

## COMPARATIVE EFFICACY OF SOME HERBAL AND SYNTHETIC ANTHELMINTICS *vis-a-vis* INCREASED MILK PRODUCTION IN COWS WITH GI NEMATODIASIS

P. DEBBARMA, M.L.V. RAO, KABITA ROY\* and P.C. SHUKLA

Department of Veterinary Medicine, College of Veterinary Science and Animal Husbandry  
The Nanaji Deshmukh Veterinary Science University, Jabalpur-482 001, India

Received: 03.04.2014; Accepted: 03.06.2014

### SUMMARY

This study was aimed to investigate the anthelmintic potency of two traditional herbal products, 'Kalajira' (*Nigella sativa*) and 'Gatran' (*Caesalpinia crista*) against the synthetic anthelmintics, ivermectin and oxfendazole in a privately owned peri-urban dairy unit. The comparative biological response in terms of quantitative reduction in the internal worm load i.e. eggs per gram faeces concomitant with increased daily milk production with improved (fat %) in naturally acquired gastro-intestinal nematode infections (*viz.* *Strongyles* and mixed infections of *Strongyles* and *Strongyloides spp.*) in cows was systematically evaluated. It was found that besides anthelmintic potency, 'Kalajira' dry seed powder is also endowed with a remarkable lactogenic property.

**Key words:** GI nematodiasis, cows, anthelmintics, milk production.

Gastro-intestinal (GI) parasites challenge the health status and productivity in lactating cows and inflict considerable cumulative economic losses to dairymen around the world. Immature larval stages may be the primary culprit, the ultimate damage is often contingent on completion of the parasitic developmental stages inside the host tissues (Soulsby, 1982).

With anthelmintic therapy of levamisole (Block *et al.*, 1987), eprinomectin (Gibbs *et al.*, 2005), and fenbendazole (Sahoo *et al.*, 2003), a consistent increase in milk yield was observed, albeit, this was variable. Improved milk quality, in terms of enhanced fat and protein per cent was also ensued following eprinomectin treatment (McPherson *et al.*, 2001). This paper describes the comparative efficacy of chemical anthelmintics such as ivermectin and oxfendazole with that of phytoanthelmintics of indigenous plants origin such as *Nigella sativa* 'Kalajira' and *Caesalpinia crista* 'Gatran' dry seeds particularly in relation to improved milk production in cows, naturally infected with parasitic GI nematodes.

A total of 24 indigenous non-descript lactating cows in the Dayodaya Trust Goushala in Tewar village near Jabalpur, M.P. with established worm load of GI nematodes, mainly *Strongyles*, or mixed infection of *Strongyles* and *Strongyloides* were randomly distributed into four equal treatment groups, each comprising of six animals. Animals of groups T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> received ivermectin bolus @ 200 µg/ kg b. wt. as a single oral

dose, *N. sativa* dry seed powder @ 50 mg/ kg b. wt. once a day orally for three consecutive days, oxfendazole @ 5 mg/ kg b. wt. single dose orally and *C. crista* dry seed powder @ 50 mg per kg b. wt. once a day orally for three consecutive days, respectively. Six indigenous lactating cows apparently healthy and worm-free with zero eggs per gram faeces (EPG) count served as the control group (T<sub>5</sub>). Daily milk yield of each cow and the milk quality parameters *viz.* fat, protein, lactose and solid not fat (SNF %) were determined with a Lactoscan on day 0 (pre-treatment) and on days 15, 30, 45 and 60 post-treatment. The data were statistically analyzed with completely randomized design (Snedecor and Cochran, 1967).

In the present study, administration of different anthelmintics led to increase in the milk production at 60 days post-treatment as compared to controls. The milk production in groups T<sub>1</sub>, T<sub>3</sub>, T<sub>4</sub> as compared to group T<sub>5</sub> was higher, however, the increase was not statistically significant (Table 1). Oral feeding of *N. sativa* (T<sub>2</sub> group) led to significant increase in milk production as compared to T<sub>5</sub> group at 60 days post-treatment (Table 1) which could be attributed to its galactopoietic effect (Anjaria, 2002) and the response was at par/slightly higher than that recorded with oxfendazole. No comparable report is forthcoming in the published literature. Ali and Blunden (2003) reported anthelmintic efficacy of *N. sativa* against tape worms and *Oesophagostomum spp.* in sheep.

\*Corresponding author: kabitaroy\_59@yahoo.in

**Table 1**  
**Effect of anthelmintics on daily milk production in GI nematodiasis in cows**

Treatment	Milk production at different days				
	0	15	30	45	60
T <sub>1</sub> (Ivermectin)	2.52 <sup>de</sup> (3.95)	2.50 <sup>de</sup> (4.35)	2.51 <sup>de</sup> (4.23)	2.56 <sup>de</sup> (4.04)	2.59 <sup>ede</sup> (4.09)
T <sub>2</sub> ( <i>Nigella sativa</i> )	2.85 <sup>abc</sup> (4.16)	2.86 <sup>abc</sup> (4.74)	2.86 <sup>abc</sup> (4.56)	2.88 <sup>ab</sup> (4.24)	2.91 <sup>a</sup> (4.28)
T <sub>3</sub> (Oxfendazole)	2.74 <sup>abcd</sup> (4.45)	2.76 <sup>abcd</sup> (4.19)	2.77 <sup>abcd</sup> (3.70)	2.78 <sup>abcd</sup> (3.59)	2.79 <sup>abcd</sup> (3.64)
T <sub>4</sub> ( <i>Caesalpinia crista</i> *)	2.61 <sup>bcdde</sup> (4.28)	2.56 <sup>de</sup> (4.41)	2.56 <sup>de</sup> (4.43)	2.60 <sup>bcdde</sup> (4.34)	2.61 <sup>bcdde</sup> (4.29)
T <sub>5</sub> (Control)	2.51 <sup>de</sup> (4.17)	2.52 <sup>de</sup> (4.17)	2.50 <sup>de</sup> (4.01)	2.43 <sup>c</sup> (4.04)	2.52 <sup>de</sup> (4.01)

\*Dry seed powder; Figures in parentheses represent the fat %. Different superscripts indicate significant difference at 5% level.

Ahmed *et al.* (2013) stated that among all the medicinal plants, *N. sativa* is emerging as a miracle herb. Since then, evidence based researches have revealed a wide spectrum of pharmacological action starting from immuno-modulatory to antimicrobial, anthelmintic, anti-inflammatory, gastroprotective and hepatoprotective effects. The therapeutic properties are mostly attributable to the presence of thymoquinone, a major chemical component of essential oil in the black seeds. In the present study, increased milk production in the group T<sub>2</sub> (Table 1) at the later stages of the clinical trial is, therefore, attributable to combined anthelmintic (EPG 0 on day 60) and galactopoietic effects of *N. sativa*.

*C. crista* seeds are used to treat asthma, fever, cough, headache, bowel upset and as an anthelmintic (Nadkarni and Nadkarni, 1976; Satiyavati *et al.*, 1976). Jabbar *et al.* (2007) reported that this plant possessed anthelmintic property against *Haemonchus contortus* both *in vitro* and *in vivo*.

The response with oxfendazole in this study was similar to the findings of Gross *et al.* (1999). The average milk fat % in cows belonging to the control group of healthy cows (T<sub>5</sub>) was 4.17. The value of the milk quality parameter in the cows with naturally acquired GI nematodiasis showed an early rising trend, though not statistically significant following oral administration of ivermectin (T<sub>1</sub>) or *N. sativa* (T<sub>2</sub>). This observation is consistent with the earlier reports (Gross *et al.*, 1999; McPherson *et al.*, 2001). However, Gibbs *et al.* (2005) did not observe any noteworthy increase in milk fat % following anthelmintic therapy. Variable impact on microbial volatile fatty acids (VFA) biosynthesis in different micro-environments may be responsible, at least in part. This may be corroborated in future trials. Pre-treatment values of other milk quality parameters, namely total protein, lactose and SNF % did not vary significantly *versus* the corresponding control (T<sub>5</sub>) value.

## REFERENCES

- Ahmad, A., Hussain, A., Mujeeb, M., Khan, S.A., Najmi, A.K., Siddique, N.A., Damanhour, Z.A. and Anwar, F. (2013). A review on therapeutic potential of *Nigella sativa*: A miracle herb. *Asian Pac. J. Trop. Biomed.* **3**: 299-305.
- Ali, B.H. and Blunden, G. (2003). Pharmacological and toxicological properties of *Nigella sativa*. *Phytother. Res.* **17**: 299-305.
- Anjaria, J. (2002). Inventory of Traditional Veterinary Medicinal Practices. Government of India, Ministry of Agriculture Publication, New Delhi, pp. 245-442.
- Block, E., McDonald, W.A. and Jackson, B.A. (1987). Efficacy of levamisole on milk production of dairy cows: A field study. *J. Dairy Sci.* **70**: 1080-1085.
- Gibbs, M.J., Hackle, C.A. and Forbes, A.B. (2005). Effects of sequential treatment with eprinomectin on performance and grazing behavior in dairy cattle under daily paddock stocking management. *Vet. Parasitol.* **133**: 79-90.
- Gross, S.J., Ryan, W.G. and Ploeger, H.W. (1999). Anthelmintic treatment of dairy cows and its effect on milk production. *Vet. J.* **49**: 106-110.
- Jabbar, A., Zaman, M.A., Iqbal, Z., Yaseen, M. and Shamim, A. (2007). Anthelmintic activity of *Chenopodium album* (L.) and *Caesalpinia crista* (L.) against trichostrongylid nematodes of sheep. *J. Ethnopharmacol.* **114**: 86-91.
- McPherson, W.B., Gogolewski, R.P., Slacek, B., Familton, A.S., Gross, S.J., Maciele, A. and Ryan, W.G. (2001). Effect of a periparturient eprinomectin treatment of dairy cows on milk production. *New Zealand Vet. J.* **49**: 106-110.
- Nadkarni, K.M. and Nadkarni, A.K. (1976). Indian Materia Medica. Popular Prakshan, Bombay.
- Sahoo, N., Mohanty, T.N., Ray, T.K., Rao, S.V. and Mallik, B. (2003). Effect of fenbendazole on milk production in cows with nematodiasis. *Indian J. Anim. Sci.* **73**: 1051-1052.
- Satiyavati, G.C., Raina, M.K., Sharma, M. (1976). Medicinal Plants of India. Indian Council of Medicinal Research, New Delhi.
- Snedecor, G.W. and Cockran, W.G. (1967). Statistical Methods. (6<sup>th</sup> edn.), Iowa State University Press, Ames, Iowa.
- Soulsby, E.J.L. (1982). A Textbook of Helminths, Arthropods and Protozoa in Domesticated Animals. (7<sup>th</sup> edn.), Iowa State University Press, Ames, Iowa.