

Original Research Article

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Demographic Study of Incidence and Etiologies of Anaemia in Sheep and Goats in and around Namakkal, Tamil Nadu

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ABSTRACT

Keywords

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Anaemia is a decrease in the total amount of red blood cells or haemoglobin in the blood or a lowered ability of the blood to carry oxygen. 263 sheep and 1836 goats presented to the Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal, Tamil Nadu were screened for the study from September 2019 to August 2020. Incidence of anaemia was the highest in sheep and goats under 3 months of age and in the winter season. Various etiologies observed in sheep included ectoparasitic infestation (n=20; 55.56 per cent), endoparasitic infection (n=7; 19.44 per cent), mixed infection (n=4; 11.11 per cent) and other conditions (n=5; 13.89 per cent), whereas in goats ectoparasitic infestation (n=84; 63.64 per cent), endoparasitic infection (n=29; 21.97 per cent), mixed infection (n=8; 6.06 per cent) and other conditions (n=11; 8.33 per cent).

Introduction

India, being an agrarian economy, has a significant proportion of the people depending directly or indirectly on agriculture and livestock as a source of income. The country has a huge population of livestock, particularly small ruminants, including 74.26

million sheep which increased by 14.1 per cent over previous census (Tamil Nadu 4.5 million, Namakkal 95.48 thousand) and 148.88 million goats, which increased by 10.1 per cent over previous census (Tamil Nadu 9.89 million, Namakkal 3.65 lakhs) (20th Livestock census, 2019). Anaemia in small ruminants is a major factor responsible for

economic losses through reduction in productivity and increased mortality. Anaemia in small ruminants is caused by endoparasites (helminths and haemoprotozoa) and ectoparasites like ticks, lice and fleas (Anumol *et al.*, 2011). Hence, the present study was undertaken to record the incidence and etiologies of anaemia in sheep and goats presented to Veterinary Hospital, Veterinary College and Research Institute, Namakkal in Tamil Nadu.

Materials and Methods

Sheep and goats brought to Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal during the period from September 2019 to August 2020 were screened for anaemia based on anamnesis, clinical signs, haemato-biochemical studies, faecal examination and peripheral blood smear examination. Clinical examinations of the animals were undertaken as per standard methods (Constable *et al.*, 2003).

Five millilitres of venous blood was collected and utilised for study of haematological parameters including Hb, PCV, RBC count, MCV, MCH and MCHC, WBC and differential counts (Weiss and Wardrop, 2010) and biochemical parameters including total protein and albumin (Alleman, 1990). The data generated in the present study was analysed using statistical analysis and presented.

Sheep with haematocrit of less than 27 per cent (Radostits *et al.*, 2006) and goats with haematocrit of less than 22 per cent (Anumol *et al.*, 2011) were considered as anaemic.

Results and Discussion

A total number of 263 sheep and 1836 goats presented to Veterinary Clinical Complex, Veterinary College and Research Institute,

Namakkal during the period from September 2019 to August 2020 were screened for the study. Out of which 36 sheep (13.69 per cent) and 132 goats (7.19 per cent) were found to be anaemic (Fig. 1).

In India, many scientists reported the incidence of anaemia in sheep and goats as 13.46 per cent (Ramesh and Suryanarayana, 1999), 15.38 per cent to 48 per cent (Bhikane *et al.*, 2006) and 35 per cent (Velusamy *et al.*, 2015). The difference in prevalence recorded by different workers might be due to different geographical locations, difference in vector population, climatic variation and genetic variation of the animals.

The major reason for anaemia was found to be external and internal parasitism (Shinde and Rajguru, 2009).

Age-wise incidence

In sheep highest incidence was recorded in less than 3 months of age (30.56 per cent), followed by 3 to 6 months (27.78 per cent), 6 to 9 months (11.11 per cent), 1 to 2 years (11.11 per cent), 3 to 4 years (11.11 per cent) and 2 to 3 years (8.33 per cent) of age grouped animals.

In goats highest incidence was recorded in less than 3 months of age (41.67 per cent), followed by 3 to 6 months (20.45 per cent), 1 to 2 years (13.64 per cent), 2 to 3 years (7.58 per cent), 3 to 4 years (7.58 per cent), 9 to 12 months (6.06 per cent) and lowest in 6 and 9 months (4.95 per cent) of age grouped animals. Similar findings were recorded by Ramesh and Suryanarayana (1999).

Highest incidence in less than 3 months of age grouped animals in the present study could be due to immunosuppression by early separation of young ones from dam which made them more prone for deficiency and infectious

diseases and increased their possible exposure to ectoparasites.

Season-wise incidence

In sheep anaemia was highest in the winter season from December to February (44.44per cent), followed by the pre-monsoon season from March to May (38.89per cent), post-monsoon season from October to November (13.89per cent) and lowest in the monsoon season from June to September (2.78per cent).

In goats anaemia was highest in the winter season from December to February (48.48per cent), followed by the post-monsoon season from October to November (34.09per cent), pre-monsoon season from March to May (11.36per cent) and lowest in the monsoon season June to September (6.06per cent).

Bhatane *et al.*, (2018) recorded highest prevalence of anaemia in winter (56.33 per cent) and lowest in monsoon (12.67 per cent) season and explained that these findings could be due to winter stress, especially in younger animals.

Velusamy *et al.*, (2015) found significantly higher helminthic infection during Northeast monsoon in Namakkal region. They observed marked seasonal influence in faecal egg counts in small ruminants. Warm and humid months were conducive for the development and survival of the pre-parasitic stages, that lead to increased incidence of anaemia in winter season (December to February).

Sex-wise incidence

Incidence of anaemia in sheep was slightly higher in males (55.56per cent) than females (44.44per cent). However, the difference was statistically insignificant. Incidence of anaemia in goat was slightly higher in females (50.76per cent) than males (48.48per cent).

However, the difference was statistically insignificant.

Non-significant association of sex and incidence of anaemia in small ruminants in the present study were in concurrence with Goklaney *et al.*, (2012) and Bhatane *et al.*, (2018).

Haematology

In anaemic sheep, highly significant elevation ($p<0.01$) of WBC count, lymphocytes and eosinophils and highly significant reduction ($p<0.01$) in Hb, PCV, RBC count, neutrophils and monocytes and significant reduction ($p<0.05$) in MCV were noticed.

In anaemic goats, highly significant elevation ($p<0.01$) of MCV, MCH and eosinophils, significant increase ($p<0.05$) in monocytes and highly significant ($p<0.01$) reduction in Hb, PCV and RBC count were noticed.

Etiology

During the study period, 36 sheep and 132 goats were anaemic and the various etiologies in sheep included ectoparasitic infestation ($n=20$; 55.56 per cent), endoparasitic infection ($n=7$; 19.44 per cent), mixed infection ($n=4$; 11.11 per cent) and other conditions ($n=5$; 13.89 per cent), whereas in goats ectoparasitic infestation ($n=84$; 63.64 per cent), endoparasitic infection ($n=29$; 21.97 per cent), mixed infection ($n=8$; 6.06 per cent) and other conditions ($n=11$; 8.33 per cent) (Fig. 2).

Anaemia due to ectoparasitic infestation

Incidence of pediculosis was highest in sheep (38.89 per cent), followed by acariosis (11.11 per cent) and mixed infestation (5.56 per cent) of pediculosis and acariosis. In goats, the incidence of pediculosis was highest (46.97 per cent), followed by acariosis (6.06 per cent)

and pulicosis (3.03 per cent). Mixed infestation of pediculosis and acariosis were 6.06 per cent and pulicosis and acariosis were 1.52 per cent.

Yakhchaliand Hosseine (2006) and Bhatane *et al.*, (2018) reported that ectoparasitism was the major cause for anaemia in small ruminants that leads to major economic loss due to poor management practices.

Animals in poor body condition that were improperly fed and exposed to harsh weather conditions carried the heaviest infestations of lice.

Climatic condition conducive to the growth and multiplication of ectoparasites, poor management, poor awareness among farmers and poor animal health services contributed to the widespread occurrence of ectoparasites (Sertse and Wossene, 2007).

Anaemia due to endoparasitic infection

Incidence of strongylosis was 16.67 per cent and coccidiosis was 2.78 per cent in sheep. Whereas in goats, the incidence of coccidiosis was highest (11.36per cent), followed by strongylosis(7.58per cent) and mixed infection of strongylosis and coccidiosis(2.27 per cent) and trichuriasis and strongylosis (0.76 per cent).

Haemonchuscontortus was the most common species caused blood loss anaemia(Nwosu *et al.*, 2007; Tariq *et al.*, 2008; Baldissera *et al.*, 2015). In the present study *Strongylespp.* were more in sheep than in goats (Waruiru *et al.*, 2005; Nwosu *et al.*, 2007; Asif *et al.*, 2008;Jatau *et al.*, 2011) which could be due to the grazing habit (graze closer to the ground) of the sheep (Velusamy *et al.*, 2015). Kids with coccidiosis developed severe anaemia(Ozlem *et al.*, 2004). Bhatane *et al.*, (2018) found that infection of *Strongyle* spp.

was higher (61.81 per cent) followed by *Trichuris* spp. (0.72 per cent) and *Eimeria* spp. (0.54 per cent).

Anumol *et al.*, (2011) observed that strongylosis was predominant, followed by moneiziasis, strongyloidosis, trichuriasis, amphistomosis and incidence of schistosomosis was the least in small ruminants.

Similar observations were made in goats of Kerala by ArunShaju (2001). Velusamy *et al.*, (2015) identified intestinal parasites such as *Strongyles*, *Trichuris*, *Moniezia*, *Amphistoma* and *Coccidia*, in which the highest prevalence was observed with *Coccidia*, followed by *Strongyles*, *Moniezia*, *Trichuris* and least with amphistomes in both sheep and goats.

Increased incidence of coccidiosis in small ruminants in present study could be due to poor management systems (Animals were kept in confinement for longer periods during rainy season to avoid damage to crops, consequently, overcrowding in unhygienic pen, predispose the animals to high parasitic infections (Velusamy *et al.*, 2015).

Mixed infection

Three theileriosis cases were recorded in sheep in peripheral blood smear examination under Giemsa stain.

Theileriosis was confirmed by detection of Koch's Blue Bodies (KBB) using FNAC from swollen pre-scapular lymph nodes (Banka *et al.*, 2020).

In sheep, 5.56 per cent cases had mixed infection of theileriosis, coccidiosis and acariosis, 2.78 per cent cases had mixed infection of theileriosis and strongylosis and 2.78 per cent cases had mixed infection of pediculosis, strongylosis and coccidiosis.

Fig.1 Overall incidence of anaemia in sheep and goats

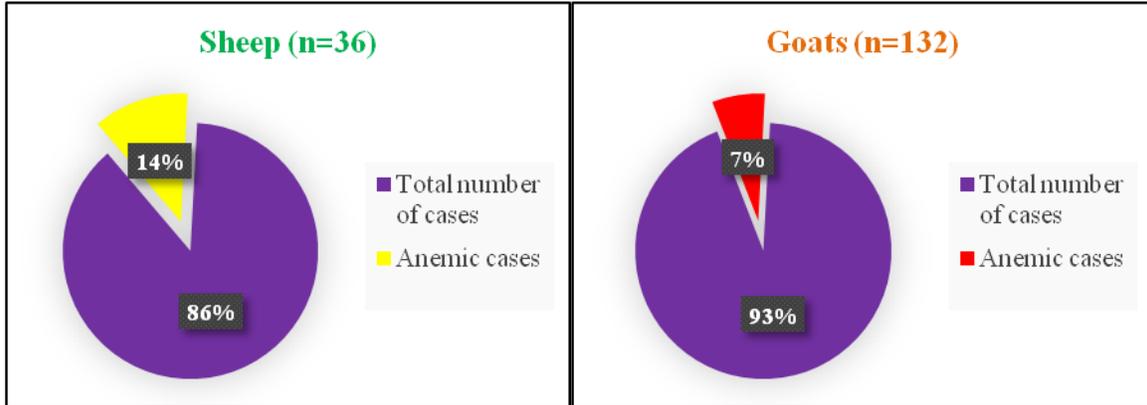
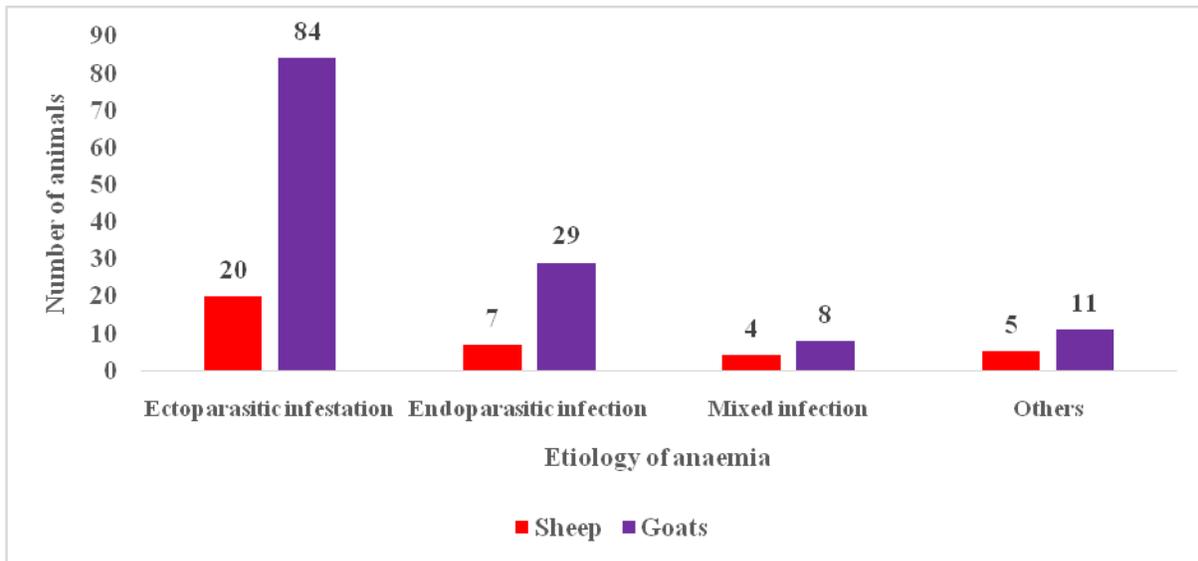


Fig.2 Etiologies of anaemia



In goats, 2.27 per cent cases had mixed infection of pediculosis, strongylosis and coccidiosis, 2.27 per cent cases had mixed infection of pediculosis and strongylosis, 0.76 per cent cases had mixed infection of moneiziasis, strongylosis and acariosis and 0.76 per cent cases had mixed infection of strongylosis and theileriosis. Haemoparasite s (*Theileriaspp.*) invade red blood cells and causedhaemolysis (Barnett (1978; Alani and Herbert, 1988). Arulmozhi *et al.*, (2016) found *Theileria* organisms in erythrocytes of sheep, in the study conducted at Namakkal. Five sheep and eleven goats did not have any

ectoparasitic or endoparasitic infection. Anaemia in these cases could be due to nutritional deficiencies, metabolic disorders, bone marrow disorders or other such conditions.

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References

- Alani, A.J. and I.V. Herbert, 1988. Pathogenesis of infection with *Theileria recondita* (Wales) isolated from *Haemaphysalis punctata* from North Wales. *Vet. Parasitol.*, 28: 293-301.
- Alleman, A.R., 1990. The effects of hemolysis and lipemia on serum biochemical constituents. *Vet. Med.*, 85: 1272-1284.
- Anumol, J., P. V. Tresamol, M. G. Saranya, K. Vijayakumar, and M. R. Saseendranath, 2011. A study on aetiology of anaemia in goats. *J. Vet. Anim. Sci.*, 42: 61-63.
- Arulmozhi, A., K. Senthilvel, R. Madheswaran and G.A. Balasubramaniam, 2016. Malignant ovine theileriosis in a sheep flock. *Indian J. Vet. Pathol.*, 40: 349-351.
- ArunShaju, T. 2001. Prevalence, haematology and treatment of strongylosis in goats. M. V. Sc. thesis, Kerala Agricultural University, Thrissur, pp. 43.
- Asif, M., S. Azeem, S. Asif and S. Nazir, S, 2008. Prevalence of gastrointestinal parasites of sheep and goats in and around Rawalpindi and Islamabad, Pakistan. *J. Vet. Anim. Sci.*, 1: 14-17.
- Balasubramaniam, G.A., G.V. S. Rao, C. Balachandran, V. George and S. Vairamuthu, 2001. Incidence of parasitic diseases among domestic animals in Namakkal district of Tamil Nadu. *Indian J. Anim. Sci.*, 71: 340-341.
- Baldissera, M. D., F. L. Pivoto, N. B. Bottari, A. A. Tonin, G. Machado, A. R. Aires, and Silva, A. S. D. 2015. Effect of zinc supplementation on ecto-adenosine deaminase activity in lambs infected by *Haemonchus contortus*: Highlights on acute phase of disease. *Exper. Parasitol.*, 151: 34-38.
- Banka, P. R., S., Sivaraman, G., Vijayakumar and G. Arulmozhi, 2020. Successful therapeutic management of theileriosis in a goat-a case report. *Int. J. Curr. Microbiol. App. Sci.*, 9: 1481-1484.
- Barnett, S.F., 1978. Theileria. In: Kreier JP (ed) Parasitic protozoa, vol 1. Academic press, New York, pp. 77-113
- Bhatane, S.C., S.D. Moregaonkar, G.R. Gangane, and B.W. Narladkar, 2018. Studies on overall prevalence of anaemia in goats with special reference to parasitic infections associated with it. *J. Entomol. Zoo. Stud.*, 6: 477-480.
- Buragohain, B., A. Phukan, C.C. Baruah, T.C. Dutta and P.R. Dutta, 2013. Prevalence of coccidiosis in goats of greater Kamrup district of Assam. *Indian Vet. J.*, 90: 42-43.
- Constable, P. 2003. Fluid and electrolyte therapy in ruminants. *Veterinary Clinics: Food Animal Practice*, 19(3): 557-597.
- Goklaney, D., A.P. Singh, R.K. Dhuria and A. Ahuja, 2012. Therapeutic Evaluation of Mineral Preparation for the Amelioration of Anaemia in Goats of Arid Zone of Rajasthan. *Iran. J. App. Anim. Sci.*, 2: 137-141.
- Jatau, I.D., A. Abdulganiyu, A.I. Lawal, O.O. Okubanjo and K.H. Yusuf, 2011. Gastrointestinal and haemo parasitism of sheep and goats at slaughter in Kano, northern-Nigeria. *Sokoto J. Vet. Sci.*, 9: 7-11.
- Livestock Census, 2019. Government of India, 20th Livestock Census-2019. Ministry of Fisheries, Animal Husbandry & Dairying; Department of animal husbandry and dairying, Krishi Bhawan, New Delhi.
- Nwosu, C.O., P.P. Madu, and W.S., Richards, 2007. Prevalence and seasonal changes in the population of gastrointestinal nematodes of small ruminants in the semi-arid zone of north-eastern

- Nigeria. *Vet. Parasitol.*, 144:118-124.
- Ozlem, O., S. Sima and A. Y. Bayram, 2004. Comparative evaluation on clinicopathological findings and treatment in acute and chronic coccidiosis of lambs and kids. *Indian Vet. J.*, 81: 1206-1209.
- Radostits, O. M., C. C. Gay, K. W. Hinchcliff and P. D. Constable, 2006. A textbook of the diseases of cattle, horses, sheep, pigs and goats. Veterinary medicine, 10th ed., pp. 2045-2050.
- Ramesh, K. and C. Suryanarayana, 1999. A note on incidence of anaemia in goats. *Ind. J. Vet. Med.*, 19(2): 98-98.
- Sarkar, S., M. K. Bhowmik, D. N. Basak, S. Pan and S. Misra, 1992. Prevalence of anemia in goats of alluvial zone of west-bengal. *Indian J. Anim. Sci.*, 62: 100-102.
- Sertse, T. and A. Wossene, 2007. A study on ectoparasites of sheep and goats in eastern part of Amhara region, northeast Ethiopia. *Small Rum. Res.*, 69: 62-67.
- Shinde, S. B. and D. N. Rajguru, 2009. Prevalence of parasitic anaemia in goats. *Vet. Pract.*, 10(1): 76-77.
- Tariq, K. A., M. Z. Chishti, F. Ahmad and A. S. Shawl, 2008. Epidemiology of gastro-intestinal nematodes of sheep managed under traditional husbandry system in Kashmir valley. *Vet. Parasitol.*, 158: 138 – 143.
- Velusamy, R., N. Rani, G. Ponnudurai and P. Anbarasi, 2015. Prevalence of intestinal and haemoprotozoan parasites of small ruminants in Tamil Nadu, India. *Vet. World*, 8: 1205.
- Waruiru, R. M., M. N. Mutune and R. O. Otieno, 2005. Gastrointestinal parasite infections of sheep and goats in a semi-arid area of Machakos District, Kenya. *Bulletin of Anim. Health Prod. Africa.*, 53: 25–34
- Weiss, D.J. and K.J. Wardrop, 2010. Normal hematology of cattle. In Schalm's Veterinary hematology, 6th Edition, Wiley- Blackwell, pp. 829-835.
- Yakhchali, M. and A. Hosseine, 2006. Prevalence and ectoparasites fauna of sheep and goats flocks in Urmia suburb, Iran. *Vet. Arch.*, 76: 431-442.

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