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# Alternative treatments in the control of psoroptic mange in a sheep flock under organic production conditions

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**Abstract.** The aim of the experiment was to verify the efficacy of the treatment of psoroptic mange in a flock of Churra sheep farmed under organic production conditions, using alternative methods. One group, C Control (N=9), was given no treatment, a second group, TAH Antihomotoxic (N=10), was intramuscularly administered an antihomotoxic preparation every two days, thus receiving a total of seven injections over a two-week period. The third group, TCI Citronella (N=10), was topically administered a 1% solution of 50% essential *Citronella Java* oil and 50% Potassium Soap twice daily, in each milking, during the two-week period. A fourth group, TCIT Citronella+Thymol (N=10), was topically administered Citronella with 1% mother tincture of Thymol to boost the acaricide activity. The results obtained were analysed by ANOVA for scores and improvement of lesions. At the end of the experiment, TCI and TCIT showed significantly fewer lesions ( $P<0.05$ ) than the control group and TAH, no differences being detected between the latter two groups. Improvement was significantly higher ( $P<0.05$ ) in TCI (45%) and TCTT (48%) in comparison with the control group, which only showed 3% improvement. TAH improved by 30% ( $P<0.05$ ) in comparison with the control group. There were no significant differences between TCI and TCIT. In conclusion, treatment with essential Citronella Java oil and potassium soap can be used as an alternative to conventional methods to control psoroptic mange.

**Keywords.** Sheep – Psoroptic mange – Essentials oils – Homeopathy.

## **Des thérapies alternatives contre la gale psoroptique testées sur un troupeau de brebis biologiques**

**Résumé.** L'objectif de l'expérience a été de prouver l'efficacité d'un traitement alternatif de la gale psoroptique sur un troupeau de brebis de race Churra, une race autochtone de Castille-León (Espagne) en conditions d'élevage organique. Au premier groupe, lot témoin appelé TC Control (n=9), aucun traitement n'a été administré. Au second lot, appelé TAH Antihomotoxique (n=10), des injections de trois préparations antihomotoxiques ont été effectuées, par voie intramusculaire, un jour sur deux. Ces injections ont été administrées pendant deux semaines, ce qui donne un total de sept injections. Au troisième lot, dénommé TCI Citronelle, a été appliqué à chaque traite, deux fois par jour, durant les deux semaines qu'a duré l'expérience, un traitement topique, dilué à 1% avec un mélange contenant 50% d'huile essentielle de citronnelle et 50% de savon de potassium. Au quatrième lot, dénommé TCIT Citronelle + Thymol (n=10), a été administré le traitement topique à base de Citronelle plus de la teinture mère de Thymol, à une teneur de 1%, ajoutée afin de renforcer l'action acaricide de ce traitement. Les résultats ainsi obtenus ont été analysés à l'aide du programme de test statistique ANOVA afin d'évaluer l'amélioration des lésions. A la fin de l'expérience, les brebis ayant reçu les traitements TCI ou TCIT présentaient des lésions significativement moins importantes ( $P<0,05$ ), en comparaison avec le lot témoin et le lot TAH. Toutefois, ces deux derniers lots ne présentaient pas de différences. Dès le début de l'expérience, l'amélioration a été nette, ( $P<0,05$ ), dans les lots ayant subi le traitement TCI ou le traitement TCIT: les taux d'amélioration ont atteint, respectivement, 45 et 48% alors que celui du lot témoin n'a atteint que 3%. Le lot qui a reçu le traitement TAH a, quant à lui, atteint un taux d'amélioration de 30%. Les lots TCI et TCIT n'ont présenté aucune différence significative. En conclusion, le traitement à base d'huile essentielle de citronnelle de Java et de savon de potassium peut être utilisé comme un traitement alternatif au traitement conventionnel de la gale psoroptique.

**Mots-clés.** Brebis – Gale – Huiles essentielles – Homéopathie.

## I – Introduction

In recent years ecological production has evolved continuously, increasing annually by 20% from 1996, occupying over one million hectares and employing 25,000 people in Spain. As a result, new management and treatment practices that correspond with the spirit of regulation involved in the Certified ecological production are being developed. Ectoparasitic infections are usually a serious problem on ecological farms (Thamsborg and Roepstorff, 2003), though farmers are authorised to use allopathic substances once a year for the control of parasites (CEE, 2009). In England, for example, synthetic pyrethroids and macrocyclic lactones are permitted for the control of ectoparasitosis (McLean *et al.*, 2003). However, treatment based on alternative medicine is advantageous because it does not leave residues in animals.

No conclusive results have been obtained in previous experiments using homeopathic remedies in sheep (Bidarte *et al.*, 2003, 2004, 2007; Verlag, 2005). Nevertheless, essential oils have been used successfully to control parasitic mites (Sanchez, 2003) in Iberian ham and Varroasis in honey bees (Higes, 1996).

The following experiment was carried out to replace allopathic treatment used on conventional production farms by other methods, and to evaluate the efficacy of each test treatment.

## II – Materials and methods

### 1. Treatment

Three alternative treatments, TAH (Antihomotoxic), TCI (Java Citronella), TCIT (TCI+ Thymol) were used in the experiment. A fourth group, TC, was kept as the control and did not receive any treatment. The experiment lasted two weeks and controls of the process were carried out at three times, days 0, 7 and 14. The control group (TC) was formed by 9 sheep (n=9), and the treated groups by 10 animals (n=10) each.

Treatment TAH (n=10) consisted of intramuscular administration of an injection of a mixture of three preparations: 1.1 cc. Psorino Heel® (Psorinum D10, Medorrhinum D12, Sulfur D6, Thuja D6, Bufo D10, Natrium chloratum D12, Vaccinium D8, Bismutum kalium D5, Oleander D4, Cicuta virosa D5, Bacilinum D12), 1.1 cc Schewef Heel® ( Sulfur D4, Sulfur D6, sulfur D12, Sulfur D30, Sulfur D200) and 2.2 cc Cutis Heel® (Cutis suis D8, Hepar suis D10, Splen suis D10, Placenta suis D10, Glandula suprarenalis suis D10, Funiculus umbilicalis suis D10, Thuja D8, Galium aparine D6, Sellenium D10, Thalium sulfuricum D13, Ignatia D6, Sulfur D10, Corsisonumaceticumtum D13, Mercurius solubilis Hahnemanni D13, Aesculus D6, Ichthyolum D28, Ledum D4, Arctium lappa D6, Acidumformicum D198, Acidum  $\alpha$ -ketoglutaricum D10, Acidumfumaricum D10, Natrium axalaceticum D10). The choice of products was based on the indications of Verlag (2005) and Phinter-Heel (1993). A total of 7 injections were administered throughout the experiment, one every 48 h.

Treatment TCI (n=10) consisted of applying a topical solution of 50% essential Java Citronella oil and 50% potassium soap in each milking for two weeks, that is a total of 30 applications, according to references in Martins (2006) and Martins and Gonzales (2007) for Citronella and in Labrador *et al.* (2004) for potassium soap.

Treatment TCIT (n=10) was applied in the same way as the previously-mentioned one, but 1% Thymol mother tincture was added to the solution to enhance its acaricidal activity, as suggested by Bidarte *et al.* (2003).

## 2. Evaluation of the lesions

A linear scale of 1 to 9 was used to subjectively evaluate the extent and severity of the lesions. Three controls were carried out (on days 0, 7 and 14). Scores were given by two veterinarians according to the size and depth of the lesion.

## 3. Statistical analysis

Statistical analysis of the results was by the SAS program (2007). An ANOVA with one variation factor, treatment, was carried out. The dependent variables were *scores* and *improvement* of the lesions. The latter variable is the difference in scores between the different control days.

# III – Results and discussion

## 1. Effect of treatment on the psoroptic mange outbreak

Table 1 shows the characteristics of the *scores* variable on each control day. An overall decrease in lesions is observed, the score being 5.48 at the start of the test and 3.78 at the end. With regard to variability of the lesions, the score was normal on day 0 and increased noticeably by the end of the experiment, probably due to the efficacy of the different treatments.

**Table 1. Basic statistics of the scores**

Control day	Mean	SD	Minimum	Maximum	CV
Day 0	5.48	1.68	2	9	33.93
Day 7	4.53	2.12	1	8	46.90
Day 14	3.78	2.34	0	9	61.91

The analysis of variance for the *scores* given to the lesion was significant in the three stages of the experiment, even on day 0 before treatment had started. Table 2 shows a comparison of the means at each stage.

Although the sheep were randomly assigned to each group, we found significant differences between TAH and TCI and TCIT on day 0, when treatment had not yet started. These differences were due to randomisation.

**Table 2. Comparison of the means of the treatment effect for the scores variable, depending on the control day**

Treatment	N	Means $\pm$ se		
		Day 0	Day 7	Day 14
TC	9	6.00 $\pm$ 0.53 <sup>a,b</sup>	5.55 $\pm$ 0.60 <sup>a</sup>	5.61 $\pm$ 0.62 <sup>a</sup>
TAH	10	6.70 $\pm$ 0.53 <sup>a</sup>	5.70 $\pm$ 0.60 <sup>a</sup>	4.70 $\pm$ 0.62 <sup>a</sup>
TCI	10	4.70 $\pm$ 0.53 <sup>b</sup>	3.70 $\pm$ 0.60 <sup>b</sup>	2.60 $\pm$ 0.62 <sup>b</sup>
TCIT	10	4.60 $\pm$ 0.56 <sup>b</sup>	3.30 $\pm$ 0.63 <sup>b</sup>	2.40 $\pm$ 0.65 <sup>b</sup>

Different letters correspond to different groups.

The mean score on days 7 and 14 shows statistically significant differences between two treatment groups. Group TCI and TCIT in comparison with TC and TAH; no significant differences were found between treatments in the same group. Treatment with Citronella (TCI and TCIT) is apparently effective as the score decreased from 4.65 to 2.5 in the two-week period. If we compare these treatments with the control group, significant differences can be observed. However, these differences were already present at the start of the experiment, which makes their interpretation difficult. As for TAH, there were no differences when compared with the control, either at the start or end of treatment.

To interpret these results we will study the *improvement* of the lesions in comparison with when treatment started. The results of the comparison of the means with the *improvement* variable can be seen in table 3. During the first week, significant differences were only observed between the groups (TCI and TCIT) and the control group, a difference of 1.40 and 0.90 points in improvement, respectively, being obtained.

During the second week, we found significant differences in all the treatments applied, in comparison with the control group and no statistically significant differences between the 3 treatments. TAH obtained an improvement of 1.00 in comparison with the control, TCI 0.90 and TCIT obtained the highest difference of all the groups, with a score of 1.10.

A study of overall *improvement* between days 0 and 14 revealed significant differences between all the treatments and the control group. However, the most noticeable difference was observed for TCI, with a score of 2.30.

**Table 3. Comparison of the means of the treatment effect for the *improvement* of lesions variable, according to the control day**

Treatment	N	Means $\pm$ ee		
		Day 0-7	Day 7-14	Day 0-14
TC	9	0.44 $\pm$ 0.22 <sup>b</sup>	-0.05 $\pm$ 0.23 <sup>b</sup>	0.38 $\pm$ 0.33 <sup>b</sup>
TAH	10	1.00 $\pm$ 0.22 <sup>a,b</sup>	1.00 $\pm$ 0.23 <sup>a</sup>	2.00 $\pm$ 0.33 <sup>a</sup>
TCI	10	1.40 $\pm$ 0.22 <sup>a</sup>	0.90 $\pm$ 0.23 <sup>a</sup>	2.30 $\pm$ 0.33 <sup>a</sup>
TCIT	10	0.90 $\pm$ 0.22 <sup>a</sup>	1.10 $\pm$ 0.23 <sup>a</sup>	2.00 $\pm$ 0.33 <sup>a</sup>

Treatment with Java Citronella and Potassium Soap was effective in controlling this psoroptic mange outbreak as it obtained the best response. Results have been obtained against ticks and the general control of ectoparasites when this treatment was applied to the dorsal area in cows (Martins, *et al.*, 2007).

No significant differences were observed between TCI and TCIT, with added Thymol, although it was effective in comparison with the control group. In view of this result, the use of TCIT is not recommended.

The treatment in injectable form (TAH) obtained significant differences from the second week and had a similar result to the other treatments. We verified that the supposed action of Psorino Heel<sup>®</sup>, Schewe<sup>®</sup> Heel and Cutis Heel<sup>®</sup> proposed by Verlag (2005) and Phinter-Heel (1993) obtained a significant response in controlling a psoroptic mange outbreak in sheep. Nevertheless, generalised treatment in large animal populations is not easy as each animal has to be treated several times and this is very costly.

## IV – Conclusions

Treatment with Java Citronella oil and Potassium Soap obtained the best result in comparison with the other treatments applied, as better recovery from dermal lesions was observed. This is the treatment of choice because apart from the results obtained, it is easy to apply and economical.

This result shows that there is an alternative to the use of allopathic products for controlling ectoparasites, which although permitted by current regulations, are more costly and harmful to the environment and also produce residues.

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