

Treatment against monieziasis by suckling lambs deserves precedence versus trichostrongylosis under extensive conditions in Morocco.

L. Mahin*, Khadija Id Sidi Yahya** & M. Chadli**

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Summary

The present trial was aimed to compare efficiency of prevention of monieziasis (Treatment Programme 1, TP1) versus prevention of gastro-intestinal strongylosis (Treatment Programme 2, TP2) in suckling lambs as assessed by clinical appearance and growing performance.

Clinical observations and fecal egg counts were conducted on 397 three-month-old lambs born in the middle of the lambing season.

Clinical signs suggestive of gastro-intestinal parasitism were found in 59 lambs (14.9 percent) and 150 out of 213 analysed fecal samples (70.4 percent) contained eggs of *Moniezia*. The twelve farms involved in the trial were paired following similarities in husbandry conditions. Ninety lambs from the farms under TP1 were compared with 90 lambs from the farms under TP2, following similarities of weight and sex. In the farms under TP1, the lambs received a single dose of niclosamide, 80 mg/kg bodyweight (drug active against *Moniezia* only). In the farms under TP2, the lambs received a single dose of morantel tartrate, 8 mg/kg bodyweight (drug active against gastro-intestinal nematodes only).

Clinical symptoms, as assessed during two control visits carried out one and two month after the treatment, disappeared in farms under TP1 and increased in the farms under TP2. Eggs of *Moniezia* were no longer found in fecal samples of the flocks under TP1 whereas the percentage of animals with eggs of *Moniezia* stabilized in the flocks under TP2. Mean daily gains in the month following the treatment were 301 g in the flocks under TP1 and 128 g in the flocks under TP2. Mean daily gains in the next month were 178 g and 112 g in both groups, respectively.

These results suggest that, in the conditions under study, where gastro-intestinal strongylosis is controlled in the adult sheep, prevention of monieziasis must be regarded as the basis of the Herd Health Programme in the growing lambs.

Résumé

Le présent essai était destiné à comparer l'efficacité de la prévention de la moniéziase (Programme de Traitement N° 1, PT1) avec la prévention des strongyloses gastro-intestinales (Programme de Traitement N° 2, PT2) chez les agneaux à la mamelle, efficacité mesurée par l'apparence clinique et les performances de croissance.

Des observations cliniques et un comptage d'œufs dans les matières fécales ont été effectués chez 397 agneaux nés en milieu de saison d'agnelage; âgés de trois mois. Des signes cliniques évoquant le parasitisme gastro-intestinal furent découverts chez 59 agneaux (14.9 p. 100). Parmi les 213 échantillons de selles examinés, 150 (70.4 p. 100) contenaient des œufs de *Moniezia*.

Les douze fermes concernées par cet essai furent ensuite appariées en recherchant les conditions d'élevage similaires. Quarante-vingt-dix agneaux des fermes sous PT1 furent associés pour comparaison à 90 agneaux semblables au point de vue âge et sexe des fermes sous PT2. Dans les fermes sous PT1, les agneaux reçurent une dose unique de niclosamide à 80 mg/kg (produit actif uniquement sur *Moniezia*). Dans les fermes sous PT2, les agneaux ont reçu une dose unique de 8 mg/kg de tartrate de morantel (produit actif uniquement contre les strongles gastro-intestinales).

Les animaux ont été examinés cliniquement et des examens de matière fécale ont été effectués un et deux mois après le traitement. Les symptômes cliniques avaient disparu dès la première visite de contrôle dans les fermes sous PT1, alors qu'ils s'étaient amplifiés dans les fermes sous PT2. Le gain quotidien moyen dans le mois suivant le traitement fut de 301 gr par jour dans les fermes sous PT1 et 128 g/j dans les fermes sous PT2. Le gain quotidien moyen du mois suivant fut de 178 et 112 g/j, respectivement.

Ces résultats suggèrent que, dans les conditions de notre essai (prophylaxie des strongyloses gastro-intestinales effectué régulièrement chez les adultes), la prévention de la moniéziase reste la pierre angulaire du programme de guidance chez les agneaux en croissance.

Introduction

Production of weaning lambs in extensive conditions is a major animal industry in the Mediterranean area. In this region, with winter rainfalls and dry summer, the natural lambing period peaks on December-January, with a maximum sale of six-months-old weaning lambs in June-July (15). Production performances in this system can be rapidly improved by Herd Health and Production Control Programmes

including vaccination against enterotoxemia and sheep pox, and control of gastro-intestinal trichostrongylosis in the ewe (12), together with genetic up-grading based on introduction of selected rams of native breeds (3).

Clinical observations have showed that the benefit of the Herd Health and Production Control Programme can be jeopardized by gastro-intestinal parasitism in the growing lamb (the cash crop in this economy), where the most deleterious

* Clinique vétérinaire «Al Wiqaya» 25700 Sidi Smail, Morocco

** Department of Medicine and surgery of the ruminants, Institut Agronomique et Vétérinaire Hassan II, B.P. 6202 Rabat-Instituts, Morocco

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role was believed to be played by tapeworms (different *Moniezia* species). Therefore, in the choice of the antihelminthic treatment of suckling lambs, the activity on *Moniezia* should be emphasized, rather than the activity on gastrointestinal strongyles.

The present trial was designed to check that hypothesis.

Material and methods

The present study was conducted on 12 farms from four regions of Central Morocco: Gharb, Zaer, Zemmour, Coastal area. In the four regions, annual rainfalls range from 400 to 600 mm.

The farms under study had a traditional extensive management system. Farms with improved husbandry techniques like supplementation of the ewes and lambs, introduction of Merino rams, control of reproduction season were not included in this trial. Further details on reproduction, nutrition, and breed characteristics in the flocks under study are given elsewhere (6).

A general Herd Health and Production Control Programme was being carried out in the flocks since September 1982 (six months before the trial). It did not include any treatment of the lambs with a drug active against monieziasis.

The present study was conducted on 397 so-called «wasti» lambs. This vernacular refers to lambs born in the middle of the lambing season, viz. in December-January. The so-called «bikri» (early) and «maâzouzi» (late) lambs, (born at the beginning and at the end of the lambing season, respectively) received the same treatments as the «wasti» lambs but were not used for collection of data.

In February, and again in March 1983, the 317 lambs were submitted to clinical examination, with special regard to symptoms suggestive of monieziasis. Feces were collected from 213 animals, randomly sampled in the flocks, with a number of samples per flock 10 to 24, representing 30 to 100 percent of the population of «wasti» lambs. Fecal samples were analysed by the Mac-Master chamber counting method. A sample was considered positive for monieziasis if one egg was found at coproscopy.

In March 1983, the 12 farms were paired following characteristics of region, stocking rate, and general management and nutritional system.

All lambs of the flocks under Treatment Programme 1 (TP1) received an oral administration of niclosamide (Mansonil R Bayer) at the dose rate of 80 mg/kg. All lambs of the flock under Treatment Programme 2 (TP2) received an oral administration of morantel tartrate (Exhelm 2 R Pfizer) at the dose rate of 8 mg/kg.

The lambs were weighed by double weighing (weight of the manipulator carrying the lamb minus weight of the manipulator) by means of a home weigher. The sensitivity of the method (± 0.5 kg) and its reproductivity were considered sufficient for the present purpose. One hundred eighty lambs were paired (one lamb from the flock with TP1 versus one lamb of the paired flock with TP2 following similarities of sex and weight. This selection involved 10 to 20 lambs per flock, representing 22.7 to 100.0 of the population of «wasti» lambs in the flock.

The whole sampling procedure was designed for different zootechnical studies reported elsewhere (6).

The 180 selected animals were weighed the day of treatment. In April and May 1983 (i.e. about one and two months after treatment they were weighed again, and submitted to coprological examinations. The whole flock was clinically examined during those visits. No other treatment was carried out during that period.

Results

Clinical symptoms

Before the treatment, clinical signs suggestive of gastrointestinal parasitism (diarrhoea, retarded weight gain, anaemia, abdominal distention), and specific of monieziasis (excretion of tapeworm segments) were noticed in 59 out of the 397 examined lambs (14.9 p.100). After treatment, the clinical cases were very rare in the flocks under TP1 and increased in the flocks under TP2 (Table 1).

Coprological examinations

The results of the coprological examinations are given in Table 2. Increasing parasitic burden from February to March was evidenced by higher percentage of samples with eggs of *Moniezia*; higher percentage of samples with eggs of Trichostrongylidae and increased number of eggs of Trichostrongylidae per positive sample. Post-treatment results were in accordance with theoretical antihelminthic spectrum of both drugs used. Physical appearance of the feces showed a relationship between liquid aspect and positivity to *Moniezia*.

Growth performances

The Mean Daily Gains on the lambs from the flocks under TP1 and TP2 are given in Table 3. The Mean Daily Gain in the flocks under TP1 between 90 and 120 days (during the month following treatment) was 301 g per day, highly different from the performance of the flocks under TP2 (128 g per day). Between 120 and 150 days both groups had poorer performances, but the flocks under TP1 did better than the flocks under TP2 (178 and 112 g per day, respectively).

Discussion

The present results confirm the observations by Ouhelli and Dakkak (10) and Ouhelli and others (11), showing a high prevalence of *Moniezia* at post-mortem examination of tracer lambs on extensive conditions in different regions of Morocco. This parasite, which is considered to be harmless in certain areas (5) was shown to have a very deleterious effect on growth performances of suckling lambs under extensive conditions in Morocco (Mahin, unpublished data). The gravity of *Moniezia* infestation has been stressed by different authors, especially in hot climates like in Cuba (13), Ghana (9), Portugal (2) and Southern USSR (8).

The 100 percent efficiency of niclosamide on *Moniezia* infestation has been definitely established (2). A better growth following treatment with niclosamide has been observed by different authors (7,16) but it has rarely been quantified. In fact, Stampa (14) found growth rates of 110 g/day in treated animals and of 69 g/day in untreated animals. Those figures are comparable to the results of the present study.

It is worth noting that, in our conditions, monieziasis is far more

TABLE 1
Clinical signs of gastro-intestinal parasitism before and after treatment.

FLOCKS UNDER TP1 (1)						FLOCKS UNDER TP2 (2)					
Flock code	Number of lambs in the flock	Number (percentage) of sick lambs				Flock code	Number of lambs in the flock	Number (percentage) of sick lambs			
		before treatment		after treatment				before treatment		after treatment	
T1	44	3	(6.8)	0	(0.0)	T3	42	6	(14.3)	6	(14.3)
T2	66	4	(6.6)	0	(0.0)	T4	29	6	(20.7)	7	(24.2)
S1	16	2	(12.5)	0	(0.0)	S3	15	6	(40.0)	7	(46.7)
S4	31	2	(6.4)	1	(3.2)	S2	27	7	(25.9)	8	(29.6)
M1	15	4	(26.7)	0	(0.0)	M2	10	3	(30.0)	7	(70.0)
R1	68	8	(11.8)	0	(0.0)	R2	34	8	(23.5)	10	(29.4)
240		23	(9.6)	1	(0.4)		157	36	(22.9)	45	(28.7)

1 TP1: nicosamide 80 mg/kg (active on *Moniezia*)

2 TP2: morantel tartrate 8 mg/kg (not active on *Moniezia*)

TABLE 2
Coprological examination and physical aspect of feces of lambs before and after treatment.

Date	Approximate age of the lambs (months)	Relationship with treatment	Treatment	FECAL SAMPLES					
				Total	Number (percentage) positive to <i>Moniezia</i>	Number (percentage) positive to <i>Trichostrongylidae</i>	Mean egg count <i>Trichostrongylidae</i>	Number (percentage) of diarrhoeic feces	
February	2	One month before	0 (1)	213	85 (39.9)	38 (17.8)	81.6	6 (2.8)	
March	3	Just before	0	213	150 (70.4)	63 (29.6)	139.7	56 (26.3)	
April	4	One month after	TP2 (1)	90	54 (60.0)	1 (1.1)	0.5	36 (40.0)	
April	4	One month after	TP1 (1)	90	0 (0.0)	21 (23.3)	97.7	1 (1.1)	
May	5	Two months after	TP2	90	66 (73.0)	0 (0.0)	0.0	37 (41.1)	
May	5	Two months after	TP1	90	0 (0.0)	17 (18.9)	117.6	1 (1.1)	

(1) 0: Before treatment

TP2: Treatment with morantel tartrate, 8 mg/kg (not active on *Moniezia*, active on *Trichostrongylidae*)

TP1: Treatment with nicosamide, 80 mg/kg (active on *Moniezia*, not active on *Trichostrongylidae*)

TABLE 3
Growth performances of lambs in flocks under TP 1 and TP2 (1)

FLOCKS UNDER TP1						FLOCKS UNDER TP2						DIFFERENCES			
Code	Number of weighed animals	Mean Daily Gain (g)				Code	Number of weighed animals	Mean Daily Gain (g)				Mean Daily Gain (g)			
		90 to 120 days		120 to 150 days				90 to 120 days	120 to 15* days	90 to 120 days	120 to 150 days				
		\bar{x}	s	\bar{x}	s							\bar{x}	s	\bar{x}	s
T1	15	294	45.6	175	36.1	T3	15	162	52.1	107	38.9	133	39.0	70	33.9
T2	15	317	43.4	179	22.8	T4	15	117	35.8	101	34.4	193	52.3	78	25.6
S1	15	298	31.8	170	27.7	S3	15	125	33.2	77	38.8	173	38.2	92	24.2
S4	15	319	38.2	181	31.2	S2	15	108	35.9	138	43.3	211	51.9	43	18.3
M1	10	299	43.7	177	34.4	M2	10	190	36.1	84	30.0	109	37.9	93	33.0
R1	20	281	23.1	184	28.2	R2	20	99	20.9	142	37.4	183	31.9	42	13.0
Total	90	301(a)	37.6	178(c)	30.1		90	128(b)	35.6	112(d)	36.2	170	17.3	67	10.1

) TP1; TP2: See Table 1

), (b): significantly different for $p \leq 0.001$

), (d): significantly different for $p \leq 0.01$

deleterious for lambs growth than gastro-intestinal trichostrongylosis. The clinical symptoms observed in the sick lambs, including diarrhoea, were due to monieziasis and not to trichostrongylosis. Though gastro-intestinal strongyle worms were not controlled in the flocks under TP1 and controlled in the flocks under TP2 the difference in weight gain remained highly significant in the benefit of the group treated against monieziasis and not against trichostrongylosis. It must be born in mind that this conclusion applies to flocks where trichostrongylosis was controlled in the adult sheep.

Close relationship between diarrhoeic feces and positivity to *Moniezia* must be explained as follow: the presence of a single egg of *Moniezia* in the feces confirms the presence of at least one tapeworm in the intestine, whose pathogenicity easily explains diarrhoeic feces. Samples positive to Trichostrongylidae with egg counts rarely exceeding 500 eggs per g must be associated with subclinical infestation not leading to clinical diarrhoea.

The reduction of the Mean Daily Gain in the fifth month in comparison to the fourth month is another outstanding result of this study. The following factors might have caused that poor performance in the TP1 group: (a) re-infestation with *Moniezia*, not detectable at coprological examination because of the prepatent period of the parasite; (b) effect of gastro-intestinal strongyles; (c) effect of reduction of lactation in the ewe, resulting in a physiological weaning.

Conclusion and practical recommendations

From the present study, it can be stated that, at least in our conditions, the lambs should be treated with a drug active 100 percent against monieziasis at least once at three months of age. Further study is needed to state whether the reduced performance noticed in the fifth month of age can be improved by a second treatment in end April. When treated with niclosamide, lambs should be isolated in a yard and not have access to pasture during 24 hours. This prevents the shedding of a great number of tapeworm segments, and a subsequent heavy infestation of the pastures. Similarly, great attention should be paid to shedding of tapeworm segments following treatment of ewes or lambs with anthelmintics partly active against *Moniezia* spp, like fenbendazole (1). The high prevalence of monieziasis as we observed in the recent years might be an epidemiological side-effect of the increasing use of fenbendazole, which has become very popular in Morocco in the last decade.

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L. Mahin. Belgian Doctor in Veterinary Medicine (University of Liège), formerly teacher and researcher in the «Institut Agronomique et Vétérinaire Hassan II» in Rabat (Morocco) and head of the B.A.D.C. project «Ambulatory Clinic», presently veterinary practitioner in Sidi Smail, Morocco

Khadija Id Sidi Yahya. Moroccan Doctorate student in veterinary medicine, the present study was associated with her thesis. Presently doctor in veterinary medicine appointed at the Laboratory for Diagnosis of Rabies, Rabat, Morocco

M. Chadli. Moroccan Doctor in veterinary medicine, first associate teacher and researcher to the Project «Ambulatory Clinic», presently Ph.D. head of the department of medicine and surgery of the Ruminants in the «Institut Agronomique et Vétérinaire Hassan II» Rabat, Morocco.