Treatment against monieziaisis by suckling lambs deserves precedence versus trochostrongylousis under extensive conditions in Morocco.

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Keywords: Herd health programmes — Ovine species — Monieziaisis — Growth performances — Nicosamide — Morocco.

Summary

The present trial was aimed to compare efficiency of prevention of monieziaisis (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 nicosamide, 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 126 g in the flocks under TP2. Mean daily gains in the next month were 176 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 monieziaisis 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 monieziaisis (Programme de Traitement N° 1, PT1) avec la prévention des strongylosis 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’agelandage, âgés de trois mois. Des signes cliniques évocant 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 enquêtées en recherchant les conditions d’élevage similaires. Quatre-vingt-dix agneaux des fermes sous PT1 furent associés pour comparaison à 90 agneaux semblables au point de vue âgé et sexe des agneaux sous PT2. Dans les fermes sous PT1, les agneaux reçurent une dose unique de nicosamide 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 strongyles gastro-intestinaux).

Les animaux ont été examinés cliniquement et des examens de matières fécales 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 g par jour dans les fermes sous PT1 et 126 g dans les fermes sous PT2. Le gain quotidien moyen du mois suivant fut de 176 et 112 g, respectivement.

Ces résultats suggèrent que, dans les conditions de notre essai (prophylaxie des strongyloses gastro-intestinales effectuée régulièrement chez les adultes), la prévention de la monieziaisis 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 trochostrongylosis in the ewe (12), together with genetic upgrading 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

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role was believed to be played by tapeworms (different *Moniezia* species). Therefore, in the choice of the anthelmintic 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: Gharbi, 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 moniezia.

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 «maazouz» (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 monieziaasis. 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 monieziaasis 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 (Marsponil 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 reproducibility 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 these 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 monieziaasis (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 anthelmintic spectrum of both drugs used. Physical appearance of the faeces 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 of Ouahili and Darikak (10) and Ouahili 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 (6).

The 100 percent efficiency of niclosamide on *Moniezia* infestation has been definitively 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, Stärna (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, monieziaasis is far more
### TABLE 1
Clinical signs of gastro-intestinal parasitism before and after treatment.

<table>
<thead>
<tr>
<th>FLOCKS UNDER TP1 (1)</th>
<th>FLOCKS UNDER TP2 (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flock code</strong></td>
<td><strong>Number of lambs in the flock before treatment</strong></td>
</tr>
<tr>
<td>T1</td>
<td>44</td>
</tr>
<tr>
<td>T2</td>
<td>66</td>
</tr>
<tr>
<td>S1</td>
<td>16</td>
</tr>
<tr>
<td>S4</td>
<td>31</td>
</tr>
<tr>
<td>M1</td>
<td>15</td>
</tr>
<tr>
<td>R1</td>
<td>68</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>240</strong></td>
</tr>
</tbody>
</table>

1. TP1: niclosamide 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.

<table>
<thead>
<tr>
<th>Date</th>
<th>Approximate age of the lambs (months)</th>
<th>Relationship with treatment</th>
<th>Treatment</th>
<th>Total</th>
<th>Number (percentage) positive to <em>Moniezia</em></th>
<th>Number (percentage) positive to <em>Trichostrongylidae</em></th>
<th>Mean egg count Trichostrongylidae</th>
<th>Number (percentage) of diarrheic feces</th>
</tr>
</thead>
<tbody>
<tr>
<td>February</td>
<td>2</td>
<td>One month before</td>
<td>0 (1)</td>
<td>213</td>
<td>65 (39.9)</td>
<td>38 (17.8)</td>
<td>81.6</td>
<td>6 (2.8)</td>
</tr>
<tr>
<td>March</td>
<td>3</td>
<td>Just before</td>
<td>0</td>
<td>213</td>
<td>150 (70.4)</td>
<td>63 (29.6)</td>
<td>139.7</td>
<td>56 (26.3)</td>
</tr>
<tr>
<td>April</td>
<td>4</td>
<td>One month after</td>
<td>TP2 (1)</td>
<td>90</td>
<td>54 (60.0)</td>
<td>1 (1)</td>
<td>0.5</td>
<td>36 (40.0)</td>
</tr>
<tr>
<td>April</td>
<td>4</td>
<td>One month after</td>
<td>TP1 (1)</td>
<td>90</td>
<td>0 (0.0)</td>
<td>21 (23.3)</td>
<td>97.7</td>
<td>1 (1.1)</td>
</tr>
<tr>
<td>April</td>
<td>5</td>
<td>Two months after</td>
<td>TP2</td>
<td>90</td>
<td>66 (73.0)</td>
<td>0 (0.0)</td>
<td>0.0</td>
<td>37 (41.1)</td>
</tr>
<tr>
<td>May</td>
<td>5</td>
<td>Two months after</td>
<td>TP1</td>
<td>90</td>
<td>0 (0.0)</td>
<td>17 (18.9)</td>
<td>117.6</td>
<td>1 (1.1)</td>
</tr>
</tbody>
</table>

1. TP0: Before treatment.
2. TP2: Treatment with morantel tartrate 8 mg/kg (not active on *Moniezia*, active on *Trichostrongylidae*).
3. TP1: Treatment with niclosamide, 80 mg/kg (active on *Moniezia*, not active on *Trichostrongylidae*).

### TABLE 3
Growth performances of lambs in flocks under TP 1 and TP 2 (1)

<table>
<thead>
<tr>
<th>Code</th>
<th>Number of weighed animals</th>
<th>Mean Daily Gain (g)</th>
<th>Code</th>
<th>Number of weighed animals</th>
<th>Mean Daily Gain (g)</th>
<th>Mean Daily Gain (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90 to 120 days</td>
<td>120 to 150 days</td>
<td></td>
<td>90 to 120 days</td>
<td>120 to 150 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>x</td>
<td>s</td>
<td></td>
<td>x</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>15</td>
<td>294</td>
<td>T3</td>
<td>15</td>
<td>162</td>
<td>52.1</td>
</tr>
<tr>
<td>T2</td>
<td>15</td>
<td>317</td>
<td>T4</td>
<td>15</td>
<td>117</td>
<td>35.8</td>
</tr>
<tr>
<td>S1</td>
<td>15</td>
<td>288</td>
<td>S3</td>
<td>15</td>
<td>125</td>
<td>33.2</td>
</tr>
<tr>
<td>S4</td>
<td>15</td>
<td>319</td>
<td>S2</td>
<td>15</td>
<td>108</td>
<td>35.9</td>
</tr>
<tr>
<td>M1</td>
<td>10</td>
<td>299</td>
<td>M2</td>
<td>10</td>
<td>190</td>
<td>36.1</td>
</tr>
<tr>
<td>R1</td>
<td>20</td>
<td>281</td>
<td>R2</td>
<td>20</td>
<td>20.9</td>
<td>14.2</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>301</td>
<td>Total</td>
<td>90</td>
<td>128</td>
<td>35.6</td>
</tr>
</tbody>
</table>

1. TP1: See Table 1.
2. (a): significantly different for \( p < 0.001 \).
3. (b): significantly different for \( p < 0.01 \).
deleterious for lambs growth than gastro-intestinal trichos-
tronylosis. The clinical symptoms observed in the sick
lambs, including diarrhea, were due to moniezia and not
to trichosrylosis. Though gastro-intestinal strongyle
worms were not controlled in the flocks under TP1 and con-
trolled in the flocks under TP2 the difference in weight gain
remained highly significant in the benefit of the group trea-
ted against moniezia and not against trichosrylosis.

It must be born in mind that this conclusion applies to flocks
where trichosrylosis was controlled in the adult sheep.

Close relationship between diarrhoeic faces and positivity to
Moniezia must be explained as follow: the presence of a sin-
gle egg of Moniezia in the faces confirms the presence of at
least one tapeworm in the intestine, whose pathogenicity
easily explains diarrhoeic faces. Samples positive to Tricho-
srylosides 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 becau-
se 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 moniezia 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 moniezia 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 Moroc-
co in the last decade.

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Literature

1. Cabaret J., Ouhelli H., Dakkak A. 1979. Efficacité comparée du fen-
bendazole et du tétramisole sur les helminthes parasites du mouton
au Maroc. II Helminthes parasites du mouton. Rev. Méd. Vét. 155,
765-769.

2. Carvalho Valera M., 1974. A monieziose dos ovinos e o seu controlo
Revista Portuguesa de Ciencias Veterinarias, 64, 46-53.

ovines au Maroc. Résultats de six années de travail sur des troupeaux

miques, Gembloux.

et leurs incidences sur la pathologie humaine T. fasc. 1 Vigot Fré-
ros, Paris.

6. Id Sidi Yahiya Khadjja, 1983. Contribution à l'établissement de pro-
grammes de guidance vétérinaire des élevages extensifs ovins et
poules de monieziose. Thèse de doctorat vétérinaire, Rabat.

farms from anoplocephalosis of sheep Veterinarnya (Moscow) 10,
29-31.

8. Lyashchenko I.S., Tepov O.V., 1974. Monieziais in the southern repu-
blics of USSR Byulleten vitemsoychnogo Instituto Gli minkologhi Skrya-
binax 14, 34-36.

of Agricultural Sciences, 6, 1, 3-7.


11. Ouhelli H., Benzaouia T., Pandey V.S., Dakkak A., 1981. Etude épi-
démiologique de certaines vermineuses du mouton au Maroc atlanti-
que par l'utilisation de la méthode des animaux traceurs. Rev. Elev.

with fenbendazole during pregnancy and lactation in a Mediterranean

13. Prieto R., 1971. Efica de la niclosamida en el tratamiento de la monie-
zia en ovinos y ovinos jóvenes. Revista cubana de Ciencias vet-
erinarias, 2, 69-75.

Leverkusen, 1, 81-85.

Homme, Terre et Eau, 4, 15-25.

soni R dans les tenalis et les helmintiases du mouton. Informations de

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