

Susceptibility of *Haemonchus contortus* infection in Jakhrana goats

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Gastrointestinal (GI) nematodes are major cause of reduced productivity in goats in India, which leads to production losses, increased cost of management and mortality in severe cases. *Haemonchus contortus* is one of the most common gastro-intestinal nematodes of goats in India (Yadav and Tandon 1989, Garg *et al.* 2003) to cause serious production losses. Genetic variation in resistance to GI nematode parasitic infection has been documented among goat breeds (Costa *et al.* 2000, Mandonnet *et al.* 2001). Besides this, several other factors like sex, age, reproductive status, nutrition and season affect the resistance to *Haemonchus* infection in goats. Fecal egg count and packed cell volume were used to express resistance among or within breeds as Gray (1991) postulated that the fecal worm egg counts was the most effective way of selecting goats for parasitic resistance. In addition, haematocrit value is used as a useful parameter to describe resistance against parasites depending on the dominant species (Taylor *et al.* 1990). There is no evidence of differences of susceptibility to *H. contortus* infection in Jakhrana goat, an important dairy goat breed in the semi-arid tract of the Rajasthan province of India. Hence, the present study was conducted to assess the parasitic load due to *H. contortus* infection and factors affecting the susceptibility of infection in Jakhrana goat.

The study was conducted on 122 Jakhrana goats, maintained at the Central Institute for Research on Goats, Makhdoom, Mathura, Uttar Pradesh, India for a period of 4 months (i.e from July 2006 to October 2006). The faecal samples were collected twice from each individual goat. The fecal egg counts (FEC) were conducted using the modified McMaster method (MAFF 1977). The blood was taken from the jugular vein of each animal in standard 5 ml vacutainer tube containing heparin with the help of sterile syringe. Blood

samples were collected at the same time when the faecal samples were taken. Packed cell volume (PCV%) was determined by the micro-haematocrit centrifuge method (Preston and Allonby 1978). The FEC as well as PCV and haemoglobin (Hb) of all animals were examined, recorded twice and the mean FEC, PCV and Hb were used for data analysis. The FEC of adult does was classified in different physiological status (i.e., pregnant and non-pregnant) of animals. As FEC were not normally distributed and because of skewed distribution, a set of logarithms transformation was applied to FEC and the resulting transformed variables were tested for normality. All raw data of FEC were transformed by the most appropriate transformation, $\text{Log}_e(\text{FEC}+100)$ before analysis. The results were back transformed by taking anti-logarithms of the least-squares means (LSM) and presented as geometric means (GFEC). Means and standard errors of the estimate for different parameters were calculated sex-wise and according to the different physiological status of does. Comparison of means was made by simple student's t-test. The relationship among FEC, PCV and Hb was measured by simple correlation coefficient (Snedecor and Cochran 1989).

The overall prevalence rate of *H. contortus* infection in Jakhrana goats was 71.3% (87/122). Out of 71.3% infected animals, the prevalence rate in males was 34%, whereas in females it was 66%. The GI parasitic infection in animals occurs due to contaminated pasture in this climatic zone. This study revealed that the prevalence rate of infection was higher in females than males. Sex-wise susceptibility pattern to the infection in this breed revealed that males had significantly higher worm load as compared to females. The overall means (units/g of faeces) for fecal egg count (FEC, epg) and geometric mean of FEC (GFEC, epg) in males were 1527.27 ± 222.22 and 1041.38 ± 1.18 , respectively, whereas the corresponding values in females were 1319.10 ± 194.97 and 423.21 ± 1.17 , respectively. The investigation also showed that the occurrence of the *H. contortus* infection was significantly higher ($P < 0.01$) in pregnant animals as compared to non-pregnant animals in terms of fecal egg count (1972.27 ± 408.64 vs. 1104.48 ± 220.30) and geometric mean

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of FEC (912.32 ± 1.35 vs. nil). However, Baker *et al.* (1998) reported that there was no significant difference between the pregnant and dry does in GFEC at mating or at kidding in African goats. The high FEC in pregnant goats in present study may be due to poor nutrition, pregnancy stress, lack of antigenic stimulation and hormonal suppression of immunity etc.

The mean PCV content of male and female animals was $19.39 \pm 0.90\%$ and $17.80 \pm 0.55\%$, respectively, during the period of investigation. Nonsignificant variation in PCV between sexes was observed in the present study. The PCV content of does was significantly ($P < 0.05$) higher in pregnant animals than non-pregnant animals ($19.59 \pm 0.99\%$ vs. $17.26 \pm 0.65\%$). Romjali *et al.* (1997) showed that lactating ewes had lower PCV than dry and pregnant ewes whereas, the difference between PCV of dry and pregnant ewes was statistically non-significant ($P > 0.05$). The faecal egg counts was significantly higher in lactating Jamunapari goats than that of dry pregnant does but there was no peri-parturient rise in FEC in the resistant Barbari goats (Chauhan *et al.* 2003).

The mean haemoglobin content of animal during the course of infection in males and females were 8.23 ± 0.18 g/dl and 7.99 ± 0.20 g/dl, respectively. The present study showed that sex had nonsignificant variations in Hb content of goats. The results may be ascribed to small number of observations in this study. Similarly, the hemoglobin contents of pregnant and non-pregnant animals during the course of study were 8.34 ± 0.35 g/dl and 7.88 ± 0.23 g/dl and this difference was also statistically nonsignificant.

The phenotypic correlation of FEC with LEFC was positive and high (0.53) but the trait was negatively and significantly ($P < 0.05$) correlated with PCV in our study. Negative association between LFEC and PCV of animals was also observed at phenotypic level (-0.28). The phenotypic relationship of LFEC and haemoglobin content was low and negative (-0.08). The correlation of PCV of animals with haemoglobin content was positive and moderate in magnitude (0.30) and statistically significant ($P < 0.05$). Ahmed and Ansari (1989) studied the effects of haemonchosis on haematology in goats in natural and experimental infection and found depletion in RBC, WBC counts, PCV and Hb values. The phenotypic correlation of about 0.48 was reported between the PCV declines and adjusted transformed FEC with genetic correlation in the range of 0.76 to 1.0 between the traits (Woolaston and Piper 1996). In a study, Rajapakse *et al.* (1996) estimated the correlation between the worm burden and Hb/PCV and they reported that high worm burden showed a weak negative correlation with PCV, and moderate worm burden showed a weak negative correlation with Hb. Similar phenotypic correlation estimate between FEC and PCV was consistently negative (and therefore favourable) in both sheep (Albers *et al.* 1987, Baker *et al.* 1999) and goats when they are infected with *H. contortus*.

SUMMARY

The study revealed that the overall prevalence rate of *H. contortus* infection in the Jakhrana flock was 71.3% and the females had higher prevalence rate as compared to males (66% vs. 34%). The fecal egg count was a good indicator of naturally infected nematode infection. Sex-wise susceptibility pattern to the infection in this breed revealed that males had significantly higher worm load than females. The occurrence of the infection was significantly higher in pregnant animals as compared to non-pregnant animals in this breed. Negative association between fecal egg count and packed cell volume of animals was also observed at phenotypic level.

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