COMPARATIVE EFFICACY OF TWO DORAMECTIN TREATMENT SCHEMES WITH A CONVENTIONAL TREATMENT PROGRAM FOR THE CONTROL OF ENDO AND ECTOPARASITES OF CROSSBRED ZEBU CATTLE.

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SUMMARY: A study was conducted in a farm in the Southeastern Region of Brazil, in zebu crossbred growing cattle to evaluate the efficacy of two and three dose doramectin treatment schemes administered subcutaneously (s.c.) at a dose rate of 200 mcg/kg, compared to the farm routine program of three tetramisol doses (7.5 mg/kg, s.c.), three flumethrin doses (1 mg/kg, percutaneously) and three trichlorfon doses (10 mg/kg, s.c.). Criteria for comparisons included weight gain, nematode egg counts in feces, tick (*Boophilus microplus*) scores and live nodules of the tropical warble fly, *Dermatobia hominis*. Ninety-six crossbred zebu cattle aged between nine and 12 months were selected and randomly allocated to three treatment groups (T1, T2 and T3) of 32 animals each, based on body weight. Animals of group T1 were treated with two doses of doramectin, on days 0 and 61. Animals of group T2 received three doramectin doses on days 0, 61 and 124. Animals of group T3 were treated with tetramisol, flumethrin and trichlorfon on days 0, 61 and 124. After treatments, animals of each group were maintained in similar but separated paddocks throughout the experimental period of 365 days. Observations were conducted on day 0 and at approximately monthly intervals, when animals were weighed and parasite burdens evaluated. Doramectin treated groups at either two or three dose schemes showed a better parasite control than the Farm Program. This superior parasite control observed in animals treated with two or three doses of doramectin resulted respectively in 14.89 kg and 48.85 kg higher mean weight gain per animal during the 365 days studied, compared to the Farm program.

KEY WORDS: Doramectin, endo or ectoparasites, productivity, beef cattle, weight gain.

INTRODUCTION

The detrimental effect and economic impact of endo or ectoparasites on the productivity of beef cattle grazing on natural pastures is a matter of great concern among cattle owners and veterinarians. This subject has been focused in several papers published within the last decade (DRUMMOND, 1987, HORN, 1987; BIANCHIN & HONER, 1987; ENTROCASSO, 1987). In a review article, HONER & BRESSAN (1992) pointed out that more recently, parasite epidemiology, population dynamics and strategic treatments replaced the interest of Brazilian parasitologists formerly dedicated to parasite surveys and taxonomy.

The Brazilian territory spreads from 5° North latitude to 34° South latitude, covering an area of more than eight million square kilometers or 3,287,195 square miles. Within such an area there are several types of climates, different cattle breeds and management practices. This provides variable environments for the development of endo and ectoparasites, such as the common cattle nematodes, ticks (*Boophilus microplus*), horn flies (*Haematobia irritans*), tropical warble flies (*Dermatobia hominis*) and screwworm flies (*Cochliomyia hominivorax*). These parasites may be found associated or not, depending upon the ecological conditions or the time of the year. Recommendations for parasite control are, therefore, very difficult to be generalized. They should be based on epidemiological studies (LIMA *et alii*, 1980; MELO *et alii*, 1980)

and on the results of trials using specific treatment schemes for each different area (MELO, 1982; SOUZA *et alii*, 1985; ALVES-BRANCO *et alii*, 1995). A few years ago, when only products of narrow spectrum were available, in areas such as the Southeastern Region, cattle had to be periodically treated with an anthelmintic against roundworms, systemic larvicides against the tropical warble fly and an antitick compound. Moreover, some animals required individual treatment with topical larvicides when infested by cutaneous myiasis produced by the screwworm fly. After the advent of broad spectrum parasiticides, such as doramectin, a new compound obtained by biosynthesis of *Streptomyces avermitilis* (GOUDIE *et alii*, 1993), the control of those parasites can perhaps be simultaneously achieved with less treatments, reduction of labor and probably with better results.

This paper describes a field trial conducted with doramectin (DECTOMAX™ Pfizer Inc.) to evaluate the efficacy of two and three treatment schemes at the recommended therapeutic dose of 200 mcg/kg s.c., in comparison with a conventional routine program previously used in the farm for the control of endo- and ectoparasites in growing cattle.

MATERIALS AND METHODS

The study was conducted in a farm of beef cattle located near General Salgado, a small town at 20° 39'S and 50° 21' W in the State of São Paulo, Brazil. From a herd of crossbred zebu cattle, 140 non castrated males, 9-12 months old were chosen based on size and uniformity. Animals were identified in the left ear by white numbered ear tags and individually weighed. They were weighed again after two weeks. Animals in which the average of the two body weights did not increase at least 3 kg, were discarded. The final 96 yearlings selected were ranked in a merit order on the basis of live weights. They were allocated to three treatment groups, T1, T2, and T3, according to a table of random numbers. Color ear tags identifying the group were applied to the right ear.

Treatments: Treatments were administered to the different groups according to the following experimental design: Doramectin (DECTOMAX) injections were given s.c. at a dose rate of 200 mcg/kg to animals of group T1, on days 0 and 61, and to animals of group T2 on days 0, 61, and 124. Animals of group T3 were treated as per "local farm practice" with tetramisol (CITEC 30, 7.5 mg/kg, s.c.), flumethrin (BAYTICOL Pour-On 1%, 1 mg/kg, percutaneously) and trichlorfon (NEGUVON Injectable Solution, 10 mg/kg s. c.) on days 0, 61, and 124. Treatment T3 will be further designated in this paper as the "Farm Program". Table 1 summarizes the experimental design used in the study.

Table 1 - Doramectin Treatment Schemes Compared to Farm Program.

Treatment code	Treatment	Route	Treatment days	Nº of animals
T1 Ear tags: green	Doramectin (x2) 200 mcg/kg	Subcutaneous	0 and 61	32
T2 Ear tags: blue	Doramectin (x3) 200 mcg/kg	Subcutaneous	0, 61 and 124	32
T3 Ear tags: red	Flumethrin 1 mg/kg Trichlorfon 10 mg/kg Tetramisol 7.5 mg/kg	Percutaneous Subcutaneous Subcutaneous	0, 61	32

Grazing: Animals of the three groups were grazed on pastures of *Brachiaria decumbens* for 12 months in three similar but separated paddocks at a stocking rate of 0.7 animal units per hectare/ year. Paddocks capable of providing adequate nutrition for 32 animals during 12 months were chosen based on similarity in dry matter contents and pasture population. Paddocks were selected after a survey performed throughout the farm by an Agronomist specialized in pastures. Each paddock was provided with salt licks to supply adequate sources of Ca, P and trace minerals. Water was supplied ad libitum.

Clinical/laboratory observations: On day 0, individual fecal samples of the 32 animals of each group were collected before treatment, for nematode egg per gram of feces (e.p.g.) counts conducted by a modified Mc Master technique. Fecal samples were taken at approximately monthly intervals for the duration of the experiment. After egg counts were done, samples were pooled and incubated for coprocultures to find out the helminth genus by means of larval identification. At each observation day, clinical assessments of tick numbers were done on a sample of 20 animals randomly selected in each group. The number of fully engorged and semi-engorged female tick (*Boophilus microplus*) on the right side of each animal was estimated visually and recorded as scores of zero (0), one (1) or two (2). When no ticks were seen, a zero (0) score was recorded. When the number varied from one to six, the score one (1) was recorded. A score two (2) was registered when more than six (6) ticks were detected. Counts of live nodules of the tropical warble fly *D. hominis* were done on the same sample of 20 animals randomly selected in each group at each observation day. The number of live nodules was assessed visually on the dorsal and lateral surfaces of each animal and then recorded. The presence or absence of screwworm lesions (cutaneous myiasis), caused by the screwworm fly *Cochliomyia hominivorax* were also checked at each observation day. However, no cutaneous myiasis were found in any group at any time.

Weighing operations: Animals of each group were individually weighed, from the beginning to the end of the experiment, at approximately monthly intervals. The three groups were confined in corrals without feed or water the night before the weighing operation.

Statistical analysis: Data collected were analyzed by the Biometric and Information Services, Animal Health Group, Pfizer Inc. N.Y. Headquarters. Variables analyzed using analysis of variance (GLM in SAS) were: mean weight gain, geometric mean of warble nodules, geometric mean of tick scores and cumulative arithmetic mean of nematode egg counts in feces. The level of rejection of null hypothesis was set at 0.05.

RESULTS AND DISCUSSION

Weight gains: Table 2 shows that after 365 days, groups T1 and T2, treated with 2 or 3 doramectin doses, respectively, showed significantly ($p < 0.0005$) higher mean weight gains compared to group T3, treated with the Farm Program. Furthermore, group T2 showed a significantly higher ($p<0.0005$) mean weight gain than group T1. Cumulative weight gains in the three groups differentiate from each other in a progressive way, from the beginning to the end of the trial, as shown in Figure 1.

Table 2 - Mean body weight gains of zebu crossbred cattle in 365 days: Results obtained by two doramectin treatment schemes in comparison with a conventional treatment of tetramisol/flumethrin/ trichlorfon (Farm Program).

Groups	Treatments	Initial Mean Weight (kg)	Final Mean Weight (kg)	Mean Weight Gain (kg)
T1	Doramectin 2X	225.50	354.19	128.69[b]
T2	Doramectin 3X	225.16	387.81	162.65[c]
T3	Tetra/Flum/Tri*	224.94	338.74	113.80[a]

a, b, c Mean weith gain with different superscripts are significantly different ($p<0.0005$).

* Tetramisol/flumethrin/trichlorfon

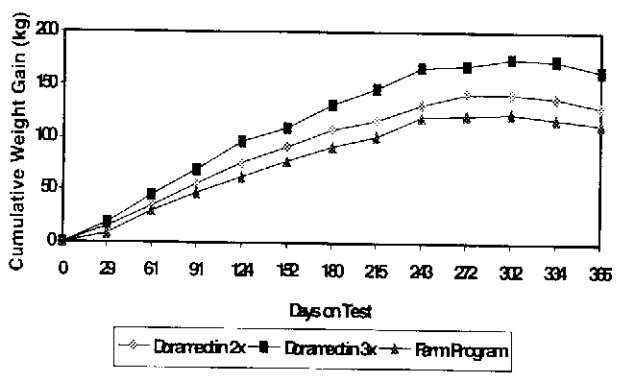

Figure 1 - Cumulative weight gains of cattle treated twice or three times with doramectin compared to cattle treated three times with tetramisol, flumethrin and trichlorfon.

The best cumulative weight gains were obtained by group T2 treated with 3 doses of doramectin, on days 0, 61, and 124, followed by group T1, treated with 2 doses of doramectin on days 0 and 61. The mean weight gains of groups T1 and T2 were 14.89 kg and 48.85 kg, respectively higher than those of group T3 as shown in Figure 2.

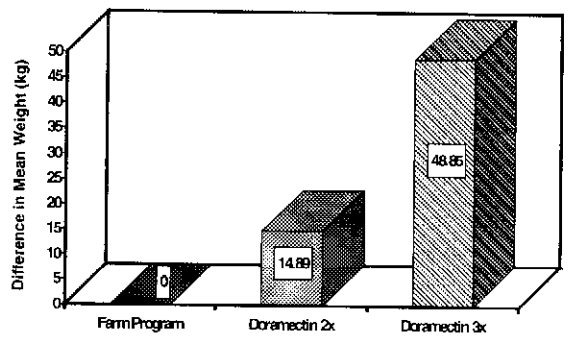

Figure 2 - Difference in mean weight gains of cattle treated twice or three times with doramectin compared to cattle treated three times with tetramisol, flumethrin and trichlorfon.

Nematode parasites: As shown in Figure 3, cumulative fecal egg counts of both doramectin treatments were smaller and significantly ($p<0.05$) different from those obtained with the conventional Farm Program. No statistically significant difference ($p>0.05$) was observed between two and three doramectin treatments, although from day 152 onwards, the two dose doramectin treatment had numerically higher cumulative e.p.g. counts.

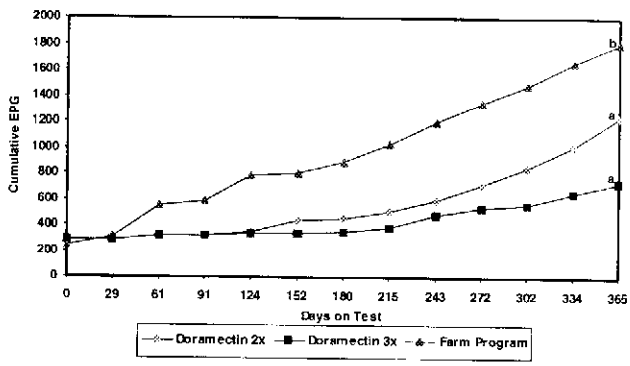

Figure 3 - Cumulative arithmetic mean number of nematode egg counts per animal treated twice or three times with doramectin compared to cattle treated three times with tetramisol, flumethrin and trichlorfon.

Results of coprocultures (Table 3) showed a prevalence of *Cooperia* spp. followed by *Haemonchus* sp. and *Trichostrongylus* sp.; *Oesophagostomum* sp. and *Bunostomum* sp. had minor incidence.

Table 3 - Percentage of helminth larvae recovered from coprocultures at each day on test.

Day on Test	*Cooperia* spp.			*Haemonchus* sp.			*Trichostrongylus* spp.			*Oesophagostumun* sp.			*Bunostomun* sp.		
	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
0	44	34	46	30	33	43	23	33	9	3	0	2	0	0	0
29	0	0	99	0	0	1	0	0	0	0	0	0	0	0	0
61	100	100	63	0	0	2	0	0	14	0	0	15	0	0	6
91	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0
124	100	92	20	0	4	21	0	4	18	0	0	39	0	0	2
152	100	0	98	0	0	0	0	0	0	0	0	2	0	0	0
180	87	100	52	4	0	29	1	0	8	8	0	11	0	0	0
215	41	100	31	51	0	32	6	0	25	0	0	9	2	0	3
243	72	98	25	11	0	40	4	1	33	6	1	2	7	0	0
272	68	99	58	26	0	30	5	1	8	0	0	3	1	0	1
302	20	100	20	56	0	34	11	0	31	10	0	15	3	0	0
334	40	80	62	51	0	24	0	16	10	9	4	4	0	0	0
365	71	68	66	20	18	14	7	13	14	2	1	6	0	0	0

The activity of doramectin against nematode infections of cattle was evaluated by JONES *et alii* (1993) and further confirmed in Brazil (BIANCHIN *et alii*, 1993; LIMA *et alii*, 1995).

Cattle tick (*Boophilus microplus*): Infestation scores in all three treatment groups were reduced after treatments and maintained at low mean levels (Figure 4). The small number of treatments restricted to a short period of the year, the genetic host resistance of the zebu crossbred cattle and the deficiency of the scoring system used to evaluate the tick burden, make the interpretation of these results difficult or even speculative.

Program some nodules have also been observed on day 124. A few nodules were seen again on the same group at day 365 but after such a long time the absence of infestation on other groups has no relationship with treatments. The mean number of nodules counted throughout the experimental period was too small for accurate statistical analysis. The therapeutic and persistent efficacy of doramectin against larval stages of *D. hominis* in cattle has been previously determined in Brazil (MOYA-BORJA *et alii*, 1993).

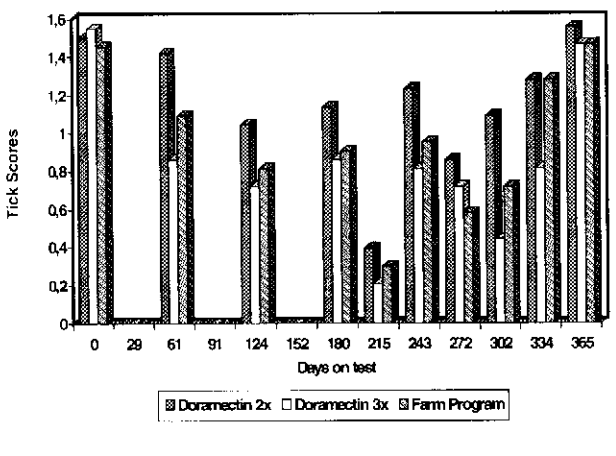

Figure 4 - Mean number of tick (*Boophilus microplus*) score per animal treated twice or three times with doramectin compared to cattle treated three times with tetramisol, flumethrin and trichlorfon.

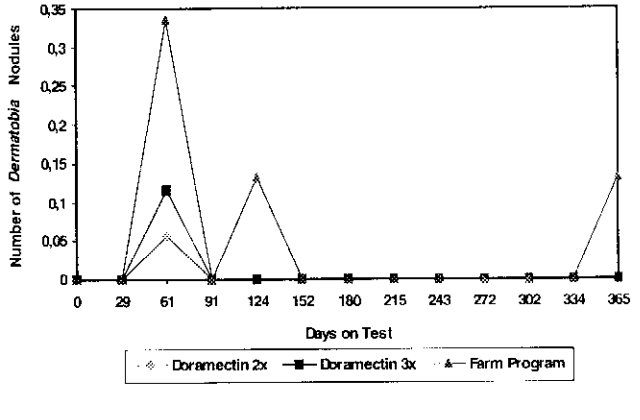

Figure 5 - Geometric mean number of *Dermatobia hominis* nodules per animal treated twice or three times with doramectin compared to cattle treated three times with tetramisol, flumethrin and trichlorfon.

Nodules of *Dermatobia hominis*: The mean number of nodules containing live larvae of the tropical warble fly *Dermatobia hominis*, is shown in Figure 5. Nodules were absent when the experiment started. At day 61, a small number of parasite nodules were observed in some animals of the three treatment groups. In the animals treated with the conventional Farm

Doramectin treatment at either two or three dose schemes showed a better parasite control than the routine Farm Program. This superior parasite control of two or three doses of doramectin resulted respectively in 14.89 kg and 48.85 kg higher mean weight gains per animal during the 365 days studied, compared to the Farm Program.

SUMÁRIO

Conduziu-se um estudo com gado de cruza zebu, em fase de crescimento, em uma fazenda da Região Sudeste do Brasil, para avaliar a eficácia de duas ou de três doses de doramectin administrado por via subcutânea na dosagem de 200 mcg/kg no controle parasitário comparado a um programa de rotina usado na fazenda (Programa da Fazenda) constando de três doses de tetramisol (7,5 mg/kg, subcutâneo), três doses de flumethrin (1mg/kg percutâneo) e três doses de trichlorfon (10 mg/kg subcutâneo). O critério para comparações incluiu ganho de peso, contagem de ovos de nematódeos por gramd de fezes, escores da infestação de carrapato (*Boophilus microplus*), e contagem de nódulos com larvas vivas da mosca do berne (*Dermatobia hominis*). Noventa e seis bovinos cruza zebu, com idade entre 9 e 12 meses, foram selecionados e alocados aleatoriamente com base no peso corporal a três grupos de tratamento (T1, T2 e T3) com 32 animais cada um. Os animais do grupo T1 foram tratados com duas doses de doramectin nos dias 0 e 61. Os animais do grupo T2 receberam três doses de doramectin nos dias 0, 61 e 124. Os animais do grupo T3 foram tratados com tetramisol, flumethrin e trichlorfon nos dias 0, 61 e 124. Após os tratamentos, os animais de cada grupo foram mantidos em pastos semelhantes, porém separados, durante todo o período experimental de 365 dias. Conduziram-se observações no dia 0 e a intervalos de aproximadamente 1 mes, quando os animais eram pesados e as cargas parasitárias avaliadas. Os grupos tratados com doramectin, tanto no esquema de duas como de três doses, mostraram um melhor controle parasitário do que o Programa da Fazenda. Este controle parasitário superior observado em animais tratados com duas ou três doses de doramectin resultou respectivamente em aumentos de 14,89 e 48,85 kg nas médias de ganho de peso por animal, durante o período estudado de 365 dias, em comparação com o Programa da Fazenda.

PALAVRAS - CHAVE: Doramectin, endo ou ectoparasitas, produtividade, gado de corte, ganho de peso.

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