

Effects of Periparturient Anthelmintic Treatment on the Milk Yield in Cows

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ABSTRACT

This study was conducted to determine the efficacy of anthelmintics against gastrointestinal parasitic infestation in periparturient dairy cows and its effect on milk yield and quality. Sixty pregnant cows of 1st & 2nd parity were divided into four groups. The efficacy of anthelmintic treatment was evaluated by counting faecal egg per gram (EPG) compared with pre-treatment values. The milk yield of each cow was recorded in pre and post treatment lactations. Cows of group A were treated with Nitroxynil 10 mg/kg body weight subcutaneously 30 days before parturition, group B were treated with combination of triclabendazole and levamisole 19.5 mg/kg body weight orally at calving and group C treated with Endex[®] at calving and 42 days after. The mean change in EPG 14 days after treatment was significantly higher ($p<0.05$) in treated (79.1%) cows than control. Average milk yield of group C (2.8 ± 0.8) was significantly higher ($p<0.01$) than group A (2.6 ± 0.7). Similarly, the average milk yield in all the treated cows was significantly ($p<0.01$) higher in treated lactation (2.5 ± 0.7) than in the previous lactation (2.2 ± 0.7). The average milk yield in all treated cows was significantly ($p<0.01$) higher than the control cows. Although, milk yields were higher in second parity than the first, there was no significant difference ($p>0.05$). The milk protein percentage was significantly higher ($p<0.05$) in treated group than the control group. Therefore, it may be concluded that periparturient anthelmintic treatment effectively reduced the gastrointestinal parasitic load and improved milk yield.

(Key Words: cows, periparturient anthelmintics, milk yield, milk components, Bangladesh)

INTRODUCTION

Cattle farming provide 39% of employment in agriculture sector, and 15% of total employment in the national economy. In Bangladesh, 20 million households keep 23 million of cattle heads under traditional farming system. The productivity of the animal with regard to fertility and milk yield is low. Domestic productions supplying 99% of market milk in Bangladesh. Total milk production of the country from cattle and buffaloes are 770,000 and 2,400 Metric ton respectively (Bangladesh Bureau of Statistics, 1999, 2003). Dairy milk production is only 14% of the minimum requirement (28 g/day). Milk availability per caput is approximately 30 g per day against 250 g. The average daily milk yield is ranges from 1.5 liter to 2.46 liter in indigenous cow (Alam *et al.*, 2009, Kabir *et al.*, 2009) and 2.1 liter to 12 liter in different crossbred type (Kabir *et al.*, 2009, Mondal *et al.*, 2005). Along with other constrains, parasitic infestation interrupts production potential of dairy cows

in Bangladesh (Jabbar and Green, 1983). Parasitism results in a reduced nutrient supply to the host through voluntary reductions in food intake and reduced food efficiency and it has major detrimental effects on the efficiency of production of ruminants through losses up of to 50% are not uncommon. Deworming strategy can reduce the occurrence parasitic infestation and economic loss to ensure the continued production of milk. There is no comprehensive precise data are available on the effects of parasitism on milk yield in dairy cows of Bangladesh. This study was conducted to improve the quantity and quality of milk production through anthelmintic treatment during periparturient period in cows.

MATERIALS AND METHODS

1. Selection and Management of Animals

This study was carried out into the Bangladesh Agricultural University and Hajee Mohammad Danesh Science Technology

University dairy farms and other areas of Belkuchi Upazila (Sub-district) in Sirajganj district and also in the Department of Parasitology, Faculty of Veterinary Science, BAU, Mymensing and the Department of Pathology and Parasitology, Faculty of Veterinary and Animal Sciences, HSTU, Dinajpur. The study were done from July 2011 to June 2013 on 60 multiparous mixed breed pregnant cows of first and second parity selected from Bangladesh Agricultural University Dairy farm (n=16), Hajee Mohammad Danesh Science & Technology University Dairy farm (n=19) and *char* island area (n=25) of Belkuchi Upazila (sub district) in Sirajganj district. The selected pregnant animals used only for dairy purpose during the study period. The animals were 5~7 years old and on an average 125 to 172 kg body weight and all the animals were maintained under traditional farm condition of Bangladesh. All the animals were kept under the same managerial conditions. Rice straw was the staple feed for the cows and green grasses were available depending on the season. The calves were tied or tethered at the night and allow to free access or suckling to their dam during the whole day. The cows were milked once a day and only in the morning.

2. Grouping of Experimental Animals

A total of 60 mixed breed pregnant cows naturally infested with gastrointestinal parasites were selected from the three study areas for comparative stability trials of anthelmintics and their effects on milk quantity and quality. Cows were divided into four groups, A (n=18), B (n=14), C (n=16) and D (n=12). All cows of group A were treated with Nitroxynil (Dovenix[®], MERIAL-17, Bourgelat 69002 Lyon-France) at the rate of 10 mg/kg body weight subcutaneously 30 days before parturition was due. Cows of group B were treated with triclabendazole and levamisole (Endex[®], Novartis Pharmaceuticals Ltd., Bangladesh) at the rate of 19.5 mg/kg body weight orally at calving. Cows in group C were treated with triclabendazole and levamisole (Endex[®], Novartis Pharmaceuticals Ltd., Bangladesh) at the rate of 19.5 mg/kg body weight orally at calving and 42 days after. Cows of group D were kept as untreated infected control.

3. Collection and Examination of Fecal Sample

Fecal samples were collected from freshly devoided faces or directly from the rectum of each experimental cow. Samples were collected in the morning for the evaluation of pre and

post treatment egg load. Firstly the samples were examined for qualitative purpose by direct smear method and if the samples were positive then quantitative determination of helminthes egg was made by McMaster method as described by Rahman *et al.* (1996).

The efficacy of anthelmintics against gastrointestinal nematodiasis in dairy cows was based on the faecal egg count reduction test (FECRT). The faecal samples were collected and examined before and after treatment at 7th and 14th day and EPG of faeces of each cow was recorded.

4. Collection and Examination of Milk Sample

Milk samples were collected from each cow once a month and analyzed for the percentage of milk fat, protein, lactose, solid not fat (SNF) and minerals. The milk compositions were analyzed by using the automated milk composition analyzer (MILKOTESTER[®], Milk analyzing device, Model: MINI 3, Milkotester Ltd. BULGARIA).

5. Data Collection on Milk Yield

The daily milk yield by individual cow was recorded in liter to find out the total lactation yield during the study period.

6. Data Analysis

Data were analyzed for descriptive statistics (i.e. means, frequencies) using Statistical Package for Social Sciences (SPSS 17.0) computer program. The SPSS package was used for performing t-test, for comparing the variables.

RESULTS

The efficacy of anthelmintic treatment at different stages of periparturient periods have been presented in Table 1. The cows of group A which were naturally infested with gastrointestinal nematode parasites treated with Nitroxynil at the rate of 10 mg/kg body weight subcutaneously 30 days before parturition was due. It showed the average EPG reduced from 506.1 ± 172.3 to 157.8 ± 24.9 and the percentage of EPG reduction was 68.97 on 14th day of post treatment i.e. efficacy of Nitroxynil was 68.97%. The cows of group B were treated with combination of triclabendazole and levamisole at the rate of 19.5 mg/kg body weight orally at single dose during calving, where the average EPG reduced from 967.7 ± 237.1 to 172.0 ± 25.9 and the percentage of EPG reduction was 79.02 i.e.

Table 1. Efficacy of anthelmintics against gastrointestinal parasites in dairy cows

Groups	Drugs with dose	Pre-treatment EPG (Mean \pm SD)	Post-treatment EPG (Mean \pm SD)	% of EPG reduction on 14 th day	P-value
A (n=18)	Nitroxylnil (Dovinix [®]) (1 ml/25 kg)	506.11 \pm 172.25	157.78 \pm 24.86	68.97	0.01
B (n=14)	Levamisol & Triclabendazol (Endex [®]) (19.5 mg/kgbw.) at calving	794.60 \pm 310.5	166.70 \pm 26.2	79.02	0.01
C (n=16)	Levamisol & Triclabendazol (Endex [®]) (19.5mg/kgbw.) at calving + 42 days after	967.67 \pm 237.09	172.00 \pm 25.91	82.21	0.01
D (n=12)	Control (untreated)	791.67 \pm 268.52	864.17 \pm 290.71	-9.22	0.976
Over all treated	Anthelmintics	794.58 \pm 310.49	166.67 \pm 26.20	79.09	0.01

efficacy of triclabendazole and levamisole was 79.02%. The cows of group C were treated with combination of triclabendazole and levamisole at the rate of 19.5 mg/kg body weight orally at double doses during calving and 42 days after, showed the average EPG fell from 794.6 \pm 310.5 to 166.7 \pm 26.2 and the percentage of EPG reduction was 82.21 i.e. efficacy of triclabendazole and levamisole was 82.21%. Whereas cows of group D (untreated control group), showed increased EPG from 791.7 \pm 268.5 to 864.2 \pm 290.7 i.e. on 14th day of post-treatment increased EPG was 9.22%. The mean change in EPG 14 days after treatment was significantly higher ($p < 0.05$) in treated (79.1%) cows than control (9.2%).

The average daily milk yield of all groups was shown in Table 2. The milk yield were in group A, B, C and D in lactations previous and treated lactation was 2.3 \pm 0.7, 2.6 \pm 0.7; 2.5 \pm 0.8, 2.7 \pm 0.9; 2.1 \pm 0.6, 2.8 \pm 0.8 and 2.2 \pm 0.9, 2.2 \pm 0.8 litres, respectively. Average milk yield of all treated groups was significantly higher ($p < 0.01$) in treated lactation

Table 2. Average daily milk yield (lit./cow) of all cows

Groups	Milk yield (lit./cow)		P-value
	Previous lactation	Treated lactation	
A (n=18)	2.3 \pm 0.7	2.6 \pm 0.7	0.01
B (n=14)	2.5 \pm 0.8	2.7 \pm 0.9	0.01
C (n=16)	2.1 \pm 0.6	2.8 \pm 0.8	0.01
D (n=12)	2.2 \pm 0.9	2.2 \pm 0.8	NS

NS = not significant.

than the previous lactation.

Table 3 shows the average milk yield in treated cows was significantly ($p < 0.01$) higher in treated lactation (2.5 \pm 0.7) than the previous lactation (2.2 \pm 0.7) and similarly average milk yield was significantly ($p < 0.01$) higher in treated group (2.5 \pm 0.7) than the control group (2.2 \pm 0.8).

Although, milk yields were higher in second parity (2.5 \pm 0.7) than the first (2.4 \pm 0.7), there was no significant ($p > 0.05$) difference (Table 4).

The average value of solid composition of milk was shown in Table 5. The percentage of milk fat, protein, lactose, Solid Not Fat (SNF) and minerals in treated and control groups was 4.4, 4.0; 3.8, 3.5; 5.5, 5.3; 10.1, 10.1 and 0.6, 0.6, respectively.

Table 3. The milk yield difference between two lactations

Groups	Milk yield (lit./cow)		P-value
	Previous lactation	Treated lactation	
Treated (n=48)	2.2 \pm 0.7	2.5 \pm 0.7	0.01
Control (n=12)	2.2 \pm 0.9	2.2 \pm 0.8	NS

Table 4. The milk yield of cow in different parities

Parity	Milk yield (lit./cow)		P-value
	Previous lactation	Treated lactation	
1	2.2 \pm 0.7	2.4 \pm 0.7	NS
2	2.4 \pm 0.7	2.5 \pm 0.7	

NS = not significant.

Table 5. Solid compositions of milk samples

Groups	Milk composition (average values in percentage)				
	Fat	Protein	Lactose	SNF	Minerals
Treated	4.356	3.758	5.48	10.092	0.628
Control	4.018	3.458	5.324	10.054	0.594

SNF = solid not fat.

The milk protein percentage was significantly higher ($p < 0.05$) in treated group than the control group. There was no significant difference ($p > 0.05$) in percentage of other milk components. Periparturient anthelmintic treatment reduced the gastrointestinal parasitic load and improved milk yield and protein percentage.

DISCUSSION

The efficacy of anthelmintic treatment at different stages of periparturient periods in groups A, B and C were 68.97%, 79.02% and 82.21%, respectively. The efficacy of treatment was corresponded to the findings of earlier studies (Singh *et al.*, 1993; Gupta *et al.*, 1989; Mahbub, 1996). Those studies reported 89.5~100% efficacy against endoparasitic infection in cattle or other small ruminants reared in tradition system in Bangladesh. The present findings were coincided with the earlier researcher Ratnaparki *et al.* (1992) who report the efficacy of triclabendazole alone 80% in cattle. The very effective performance of triclabendazole along with levamisole against endoparasites in the current study also coincided with the performance of triclabendazole alone reported earlier in cattle (Mahbub, 1996). Moreover, using the levamisole (with triclabendazole) in this study could have trend of body weight gain (Hassan, 2012) modulated the body's immune system to give necessary protection against different infectious organisms (Mahbub, 1996). However, in this study has not studied immune status and body weight gain with the administration of levamisole along with triclabendazole.

The average milk yield of cows of this study is supported by the other reporters (Haq *et al.*, 1992; Gross *et al.*, 1999) who found that deworming helps to increased milk production 0.5 litre per cow per day. Sanyal *et al.* (1992) reported that anthelmintics treated cows produces 142 litres more milk over 100 days, with extension of lactation length and reducing the length of time of onset of oestrus.

In this study milk protein percentage was significantly higher

($p < 0.05$) in treated cows without other milk components. The finding was coincided with findings of Farque *et al.* (2007) who reported that anthelmintic treatment with concentrate feed supplementation significantly increased milk protein and ash percentage. This results also has been supported by the Gross *et al.* (1999) and Reist *et al.* (2002) who reported that milk production increased (0.6 kg/day) with the yield of milk fat and protein percentage after anthelmintics treatment.

The present findings suggest that the periparturient anthelmintics treatment have shown very satisfactory performances in terms of the reducing of gastrointestinal parasitic load and the changing of milk components. Periparturient deworming may be used as the most efficient strategy to improve milk production and quality in cows.

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