

A Field Study on Efficacy of Albendazole (Albezol®) Against Gastro-intestinal Nematodes in Ruminants

Theera Rukkwamsuk¹, Anawat Sangmalee¹, Korawich Anukoolwuttipong²
and Nitis Sookhong¹

ABSTRACT

A field study was aimed to determine efficacy of albendazole against gastro-intestinal nematodes in ruminants. Forty-eight infested animals (27 beef cattle and 21 goats) were used. Albendazole [Albezol®, 11.25% (wt/vol)] was given orally to animals at a dosage of 10 mg/kg body weight. Blood samples were collected at 0, 28 and 56 days after treatment for determination of packed cell volume (PCV) and plasma protein (PP) concentrations. Fecal samples were collected at 0, 7, 28, and 56 days after treatment and were examined for worm eggs using simple floatation method. When available, egg-containing fecal samples were counted for the number of eggs per gram (EPG) of feces using Mc Master technique. For beef cattle, the average (min, max) EPGs in fecal samples were 144 (100, 600), 0 (0, 0), 0 (0, 0) and 4 (0, 100) at day 0, 7, 28, and 56 days after treatment, respectively. Average percentages of beef cattle infested with GI-nematodes were 100, 0, 0, and 4 at day 0, 7, 28, and 56 days after treatment, respectively. Mean PCV (\pm SD) was 32.2 (\pm 4.2) % at day 0, the means were higher at 28 and 56 days after treatment. Compared with day 0, mean PP concentration was also higher at 28 days after treatment. For goats, average percentages of goats infested with GI-nematodes were 100, 0, and 14 at day 0, 7, and 28 after treatment, respectively. Average (min, max) numbers of eggs counted on 5 microscopic fields (40X) were 10 (1, 30), 0 (0, 0), and 1 (1, 2) at day 0, 7, and 28 after treatment. Mean PCV at day 28 after treatment was 31.6 (\pm 4.1)% and was higher than mean at day 0, 24.1 (\pm 5.2)%. Mean PP concentrations did not differ between day 0 and day 28 after treatment. Results showed high efficacy of albendazole in treatment and control of gastro-intestinal nematodes of ruminants.

Key words: albendazole, efficacy, gastro-intestinal nematode, ruminant

INTRODUCTION

Infestation of gastro-intestinal nematodes remains one of the major constraints to ruminant production (Perry and Randolph, 1999). Over 50% of dairy heifers raised in small-holder farms in Kamphaengsaen and Nong-Po were found to be

infested with gastro-intestinal nematodes. *Haemonchus spp.* and *Trichostrongylus* were the major genera (Rukkwamsuk *et al.*, 2001). Another studies in tropical countries also found similar results (Githigia *et al.*, 2001; Torres-Acosta *et al.*, 2003). Milk yield of dairy cows infested with gastro-intestinal nematodes was decreased and

1 Department of Large Animal and Wildlife Clinical Sciences, Faculty of Veterinary Medicine, Kasetsart University, Kamphaengsaen, Nakhon Pathom 73140 Thailand.

2 Department of Farm Resources and Production Medicine, Faculty of Veterinary Medicine, Kasetsart University, Kamphaengsaen, Nakhon Pathom 73140 Thailand.

growth rate of infested beef cattle also was retarded during fattening period. In severe gastro-intestinal nematode infestation of small ruminants, death is common. Treatment and control of gastro-intestinal nematodes could result in improving performance of farm animals.

Albendazole, a benzimidazole derivative, is authorized for use in veterinary medicine, and has been used for decades in treatment and control of gastro-intestinal nematodes as well as liver flukes (Dayan, 2003). It is permitted for use in both pregnant and non-pregnant food animals. Meat from treated animal is permitted for human consumption after recommended withholding period (Terrill *et al.*, 2001). The anthelmintic drug efficiency depends on types of nematodes, animal species, and duration of usage. Frequent uses and/or misuses of anthelmintics could increase the incidence of anthelmintic resistance of gastro-intestinal nematodes. Reports claimed that albendazole resistance was also possible in some animal species such as sheep and goats (Terrill *et al.*, 2001).

This study attempted to test whether albendazole currently remained effective for treatment and control of gastro-intestinal nematodes in ruminants in Kamphaengsaen and Nong-Po areas.

MATERIALS AND METHODS

Animals, sampling and analysis

Twenty-seven beef cattle from The Cattle and Buffalo Research and Development Center at Kasetsart University, Kamphaengsaen and 21 goats from a private small-holder farm were used. All animals were orally drenched once with albendazole (Albezol®, 11.25% wt/vol) at a dosage of 10 mg/kg of body weight. Blood and fecal samples were collected just the time before albendazole was administered (day 0). Fecal samples were re-collected at 7, 28, and 56 days after treatment. Blood samples were re-collected

at 28 and 56 days after treatment. Fecal samples were determined for gastro-intestinal worm eggs using simple floatation method as described by Sangvaranond (1998). When available, egg-containing fecal samples were counted for number of eggs per gram (EPG) of feces using Mc Master technique as described by Sangvaranond (1998). For all blood samples, packed cell volume (PCV) was determined using micro-hematocrit centrifugation and concentration of plasma protein was determined using refractometry.

Statistical analysis

Data were expressed as mean \pm SD or mean (min, max). Comparison of PCV and PP concentration between before and after treatment was performed using a repeated-measures analysis of variance (Petrie and Watson, 1999).

RESULTS AND DISCUSSION

From fecal examination, strongylid eggs were found in feces of both beef cattle and goats which was in agreement with previous studies (Rukkwamsuk *et al.*, 2001; Rukkwamsuk and Krajaysri, 2002). A number of EPG of strongylid eggs in feces of beef cattle are demonstrated in Figure 1. Before treatment, average number of EPG of feces was 144 (100, 600), the number dropped close to 0 at 7 days after treatment and remained 0 until 28 days after treatment. Thereafter, the EPG increased slightly close to 4 (0, 100) at 56 days after treatment. Considering number of infested beef cattle, percentage of infested animals dropped immediately from 100% at day 0 to 0% at day 7, and, at day 56, one (4%) beef cattle was infested (Figure 2). For goats, number of strongylid eggs counted in 5 microscopic fields (40X) were 10 (1, 30) at day 0, the number dropped to 0 at day 7, and increased to 0.2 (1, 2) at day 28 after treatment (Figure 3). As found in beef cattle, percentage of infested goats dropped from 100% at day 0 to 0% at day 7.

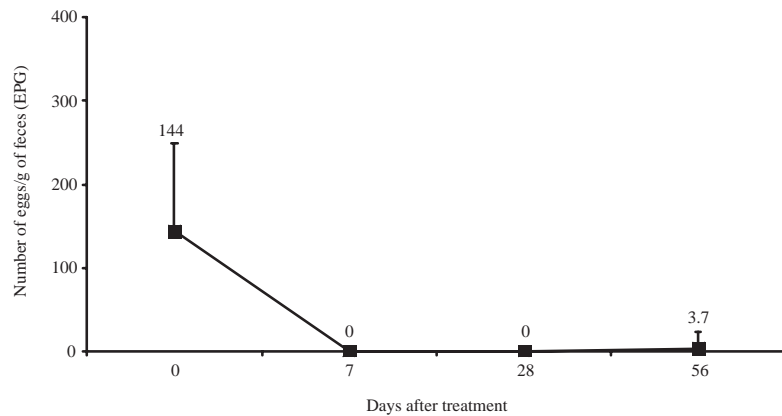


Figure 1 Average number of strongylid eggs (\pm SD) per gram of feces in beef cattle at 0, 7, 28, and 56 days after albendazole treatment.

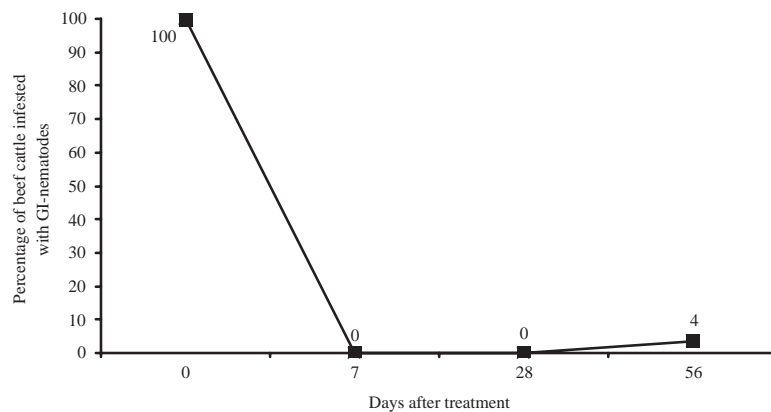


Figure 2 Reduction of percentage of beef cattle infested with gastrointestinal nematodes during the first 56 days after albendazole treatment.

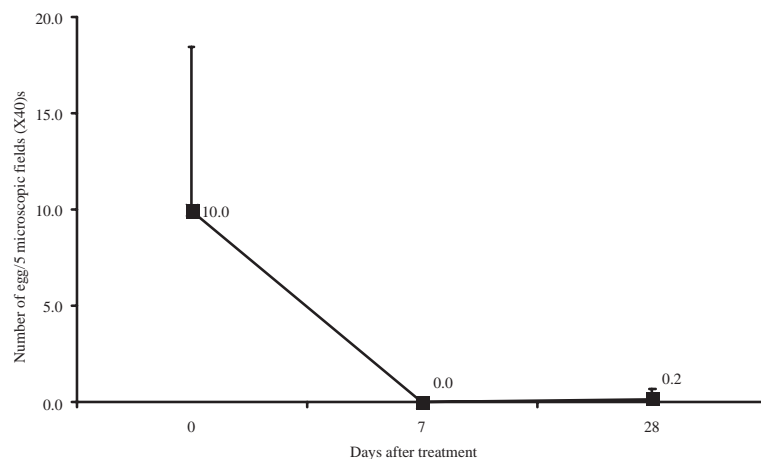


Figure 3 Average number of strongylid eggs (\pm SD) counted in 5 microscopic fields (40X) in goat feces at 0, 7, and 28 days after albendazole treatment.

However, at day 28, 3 goats (14%) were found to be infested (Figure 4). Results were similar to the previous study on efficacy of ivermectin against gastro-intestinal nematodes in ruminants (Rukkwamsuk and Krajaysri, 2002). Beef cattle treated with ivermectin became negative on fecal examination for worm-eggs by simple floatation until 56 days after treatment. However, goats treated with ivermectin became low infested until 56 days after treatment. The efficacy of albendazole in treatment of gastro-intestinal nematodes in this study was similar to the efficacy studied by Williams *et al.* (1997) and Waruiru

(1997).

General health status as indicated by PCV and PP concentrations in beef cattle and goats is demonstrated in Table 1. It was clear that both beef cattle and goats improved their general health status after treatment with albendazole. Particularly in goats, PCV at day 28 after treatment was 30% higher than at day 0. This result was in agreement with previous report (Githigia *et al.*, 2001). Plasma protein concentrations did not change much after treatment with albendazole, which was also reported by Githigia *et al.* (2001).

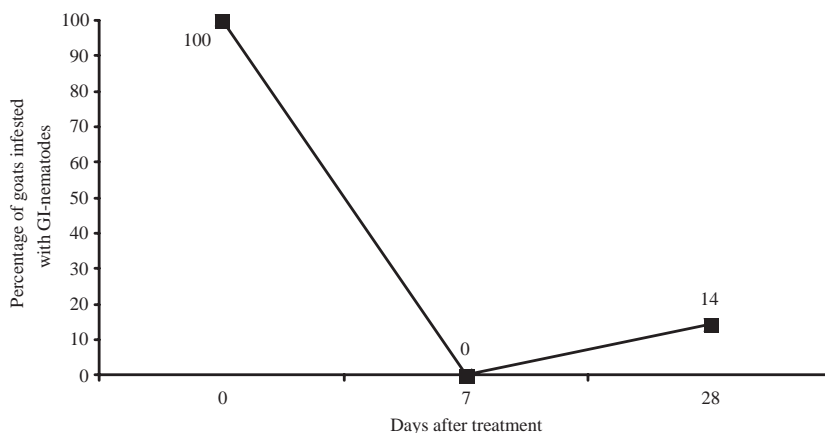


Figure 4 Reduction of percentage of goats infested with gastrointestinal nematodes during the first 28 days after albendazole treatment.

Table 1 Packed cell volume (PCV) and plasma protein (PP) concentration of 27 beef cattle and 21 goats at 0, 28 and 56 days after treatment with albendazole. Data are expressed as mean \pm SD. Means in rows with different superscript letters are significantly different ($P < 0.05$).

Parameter	Days after treatment			Standard value ^{1/}
	0	28	56	
Beef cattle (n = 27)				
PCV (%)	32.2 ± 4.2 ^a	34.7 ± 6.0 ^b	34.3 ± 3.8 ^b	24.0, 46.0
PP (g/dl)	8.36 ± 0.5 ^a	8.67 ± 0.5 ^b	8.40 ± 0.5 ^a	4.0, 12.0
Goat (n = 21)				
PCV (%)	24.1 ± 5.2 ^a	31.6 ± 4.1 ^b	ND ^{2/}	22.0, 38.0
PP (g/dl)	7.1 ± 0.9 ^a	7.2 ± 0.7 ^a	ND ^{2/}	4.0, 13.0

^{1/} Standard values are from Radostits *et al.* (1994) and are expressed as minimum and maximum.

^{2/} Not determined.

CONCLUSION

Gastro-intestinal nematodes still have an impact on health of ruminants. Low PCV and possibly low PP concentration would result in poor health status of ruminants infested with gastro-intestinal nematodes, which would eventually lead to lower production. In this study, albendazole (Albezol®, 11.25% wt/vol) at a dosage of 10 mg/kg of body weight was proved to have a satisfactory efficacy in treatment and control of gastro-intestinal nematodes in ruminants, particularly in a herd with no history of albendazole uses.

ACKNOWLEDGEMENTS

The authors acknowledge the help of all animal care-takers who helped restraining all animals during the study. The authors also thank Union Drug Laboratories, Ltd. for providing albendazole (Albezol®) used in this study.

LITERATURE CITED

- Dayan, A.D. 2003. Albendazole, mebendazole and praziquantel. Review of non-clinical toxicity and pharmacokinetics. **Acta Trop.** 86: 141-159.
- Githigia, S.M., S.M. Thamsborg, W.K. Munyua and N. Maingi. 2001. Impact of gastrointestinal helminths on production in goats in Kenya. **Small Ruminant Res.** 42: 21-29.
- Perry, B.D. and T.F. Randolph. 1999. Improving the assessment of the economic impact of parasite disease and of their control in production animals. **Vet. Parasitol.** 84: 145-168.
- Petrie, A. and P. Watson, 1999. **Statistics for Veterinary and Animal Science.** Blackwell Science Ltd., Oxford, United Kingdom. 243 p.
- Radostits, O.M., D.C. Blood and C.C. Gay. 1994. **Veterinary Medicine : A Textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses.** Bailliere Tindall, London. United Kingdom. 1763 p.
- Rukkamsuk, T., T. Krajangjam, P. Tiaw-yin, S. Asawakitipong and S. Sontipun. 2001. Study on gastro-intestinal nematodes of heifers raised in small holder farms in Kampangsae and Nong-Po regions, pp. 573-576. *In The Proceedings of 39th Kasetsart University Annual Conference.* Kasetsart University, Bangkok.
- Rukkamsuk, T. and J. Krajsysri. 2002. A field study on efficacy of ivermectin against gastro-intestinal nematodes in ruminants, pp. 322-328. *In The Proceedings of 40th Kasetsart University Annual Conference.* Kasetsart University, Bangkok.
- Sangvaranond, A. 1998. **Veterinary Clinical Parasitology.** Kasetsart University Press, Bangkok, Thailand. 412 p.
- Terrill, T.H., R.M. Kaplan, M. Larsen, O.M. Samples, J. E. Miller and S. Gelaye. 2001. Anthelmintic resistance on goat farms in Georgia: efficacy of anthelmintics against gastrointestinal nematodes in two selected goat herds. **Vet. Parasitol.** 97: 261-268.
- Torres-Acosta, J.F.J., U. Dzul-Canche, A.J. Aguilar-Caballero and R.I. Rodrigues-Vivas. 2003. Prevalence of benzimidazole resistant nematodes in sheep flocks in Yucatan, Mexico. **Vet. Parasitol.** 114: 33-42.
- Waruiru, R.M. 1997. Efficacy of closantel, albendazole and levamisole on an ivermectin resistant strain of *Haemonchus contortus* in sheep. **Vet. Parasitol.** 73: 65-71.
- Williams, J.C., A. DeRosa, Y. Nakamura and A.F. Loyacano. 1997. Comparative efficacy of ivermectin pour-on, albendazole, oxfendazole and fenbendazole against *Ostertagia ostertagi* inhibited larvae, other gastrointestinal nematodes and lungworm of cattle. **Vet. Parasitol.** 73: 73-82.