



Effect of biochemical profiles and reproductive performance during internal parasites in Goat and Sheep

Dinesh Mahto

Krishi Vigyan Kendra, Bandhuganj, Jehanabad (Bihar Agricultural University) Sabour, Bhagalpur, Bihar, India

*Corresponding email: drdineshgy@gmail.com

ARTICLE INFO	ABSTRACT
<p>Original Research article Received on March 10, 2017 Accepted on April 20, 2017</p> <p>Article Author Dinesh Mahto</p> <p>Corresponding Author Email drdineshgy@gmail.com</p>	<p>Gastrointestinal parasitic infected ewes and does were kept almost parasite free for about 3 months using Albendazole alone or supplemented with mineral mixture. The Hb (g/dl) level ranged from 8.83±0.08 to 8.96±0.03 in ewes & does was 8.78±0.02 to 8.95±0.24 before treatment. The level of Hb increased significantly (P<0.01) in both the treatment groups after treatment on day 20. The Serum level of Ca, P, Cu and Zn in ewes & does increased significantly after treatment on day 20 in both the treatment groups as comparison to control group. Although they did not vary significantly among themselves except the level of Cu which was significantly (P<0.01) higher in group II than the group I in ewes & does. The level of Zn was higher in group I than group II in does. The minimum interval from treatment to onset of estrus were recorded in group II, 41 days in ewes & 43 days in does which was followed by group I 44 days in ewes & 46 days in does and control group 55 days in ewes & 52 days in does. The average required number of services per conception in does were 1.33, 1.00 and 2.00 for I, II and control groups, respectively. The corresponding values in ewes were 1.67, 1.17 and 2.17, respectively. The pregnancy rates in the three groups were 66.66, 83.33 and 33.33%, respectively in case of does. The corresponding values in ewes were 50.00, 66.66 and 33.36%, respectively.</p>
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The sheep and goat husbandry plays a significant role in the national economy. It provides much relief to the economically weaker people of society who have adopted it as a primary or subsidiary occupation for their livelihood security. The success of sheep and goat farming lies in ensuring proper and optimal reproductive performance of each individual female in the flock within normal physiological limits. Reproductive performance is a complex characteristic. The complex trait comprises litter size, lambing performance, lamb/kid survival, conception rate, fertility rate and prolificacy. Sheep and goat are highly susceptible to gastrointestinal parasitic infections. Apart from this, intestinal helminthes cause significant reduction in efficiency of nutrient utilization (Coop and Angus, 1975), poor calcium and phosphorus retention (Reveron *et al.*, 1974, Sykes and Coop, 1976) and poor feed conversion (Andrew *et al.*, 1944), blood loss and loss of plasma protein (Arora *et al.*, 2001). When sheep and goat are raised under natural grazing practices, the reproductive performance is affected by several factors *viz.* environmental or climatic stress, nutritional status, improper management and lack of

prevention and control of diseases. Many disease producing organism like bacteria, virus, fungi and parasites affect reproductive performance. Among these, parasitic infection is one of the major problems affecting production and reproduction of sheep and goat.

MATERIALS AND METHODS

The present study was conducted to see the effect of intestinal parasites on reproductive performance of ewes and does. For this a total number of 36 ewes and does which had lambing/kidding for at least once and were found positive for common intestinal nematodes were utilized and allotted to three groups *viz.* T₁, T₂ and T₃, each group having 6 animals. The animals of group T₁ were treated with Albendazole (Helmigard) @ 5 mg/kg body weight, orally. The group T₂ animals were treated with Albendazole @ 5 mg/kg body weight orally along with a supportive therapy of mineral mixture (Calvimin) @ 10 gm orally daily for 20 days. Animals of group T₃ served as untreated control. All the experimental ewes and does were maintained at almost balanced diet

along with routine grazing at least 4 to 5 hours daily. Clean water was supplied ad-lib. The ewes and does were provided with ear tags for proper identification. The primary health check up of each animal was carried out prior to the experiment. During the course of experiment, animals were kept under close observation.

RESULTS AND DISCUSSION

The maximum pathogenicity of gastrointestinal parasitic infections in ewes and does are due to the grazing practices. The efficacy of Albendazole and Albendazole + Mineral mixture were used to control the common G.I. helminths in ewes and does. Albendazole alone and Albendazole + Mineral mixture during the present study revealed almost 100% efficacy against the common G. I. helminths of ewes and does (*Haemonchus*, *Strongyloides*, *Trichostrongylus*, *Oesophagostomum*, *Bunostomum*, *Cooperia* and *Ostertagia* spp.) as assessed by the day 20 post treatment EPG counts (Table 1). The present findings are in agreement with the earlier observations of Theodorides *et al.* (1976), Ahmad *et al.* (1990) and Singh *et al.* (1994). Reinfection was found on 35th day post treatment in few cases in both the treatment groups (*i.e.* T₁ and T₂) of ewes and does. Since the animals were maintained to see their reproductive performance upto 75th day post treatment, they were retreated with the same drugs on day 35 if found positive to keep them parasite free and healthy. In the case of repeat treatment both the drug of each treatment group (T₁ and T₂) were found to show almost 100 per cent efficacy as assessed by the post treatment EPG observations on day 40 both in the ewes and does. The ewes and does infected with G.I. helminthes and subsequently treated with Albendazole were found to have low Hb (g/dl) 8.90 ± 0.06 and 8.78 ± 0.02 g/dl, respectively on day zero. The values significantly increased to 10.65 ± 0.12 g/dl and 10.78 ± 0.05 g/dl, respectively on day 20 post treatment. The G. I. helminthes infected ewes and does when treated with Albendazole + Mineral mixture, it was observed that the values of Hb improved from 8.96 ± 0.03 g/dl and 8.93 ± 0.04 g/dl, respectively on day zero (before treatment) to 10.84 ± 0.12 g/dl and 10.78 ± 0.05 g/dl, respectively on day 20 post treatment. Whereas the infected untreated control ewes continued to have reduced haematological values of Hb during the entire period

of observations. The haematological observations of the present findings are in close agreement with the reports of Yousuf *et al.* (1988) , Bhat *et al.* (2004) and Padmaja *et al.* (2006) in sheep and Siddiqua *et al.* (1990) in Black Bengal goat, and Lakra *et al.* (2007) in Black Bengal goat. The reduction in Hb values during infection recorded during present study might have occurred due to blood loss, less feed intake and utilization, suppressive effects on haemopoiesis caused by the toxic substances produced by helminthes in the host. The return of the different haematological values towards normalcy after treatment indicated that the elimination of G. I. helminths facilitated proper digestion, absorption and metabolism of feed nutrients as well as arrest of blood loss and release of toxic materials. Thus, it was clearly evident from the study that the drugs were free from any apparent side or toxic effects like diarrhoea, Fever, in appetite, tremor, depression or excitement and the helminthes control packages were found very useful to control the common G. I. helminthes in ewes and does as indicated by the positive effects on different haematological parameters of blood. Finally, it can be inferred that for achieving all around improvement in health and reproductive performance, the application of package for parasite control appears to be beneficial. Gastrointestinal helminthes parasites affect the nutritional status and indirectly reproductive performance in sheep and goat. It is an important constraint for profitable running of farms of these small ruminants. In this context, the present study was conducted to assess the levels of some blood parameters and biochemical's like Hb, Ca, P, Cu and Zn in infected and treated ewes and does. The effect of parasitic infection on the above mentioned blood biochemical profiles and ultimately on reproductive performances of ewes and does were also assessed.

Calcium

The overall mean serum calcium level in infected ewes and does prior to treatment were recorded to be 8.76 ± 0.13 and 8.63 ± 0.11 mg/dl, respectively which increased significantly after treatment in both the group of animals which is in accordance with the findings of Biswas *et al.* (1986) in Sahawadi Sheep and Dede *et al.* (2003) in goat. The infected animals were found to have lower calcium value than the treated animals, which might

Table 1. Efficacy of Albendazole alone or in combination with mineral mixture for the control of common G. I. helminthes in ewes and does

Groups (No. of animals)	Nature of infection	Drugs doses used, and administration	Average pre treatment EPG on 0 day	Average post treatment EPG and drug efficacy (%) on 20 th DPT	Reinfection detected on 35 th day and treatment repeated on the day	Average post treatment EPG and drug efficacy (%) on 40 th DPT	Status of parasitic infection on 75 th day	
T1	Ewes (6)	Common G.I. helminthes*	Albendazole, 5 mg/kg b.wt., single oral dose	1800.00±85.63	33.33±21.08 ^a (98.14%)	Albendazole, 5 mg/ kg b.wt., single oral dose	00.00±0.00 ^a (100%)	Completely cured off helminthes infection
	Does (6)	-Do-	-Do-	1783.33±87.24	33.33±33.33 ^a (98.13%)	-Do-	00.00±0.00 ^a (100%)	-Do-
T2	Ewes (6)	-Do-	Albendazole, 5 mg/kg b.wt., single oral dose + mineral mixture 10 gm orally daily for 40 days	1816.66±94.57	33.33±21.08 ^a (98.16%)	Albendazole, 5 mg/ kg b.wt., single oral dose + mineral mixture 10 gm orally	00.00±0.00 ^a (100%)	-Do-
	Does (6)	-Do-	-Do-	1750.00±67.08	16.66±16.66 ^a (99.04%)		00.00±0.00 ^a (100%)	-Do-
T3	Ewes (6)	-Do-	Control	1766.66±88.19	2200.00±143.75 ^b		2716.66±124.94 ^b	++ to +++ remained during period of observation
	Does (6)	-Do-	-Do-	1750.00±84.65	2166.66±133.77 ^b		2600.00±121.10 ^b	

T₁ – Albendazole treated group, T₂ – Albendazole + mineral mixture treated group, T₃ – Infected untreated control

*G.I. helminths: *Haemonchus* sp., *Oesophagostomum* sp., *Ostertagia* sp., *Trichostrongylus* sp., *Trichuris* sp., *Marshallagia* sp., *Bunostomum* sp., *Strongyloides* sp. Values bearing different superscripts in a column differed significantly.

Table 2 . Pre and post treatment Hb (g/dl) during common G.I. helminthes infections in ewes and does

Treatment Groups	Hematological Parameters					
	ewes Hb (g/dl)		't' Value	Does Hb (g/dl)		't' Value
	Pre treatment (Day 0)	Post treatment (20 th Day)		Pre treatment (Day 0)	Post treatment (20 th Day)	
T ₁ -Albendazole	8.90±0.06	10.65±0.12	11.14*	8.78±0.02	10.78±0.05	25.64**
T ₂ -Albendazole + Mineral mixture	8.96±0.03	10.84±0.12	12.85*	8.93±0.04	10.96±0.08	12.22*
T ₃ -Control	8.83±0.08	8.67±0.08	3.15 ^{NS}	8.95±0.24	8.69±0.14	1.671 ^{NS}

NS = Non-Significant., * = P<0.05, ** = P<0.01

Table 3. Pre and Post treatment blood biochemical profiles during common G.I. helminthes infections in ewes and does

Elements	Animals	Treatment	Albendazole	't' Value	Albendazole +Mineral mixture	't' Value	Control	't' Value
Ca (mg/dl)	ewe	pre	8.72±0.12		8.72±0.15	14.30*	8.76±0.13	8.90*
		post	11.54±0.15	12.68*	11.58±0.09		7.82±0.10	
	doe	pre	8.78±0.21	7.08*	8.88±0.25	10.10*	8.63±0.11	4.46 ^{NS}
		post	11.19±0.13		11.48±0.15		7.93±0.05	
P (mg/dl)	ewe	pre	2.57±0.04	8.753*	2.80±0.11	6.86*	2.53±0.09	3.09 ^{NS}
		post	3.66±0.15		3.93±0.17		2.05±0.08	
	doe	pre	2.71±0.07	6.86*	2.56±0.02	14.95*	2.72±0.11	5.54 ^{NS}
		post	3.61±0.09		3.84±0.07		2.24±0.13	
Cu (µg/dl)	ewe	pre	27.07±0.20	213.43**	27.05±0.08	217.299**	27.43±0.02	4.04 ^{NS}
		post	82.90±0.15		83.63±0.09		26.57±0.20	
	doe	pre	27.38±0.23	200.42**	27.04±0.08	265.43**	27.76±0.13	4.00 ^{NS}
		post	82.70±0.04		83.76±0.14		26.59±0.04	
Zn (µg/dl)	doe	pre	43.65±0.28	53.799**	43.80±0.37	39.637**	43.79±0.15	7.67*
		post	80.72±0.54		81.57±0.64		41.40±0.22	
		pre	46.29±0.26	88.37**	46.52±0.25	54.59**	46.72±0.23	5.17 ^{NS}
		post	81.64±0.58		87.09±0.59		44.13±0.72	

NS = Non-Significant., * = P<0.05, ** = P<0.01

Table 4. Average interval from treatment to onset of estrus (days) in ewes & does

Groups (No. of animals)	Nature of infection	Type of drug used	Ewes		Does					
			Occurrence of estrus in Ewe (Days)	'F' value	Pregnancy rate (%)	'F' value	Occurrence of estrus in does (Days)	'F' value	Pregnancy rate (%)	
T ₁ (6)	Common G.I. helminthes	Albendazole	44.00±0.73 ^b		50.00±6.08 ^b		46.00±0.73 ^b		66.66±7.45 ^b	
T ₂ (6)	Common G.I. helminthes	Albendazole + Mineral mixture	41.00±0.36 ^a	163.00**	66.66±7.45 ^b	5.62**	43.00±0.73 ^a	45.0**	83.33±4.30 ^b	15.00**
T ₃ (6)	Common G.I. helminthes	Infected untreated control	55.00±0.57 ^c		33.36±7.43 ^a		52.00±0.57 ^c		33.33±7.45 ^a	

Values bearing different superscripts in a column differed significantly. ** P < 0.01

occur due to the poor absorption of calcium from the gut (Roseby, 1973 and Sykes *et al.*, 1977).

Phosphorus

The mean values of serum phosphorus prior to treatment were 2.53 ± 0.09 and 2.72 ± 0.11 mg/dl, in infected untreated ewes and does, respectively. The value increased significantly after treatment in both the ewes and does. The serum inorganic phosphorus level was lower in control (*i.e.* infected) ewes and does. This result is also in close agreement with the reports of *Furmage et al.* (1974), *Arora et al.* (2001) and *Rajguru et al.* (2001). The lower level of serum inorganic phosphorus in infected animals might be due to the infection of parasite present in G. I. tract and its effects on feed intake and digestion (Roseby, 1973) and utilization.

Copper

The levels of copper in ewes and does in T₁, T₂ and T₃ group on day 0 were found to be 27.07 ± 0.20 , 27.05 ± 0.08 and 27.43 ± 0.02 µg/dl and 27.38 ± 0.23 , 27.04 ± 0.08 and 27.76 ± 0.13 µg/dl, respectively. The corresponding values on day 20 post treatment were 82.90 ± 0.15 , 83.63 ± 0.09 and 26.57 ± 0.20 µg/dl and 82.70 ± 0.04 , 83.76 ± 0.14 and 26.59 ± 0.04 µg/dl, respectively. The copper level was lower in infected ewes and does as compared to post treatment values which are in close agreement with the findings of *Dede et al.* (2003) in goats and *Lakra et al.* (2007) in Black Bengal goats.

Zinc

The levels of zinc in ewes and does in T₁, T₂ and T₃ group on day 0 were found to be 43.65 ± 0.28 , 43.80 ± 0.37 and 43.79 ± 0.15 µg/dl and 46.29 ± 0.26 , 46.52 ± 0.25 and 46.72 ± 0.23 µg/dl, respectively. The corresponding values on day 20 post treatment were 80.72 ± 0.54 , 81.57 ± 0.64 and 41.40 ± 0.22 µg/dl and 81.64 ± 0.58 , 87.09 ± 0.59 and 44.13 ± 0.72 µg/dl, respectively. During the present study the zinc level were lower in parasite infested ewes and does which are in close agreement with the earlier reports of *Dede et al.* (2003) in goats and *Lakra et al.* (2007) in Black Bengal goats. The decreased biochemical profiles during present study might have occurred due to blood loss caused by sucking nature of some helminths particularly that of *Haemonchus*

contortus. Some helminths also produce hypoproteinemia, hypoalbuminemia and hypoglycemia due to reduced feed intake and absorption through the injured gut and elevation of blood gastrin level, which results in altered carbohydrate metabolism and ultimately function of liver gets disturbed. Hypoalbuminemia has been seen as the most common cause of a low serum total calcium. Due to alteration in carbohydrate metabolism, serum phosphorus level gets decreased. Bursate worms cause macrocytic hypochromic anaemia, which results into serum deficiency as copper helps in blood cell formation. Zinc has the binding ability with protein to over 60 percent, so the resultant hypoproteinemia and hypoalbuminemia in case of parasite infestation are the main cause for decrease in the level of zinc in serum. All the biochemical profiles are the fractions of haemoglobin. Therefore, treatment with broad spectrum anthelmintic along with supportive drugs appears to have helped the G. I. helminths affected animals to recover anaemia due to repairing of damage tissue, restoration of body fluid balance and resumption of their function. The results depicted under table 4 in respect to interval from treatment to onset of estrus revealed that this duration was significantly shortest (41.00 ± 0.36 days) in ewes and (43.00 ± 0.73 days) in does, Albendazole+Mineral mixture treated ewes and does followed by Albendazole treated group of ewes and does.

However, this value were significantly higher in both the treated groups as compared to the untreated control group of ewes and does. Since very few reports are available on the effect of parasite infection on reproductive performance of ewes and does, the efficiency of treatment was compared on the basis of interval from treatment to onset of estrus, conception rate, pregnancy rate and number of services per conception. Information regarding onset of estrus in ewes and does after G. I. helminths control package application are not available. However, *Gatongi et al.* (1997) reported that after treatment with Ivermectin @ 200 µg in ewes and does the flock fertility and reproductive performance improved as compared to untreated ewes and does. The infected untreated ewes and does might have exhibited the first estrus after prolonged interval due to anaemia, anorexia, poor growth and macro mineral deficiency in blood serum under the influence of intestinal parasites. The results of the present study indicated

significantly lowest number of services per conception (1.00 for ewes and 1.17 for does) and highest pregnancy rate (66.66 ± 7.45 for ewes and 83.33 ± 4.30 for does) in the treatment group T₂ where Albendazole + Mineral mixture were administered. During the present study, the reproductive performance of both ewes and does improved after treatment with anthelmintic drugs. The interval from treatment to onset of estrus was low, the numbers of services per conception were also low and the pregnancy rate percent were higher in treated animals. In infected animals the levels of Ca, P Cu and Zn and Hb were low which improved after treatment. Balakrishnan and Balagopal (1994) have reported that serum Ca, P, Cu and Zn levels were significantly lower in buffaloes with poor reproductive performances. Mineral imbalance was the reason advocated for poor reproductive performance in buffaloes by them. Bhaskaran and Abdullah Khan (1981) have reported that marginal deficiency of Phosphorus is sufficient to cause disturbances in pituitary ovarian axis without manifestation of specific deficiency symptoms. Phosphorus is also essential for transfer of biological energy particularly through ATP and its deficiency may thus interfere with fertilization and or may cause early embryonic death. During the present study the levels of all the haematological parameters improved after treatment. EPG count dropped to almost zero post treatment and the reproductive performance improvement after treatment in this study might be due to increased serum levels of Ca, P, Cu and Zn and improved level of Hb post treatment.

SUMMARY

The Albendazole along with mineral mixture can be administered to the parasitized sheep and goats to improve their reproductive performances.

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