents a serious health concern across the three AEZs and this can be justified by higher percentage of respondents in the lowlands (96.3%), foothills (100%) and mountains (100%) who reported infection by GIPs among their horses. Among other age groups, foals were highly susceptible to infection by GIPs and the most common type of GIP known among farming communities were nematodes. The majority of respondents do not deworm their horses except the few that deworm their horses with both ivermectin and fenbendazole. The results further confirm higher chances of overgrazing in the study areas as most respondents indicated that the grazing areas were shared between many villages. Majority of respondents across the three AEZs indicated that grazing alone did not provide enough nutrition even though few of them provided supplementary feeding to their horses and this suggests that horses in the study area were under fed. It is concluded that horses across the three AEZs are exposed to similar husbandry practices which are considered inadequate in the control of GIPs.

Keywords | Agro-ecological zone, Demographic characteristics, Farmer education, Husbandry practices, Gastro-intestinal parasites

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INTRODUCTION

Livestock industry has always been a vital component of the economic and social structure in Lesotho. Horses are among other livestock that are mostly owned by Basotho farmers. Limited road infrastructure here in Lesotho particularly in remote areas of the country make horses to be the most relevant animal to be kept by many small holder farmers. Horses undertake several activities on a daily basis which include the transportation of goods and people, and most importantly they have a prominent position in agricultural system in the country. Furthermore, horses transport goods to and from markets, farms and shops, traveling long distances. Urban dwellers are able to generate income through the use of equine in door to door transportation services (Tesfaye and Curran, 2005).

Despite the increasing importance of horses, horse farming is still hampered by frequent outbreaks of diseases and of these diseases, infections by GIPs accounts for a con-

siderable damage and massive economic losses especially in young horses (Upjohn et al., 2010). GIPs occur pervasively in horses and present a cardinal veterinary concern throughout the world. The study conducted in Ethiopia by Wedajo and Hadush (2017) revealed that GIPs are one of the most common factors that constrain the health and working performance of horses. The damage done by GIPs on horses vary depending on the species and number of parasites, nutritional and the immune status of a host (Asef et al., 2011). Anthelmintics have been the mainstay in the control of GIPs in many countries; however, resistance to the earlier registered anthelmintics has been reported many times (Traversa et al., 2012).

In this context, the use of management practices in an integrated manner is essential for an effective control of parasitic diseases as well as reducing the spread of resistance to anthelmintic (Molento et al., 2009). The management of pasture is one of the effective practices to mitigate internal parasites in grazing livestock (Stuedemann et al., 2004). Pasture rotation with optimum rest period is an important component to minimize internal parasites in grazing animals (Colvin et al., 2008). Moreover, the study conducted by Relf et al. (2013) has revealed that lack of rotational grazing practices was associated with a higher prevalence of cyathostomin egg excretion. The study of Kumar et al. (2013) has revealed that animals that are kept in good living conditions are able to resist or tolerate internal parasites as compared to animals kept under poor housing conditions. Madke et al. (2010) have suggested that animal housing must be well ventilated to maintain required humidity and air circulation. The growth of parasites population is accelerated in high humid and low light. The work of Hughes and Kelly (2006) revealed that nutrition is directly associated with susceptibility of animals to parasitism as some minerals including zinc, iron, cobalt, sodium etc. are essential to develop functional immunity against the parasites.
The objective of this study was to determine the influence of AEZs on farmers' level of knowledge on GIPs, the husbandry practices and the control measures used among farming communities.

METHODOLOGY

Study design

A cross sectional study was conducted by way of personal interviews with horse owners from nine villages selected through stratified random sampling.

Sampling and data collection

The sample size was determined using the formula suggested by Taherdoost (2017).

N= sample size
P= percentage occurrence of a state (50%)
E= percentage maximum error required (5%)
Z= value corresponding to level of confidence required (1.96)

Using this formula, a total of 384 respondents were required for sampling however, the number of available participants was limited in the sampled areas to meet the required number. Given this condition only 144 respondents were able to successfully partake in the study. Of these 144, 48 respondents were from each of the three distinctive AEZs being lowlands, foothills and mountains. From each AEZ two focus group discussions (FGDs) consisting of 15 horse owners were made and this is according to Krueger and Casey (2009) who indicated that a group size seldom goes beyond 12 participants. From each focus group 9 respondents were randomly selected to participate on one-to-one interviews to collect additional data using individual interview schedule. The structured questionnaire was designed to obtain information regarding farmers' demographic characteristics, horse farming experience, knowledge on GIPs and horse husbandry practices with respect to GIPs.

Data analysis

The data was analysed using the Statistical Package for the Social Sciences (SPSS) version 16.0 (IMB SPSS 2009). Descriptive statistics was employed to determine the percentages and standard errors. The association between AEZs and the tested parameters was assessed by χ^2 test. Where an overall or omnibus χ^2 test was found to be significant (i.e., $p < 0.05$), the importance of different AEZs was tested using a post-hoc cell-wise adjusted standardized residual analysis as described in Garcia-Perez and Nunez-Anton (2003). For the purpose of this study the data from the FGDs was not analyzed instead the FGDs were used as precursor to a quantitative stage determining the issues to be covered in the structured interviewing and giving insights into the problems or opportunities that were being researched.

RESULTS

Demographic profile of horse owners

The results in Table 1 indicate that horses were mainly owned by men across the AEZs (χ^2= 4.32, p= 0.11). The majority of horse owners attained primary level as the highest level of education with no significant association between level of education and AEZ (χ^2= 4.31, p=0.36). Training on equine related issues was received by few horse owners in the lowlands (7.4%), foothills (22.2%) and mountains (14.8%) and AEZ did not have any effect on the number trained (χ^2=2.34, p=0.30).

Table 1: Demographic profile of horse owners' in the three AEZs

Category	Lowlands (%)	Foothills(%)	Mountains (%)	SE	X^2	p-value
	Gender					
Male	85.2	100	92.6	0.09	4.32	0.11
Female	14.8	0	7.4	0.21		
	Education level					
Primary	63.0	77.8	51.9	0.11	4.31	0.36
High school	25.9	18.5	33.3	0.16		
None	11.1	3.7	14.8	0.25		
	Equine training					
Yes	7.4	22.2	14.8	0.22	2.34	0.30
No	92.6	77.8	85.2	0.99		

X^2= Pearson Chi-Square value, SE= Standard error

Table 2: Farmers familiarity with common GIPs, their causes and age susceptibility

Category	Lowlands (%)	Foothills(%)	Mountains (%)	SE	X^2	p-value
	GIPs as a problem in different AEZs					
Yes	96.3	100	100	0.09	2.02	0.36
No	3.70	0.00	0.00	-		
	Common GIPs known by horse owners					
Nematode	51.90	70.43	48.10	0.12	5.48	0.24
Cestodes	7.41	3.71	18.51	0.22		
Both NEM & CES	40.72	25.91	33.39	0.15		
	Causes of GIPs					
Grazing MGM	63.0	66.7	51.9	0.12	1.43	0.83
Insufficient MEDS	14.8	14.8	22.2	0.21		
Insufficient feeds	22.2	18.5	25.9	0.18		
	Age susceptibility to GIPs					
Foal	55.6	48.1	51.9	0.12	9.84	0.27
Weanling	0	0	11.1	0.00		
Adult	22.2	18.5	14.8	0.22		
Both foal & adult	18.5	33.3	22.2	0.18		

X^2= Pearson Chi-Square value, SE= Standard error, NEM= nematode, CES= cestodes, MGM= Management, MEDS= medication

Farmers' familiarity with GIPs in different AEZs

Infection by GIPs particularly nematode represent a major health threatening factor in horses as the majority of respondents in Table 2 affirmed GIPs as a problem. The results however revealed no association between AEZs and the number of farmers considering GIPs as a problem (χ^2= 2.02, p=0.36). There was also no association between AEZs and the common GIPs known by respondents (χ^2= 5.48, p=0.24). Among other age groups most respondents consider foals more susceptible to infection by GIPs and the majority of them attributed the infection to poor grazing management. AEZ on the other hand had no influence on age susceptibility to infection (χ^2= 9.84, p= 0.27). and the causes of GIPs (χ^2= 1.43, p= 0.83).

Control measures of GIPs in different AEZs

The majority of the interviewed respondents do not deworm their horses against GIPs except the few of them who use both ivermectin and fenbendazole. The choice of the anthelmintic used for the control of GIPs was not associated with AEZs (χ^2= 4.65, p= 0.58). When measuring the dosage rate most respondents estimate horse weight instead of measuring the weight. Most respondents deworm their horses more than four times in a year however this was not influenced by AEZ (χ^2= 7.42, p= 0.12).

Grazing management in different AEZs

The horses had access to rangelands which were mostly shared by more than three villages (Table 4). This study revealed that grazing alone did not provide adequate nutrition for the horses. The results further showed that AEZs

Table 3: Farmers choice of anthelmintic and frequency of use to treat GIPs of horses

Category	Lowlands%	Foothills%	Mountain%	SE	X^2	p-value
	Do you deworm your horses					
Yes	70.4	77.8	81.5	0.10	0.96	0.61
No	29.6	22.2	18.5	0.17		
	Type of commercial medication used					
Ivermectin	14.8	7.4	14.8	0.78	4.65	0.58
Fenbendazole	0	7.4	3.7	0.57		
Do not use drugs	70.4	55.6	59.3	0.82		
	How is the dosage measured					
Guessing weight	37.0	44.4	48.1	0.80	7.42	0.12
Measuring weight	0.0	0.00	0.0	-		
Estimating age	14.8	33.3	33.3	0.76		
	Frequency of use of medication					
Annually	3.7	11.1	0.0	0.50	10.78	0.09
Seasonally	22.2	25.9	37.0	0.16		
More than four times	25.9	40.7	44.4	1.42		

X^2= Pearson Chi-Square value, SE= Standard error

Table 4: Grazing management of horses

Category	Lowlands(%)	Foothills(%)	Mountains(%)	SE	X^2	p-value
	Access to grazing					
Yes	100.0	100.0	100.0	0.09	-	-
	Grazing nutrition adequate					
Yes	33.3	22.2	40.7	0.15	2.15	0.34
No	66.7	77.7	59.3	0.11		
	Rotational grazing					
Yes	100.0	85.2	100.0	0.09	8.41	0.01
No	0.0	14.8	0.0	0.00		
	Villages sharing grazing					
1	29.6	18.5	14.8	0.21	3.62	0.45
2	0.0	7.4	7.4	0.28		
>3	70.4	74.1	77.8	0.10		
	Mixed grazing					
Yes	37.0	33.3	29.6	0.16	0.33	0.85
No	63.0	66.7	70.4	0.11		
	Removal of manure from grazing lands					
Yes	29.6	14.8	18.5	0.20	1.93	0.38
No	70.4	85.2	81.5	0.10		

X^2= Pearson Chi-Square value, SE= Standard error

did not affect the number of villages sharing grazing lands (χ^2= 3.62, p= 0.45). The χ^2 test revealed an association between an AEZ and rotational grazing (χ^2= 8.41, p= 0.01), however the post-hoc cell-wise adjusted standardized residual test confirmed that the association was not significant (p>0.05). Mixed grazing is not common among farming communities however, this is not influenced by AEZ (χ2= 0.33, p= 0.85). The results of the current study also showed that the grazing lands were highly contaminated since few respondents remove manure from grazing lands and this was not different between AEZs (χ^2= 1.93, p= 0.38).

Table 5: Management practices of horses

Category	Lowlands(%)	Foothills(%)	Mountains(%)	SE	X^2	p-value
	Do you keep horses in roofed stall					
Yes	11.1	7.4	18.5	0.23	3.60	0.46
No	85.2	92.6	81.5	0.10		
	Frequency of cleaning stall					
Do not clean	66.7	51.9	63.0	0.11	6.03	0.41
Once a month	11.1	29.6	22.2	0.18		
Fortnight	7.4	0	7.4	0.28		
Only after rains	14.8	18.5	7.4	0.28		
	Use feed supplements					
Yes	33.3	37.0	48.1	0.13	1.34	0.51
No	66.7	63.0	51.9	0.12		

X^2= Pearson Chi-Square value, SE= Standard error

The management practices in different AEZs

The higher percentage of the horses was kept under unroofed stalls which were rarely cleaned (Table 4). An AEZ had no influence in keeping of horses under roofed stalls (χ^2= 3.60, p= 0.46) and frequency of cleaning stalls (χ^2= 6.03, p= 0.41). Few respondents provided feed supplements to their horses and this was similar between different AEZ (χ^2= 1.34, p= 0.51).

DISCUSSION

The results in Table 1 which show that horses were owned mostly by men than women coincide with those of Yisehak (2008) who indicated that a common perception is that women are more likely to own small stock, such as chickens, sheep and goats, than larger animals. These can also be associated with the fact that women's role in livestock production in developing countries has been limited by cultural biasness that underestimate their contributions and potentials. Patel et al. (2016) also showed women are constantly confronted with constraints hindering them to access natural resources, marketing opportunities and financial services. These constraints often prevent women from accomplishing their full potential within the agricultural sector, including livestock.

The results as presented in Table 1 concur with the findings of Iftikhar et al. (2007) who reported primary education as the highest level of education attained by most farmers. These results suggest that most horse owners can read and write however with little understanding of English. Torres-Acosta and Host (2008) explained that farmers' ability to read and understand the drug labels was found to be critical in ensuring the correct use of anthelmintic drugs which sustains their long-term effectiveness. Earlier studies have documented that literacy is a crucial factor in agricultural innovation (Adeleye et al. 2016). The limited training sessions in equines as illustrated in Table 1 could be traced back to the less development of equine industry in Lesotho. Along with different factors Iftikhar et al. (2007) reported training as an important activity that should constantly be done in order to impart new knowledge, skills, behavior and attitude on farmers for improved farming practices. Given the world wide raising concern of parasites resistance to commonly used anthelmintics, it would be of a great importance that farmers are trained on the latest means that are recommended in controlling GIPs. Training helps farmers to incorporate the latest scientific advances and technology tools into their daily operations including parasites control.

The results illustrated in Table 2 which show that farmers were aware and considered infection by GIPs as a major challenge concur with Wannas et al. (2012) who reported higher susceptibility of horses to a large number of parasites. Horses among farming communities are constantly confronted with infection by nematode than other GIPs and this agrees with the findings of Kompi et al. (2021) who confirmed higher prevalence of nematodes in a study conducted in Maseru District Lesotho. Although grazing lands represent the major source of nutrition for most horses among farming communities in Lesotho, most respondents associate the occurrence of GIPs to grazing lands due to the fact that in most cases they are over stocked and this assumption is supported by Rendle et al (2019) who indicated that helminth pasture burdens are likely to increase with increasing stocking density.

The higher prevalence of GIPs in foals reported by horse owners in different AEZs concur with the work of Kompi et al. (2021) who proved susceptibility of young animals to infection by GIPs than other age groups. Higher infection rates and more severe infections reflect lack of immunity in younger animals (Belete and Derso, 2015). There is an increasing likelihood of having parasites resistance to commonly used anthelmintics among farming commu-

nities as a result of approximating animal weight when measuring dosage rate. Approximating the weight of an animal could lead to inaccuracy that may result to under dosing which is believed to encourage the development of resistance because sub-therapeutic doses might allow the survival of heterozygous resistant worms (Shalaby, 2013). The higher frequency of use of anthelmintic among farming communities as reflected in Table 3 further suggests increasing possibilities of parasites resistance. According to Matthews (2014) high treatment frequency has led to considerable selection pressure for anthelmintic resistance. Although the results in Table 4 indicate that rotational grazing was highly practiced among farming communities, the fact that grazing areas are rarely cleaned and are mostly shared by more villages, suggest that such areas are over stocked. Over stocking predispose animals to infection by GIPs as Shalaby (2013) stated that stocking rate is an important consideration in parasite control as it affects exposure to infective larvae and contamination of the pasture. The findings of this study further revealed higher likelihood of pasture contamination due to poor pasture management in terms of faecal collection from the razing areas. According to Tzelos et al. (2017) frequent faecal collection is proven to be effective in reducing numbers of eggs shed in faeces although this is labour intensive.

The limited practice of mixed grazing suggests that horses in the study area were at higher risk of being infected with GIPs as Kumar et al. (2013) has also indicated that mixed grazing minimizes GIPs infection because several parasite species cannot infect two animals of different species. Most respondents in Table 4 reported that their horses were not nutritionally satisfied from grazing alone. Under these circumstances one would expect that horses would be fed supplementary feed but the results in Table 5 show that the majority of owners did not provide extra feed to their horses. Given this condition it is apparent that most horses lack some important minerals hence why they were susceptible to infection by GIPs. In support of these findings, Kumar et al. (2013) indicated that availability of vitamins, minerals and other nutrients are directly associated with susceptibility of animal to the parasites. The horses that were kept under unroofed stalls which were rarely cleaned as reported in Table 5, also exposed them to GIPs infestation. According to Kumar et al. (2013) animals reared under good management system tend to possess strong immunity and demonstrate resistance to infectious diseases.

CONCLUSION

With the findings of this study it is concluded that AEZ has no influence on farmers demographic and socio-economic profile, knowledge and control of GIPs of horses.

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AUTHORS CONTRIBUTION

All authors have greatly contributed towards the conceptualization and design of the work, methodological approach, analysis and interpretation of the data and writing

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

REFERENCES

- Adeleye O, Alli-Balogun JK, Afiemo OG, Bako S (2016). Effects of goat production on the livestock of women in Igabi,Chikun and Kajuru Local Government Areas, Kaduna State, Nigeria. Asian J. Agric. Ext. Econ. Sociol. 11(1): 1–8. https://doi.org/10.9734/AJAEES/2016/22194
- Asefa Z, Kumsa B, Endebu B, Gizachew A, Merga T, Debela E (2011). Endoparasites of donkeys in Sululta and Gefersa districts of Central Oromia, Ethiopia. J. Anim. Vet. Adva. 10(14): 1850–1854.
- Belete S, Derso S (2015). Prevalence of major gastrointestinal parasites of horses in and around mekelle (quiha and wukro*)*. World J. Anim. Sci. Res. 3 (3): 1-10.
- Garcia-Perez MA, Nunez-Anton V (2003). Cellwise residual analysis in two-way contingency tables', Educational and Psychological Measurement. 63(5): 825-839. https://doi.org/10.1177/0013164403251280
- Colvin AF, Walkden-Brown SW, Knox MR, Scott JM (2008). Intensive rotational grazing assists control of gastrointestinal Nematodirus of sheep in a cool temperate environment with summer-dominant rainfall. Vet. Parasitol. 153(1-2): 108–120. https://doi.org/10.1016/j.vetpar.2008.01.014
- Hughes S, Kelly P (2006). Interactions of malnutrition and immune impairment, with specific reference to immunity against parasites. Parasite Immunol. 28: 577–588. https://doi.org/10.1111/j.1365-3024.2006.00897.x
- Iftikhar N, Ali T, Ahmad M (2007). Role of rural women in agriculture and their training needs. The J. Anim. Plant. Sci. 17(3-4): 93-95.
- Kompi PP, Molapo S, Ntsaoana ME (2021). Prevalence and faecal egg load of gastrointestinal parasites in horses in Maseru District Lesotho. J. Anim. Health. Produc. 9(1): 5-12
- Krueger RA, Casey MA (2009). Focus groups: a practical guide for applied research.4edition. Sage Publications, Thousand Oaks.
- Kumar N, Rao TKS, Varghese A, Rathor VS (2013). Internal parasite management in grazing livestock. J. Parasit. Dis. 37(2): 151–157. https://doi.org/10.1007/s12639-012-0215-z
- Madke PK, Lathwal SS, Singh Y, Kumar A, Kaushik V (2010).

Study of behavioural and physiological changes of crossbred cows under different shelter management practices. Indian J. Anim. Sci. 80 (8): 771–774.

- Matthews JB (2014). Anthelmintic resistance in equine nematodes. Int. J. Parasitol. Drugs and Drug Resist. 4(3): 310–315. https://doi.org/10.1016/j.ijpddr.2014.10.003
- Molento MB, Gaviao AA, Depner RA, Pires CC (2009). Frequency of treatment and production performance using the FAMACHA method compared with preventive control in ewes. Vet. Parasitol. 162(3-4): 314-319. https://doi.org/10.1016/j.vetpar.2009.03.031
- Patel SJ, Patel MD, Patel JH, Patel RN, Gelani RN (2016). Role of women gender in livestock sector: A review. J. Livest. Sci. 7: 92-96.
- Relf VE, Morgan ER, Hodgkinson JE, Matthews JB (2013). Helminth egg excretion with regard to age, gender and management practices on UK Thoroughbred studs. Parasit. 140(5): 641–652. https://doi.org/10.1017/S0031182012001941
- Rendle D, Austin C, Bowen M, Cameron I, Furtado T, Hodgkinson J, McGorum B, Matthews J (2019). Equine de-worming: a consensus on current best practice. UK-Vet Equine. https://doi.org/10.12968/ukve.2019.3.S.3
- Shalaby HA (2013). Anthelmintics Resistance; How to Overcome it? Iranian J. Parasit. 8(1): 18–32.
- Stuedemann JA, Kaplan RM, Ciordia H, Franzluebbers AJ, Stewart TB Seman DH (2004). Bermudagrass management in the Southern Piedmont USA V: gastrointestinal parasite control in cattle. Vet. Parasitol. 126(4): 375–385. https://doi.org/10.1016/S0304-4017(04)00413-3
- Taherdoost H (2017). Determining Sample Size; How to Calculate Survey Sample Size. Int. J. Econs & Mgmt System. hal-02557333.
- Tesfaye A, Curran MM (2005). A longitudinal survey of marketing Donkey's in Ethiopia. Trop. Anim. Health. Pro. 137(1): 87-100. https://doi.org/10.1007/s11250-005-9010-5
- Traversa D, Castagna G, von Samson-Himmelstjerna G, Meloni S, Bartolini R, Geurden T, Pearce MC, Woringer E, Besognet B, Milillo P, D'Espois M (2012). Efficacy of major anthelmintics against horse cyathostomins in France. Vet. Parasitol. 188(3-4): 294–300. https://doi.org/10.1016/j.vetpar.2012.03.048
- Torres-Acosta FJF, Hoste H (2008). Alternative or improved methods to limit gastro-intestinal parasitism in grazing sheep and goats. Small Ruminant Research. 77, 159-173. https://doi.org/10.1016/j.smallrumres.2008.03.009
- Tzelos T, Barbeito JS, Nielsen MK, Morgan ER, Hodgkinson JE, Matthews JB (2017). Strongyle egg reappearance period after moxidectin treatment and its relationship with management factors in UK equine populations. Vet. Parasitol. 237:70-6. https://doi.org/10.1016/j.vetpar.2017.02.018
- Upjohn MM, Shipton K, Lerotholi T, Attwood G, Verheyen KLP (2010). Coprological prevalence and intensity of helminth infection in working horses in Lesotho. Trop. Anim. Health. Pro. 42(8): 1655-61.
- Wannas HY, Dawood KA, Gassem GA (2012). Prevalence of gastro-intestinal parasites in horses and donkeys in Al Diwaniyah Governorate Al-Qadisiya. J. Vet. Med. Sci. 11(1): 148-155. https://doi.org/10.29079/vol11iss1art183
- Wedajo A, Hadus T (2017). Prevalence of Gastrointestinal Nematode Parasites of Horses and Donkeys in and Around Sagure Town, Ethiopia. Middle-East J. Appl. Sci. 3 (2): 16-22.
- Yisehak K (2008). Gender responsibility in smallholder mixed crop-livestock production systems of Jimma zone, South West Ethiopia. Livestock Research for Rural Development, 20 (11).