

THE EFFICACY OF INJECTABLE IVERMECTIN FOR THE CONTROL OF SARCOPTIC MANGE IN PIGS.

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SUMMARY: Ivermectin given in a single subcutaneous dose of 300 µg/kg was tested for safety and efficacy against swine sarcoptic mange. Approximately 25% of the adult population in a breeding piggery showed clinical lesions of hyperkeratosis caused by sarcoptic mange. Ear scrapings were taken from 30 affected animals to provide parasite counts. Ten of 30 animals were used as untreated controls; all test animals were injected subcutaneously on Day 0 with ivermectin. Lesions began subside and pruritus to disappear as early as seven days after treatment. On Day 14, scratching stopped and mean ear mite count was reduced to zero in all treated animals. Control pigs showed persistent lesions and pruritus throughout the 28 days of the trial.

KEY WORDS: *Sarcoptes scabiei*, swine mange, treatment, ivermectin.

INTRODUCTION

Although scabies was mentioned in biblical times, it was only in the second half of the nineteenth century that medical authorities recognized *Sarcoptes scabiei* as the causative organism (PARISH, 1977). This is surprisingly for a mite that infests many different mammalian hosts distributed in 43 species, 7 orders, and 17 families (FAIN, 1968; ANDREWS, 1983).

Most human and animal cross-transmissions are probably self-limiting. Biological evidence indicates that there are physiological differences and large host specificity among scabies mites from different hosts (ARLIAN, 1989).

It has been affirmed that *Sarcoptes* had primate host origins and animal domestication presents itself the most likely form of sustained contact necessary to ensure cross-transmission (FAIN, 1968, 1978; ANDREWS, 1983). The first evidence of a domestic animal, a dog, is dated between 14,000 and 12,000 years ago (REED, 1984). Therefore, it is assumed that the dog was the first domestic animal to acquire scabies from humans. Otherwise, the first ungulates to become infested (also via domestication) were probably the sheep, followed by pigs around 9,000 years before present (REED, 1984; ANDREWS, 1983).

Nowadays sarcoptic mange in pigs has been reported in all major swine producing countries (LEE *et alii*, 1980) and is prevalent in Brazilian swine herds (LIGNON, 1985). In Brazil,

pigs are raised in all 26 states under many different systems of production, sizes of operation, combinations of housing facilities, and management techniques, which vary from simple to specialized, high-density confinement. Pasture and low-intensity production is still an important part of many systems, but as expansion takes place, high-density confinement production is becoming more of a necessity. Consequently, sarcoptic mange may be a serious problem as intensive production methods are practised.

The Brazilian swine herd, estimated to be 32 million head, the fourth in the world, produced 1.4 million tons of meat in 1995. Although Brazil is by far the largest producer of swine products in Latin America, at the moment it is ranked only the twelfth in the world concerning the production efficiency (ALBUQUERQUE, 1996). Even considering that is not yet possible to quantify exactly the economic losses caused by swine scabies in Brazil, studies have shown that growth rate and feed conversion were reduced by approximately 10% (CARGILL & DOBSON, 1979). For instance, annual losses from insects, ticks, and mites to the swine industry in the United States has been estimated at over \$100 million. Of this sum, \$30 million to mites, primarily the sarcoptic mange (WILLIAMS, 1985). This underlines the importance of eradicating the disease in swine.

Several world-wide insecticides/acaricides are available today for swine mange control as sprays, dips, oilers, dusts,

pour-ons, oral, parenteral, or bedding treatments (MARTINEAU *et alii*, 1984; WILLIAMS, 1985). Although their efficiency is well documented, sarcoptic mange still remains one of the major problems in swine production. Therefore, the present trial was conducted to evaluate the efficacy of injectable ivermectin (Altec™, Tortuga) given to pigs with natural infestation of *S. scabiei*.

MATERIALS AND METHODS

Animals, Case History, and Treatment: The trial was initiated on July, 1996, and was conducted for four consecutive weeks on a piggery at Pedra Bela, SP. Thirty adult Large White pigs were selected for mite sampling from a group of approximately 127 pigs, on the basis of clinical signs. The animals were individually identified by ear tattoo.

Sarcoptic mange infestation had been a chronic problem for the past three years and approximately 25% of the adult population, mainly primiparous/multiparous sows, were showing clinical lesions of hyperkeratosis. Prior to the trial, control of sarcoptic mange had been attempted using systemic organophosphates, as a pour-on treatment, but mange regularly relapsed.

Ten of the 30 experimental animals were used as untreated controls, placed side by side in individual tie-stalls and three empty stalls, on each side of this group, isolated them from the other pigs throughout the trial. Each one of the other 20 pigs in the trial, including all the breeding animals of the piggery, were confined to individual concrete walled pens in confinement buildings where direct contact between pigs was not allowed, and treated on Day 0. A single dose of ivermectin (300 µg/kg) was injected subcutaneously posterior to the base of the ear. The ten control animals remained untreated up to the end of the trial, at which time they were treated to avoid a subsequent infestation.

Clinical Signs and Parasite Counting Procedure: Sampled animals were identified as clinically positive when signs of pruritus were observed. Typical mange with lesions of hyperkeratosis was diagnosed mainly on the ears and/or the legs. A score index (MARTINEAU *et alii*, 1984) was used to determine the clinical significance of mange (Tables 1 and 2).

Skin scrapings were taken from the external meatus of the ear from each of the sampled animals on Day -7 of the trial. A scalpel blade was used to scrape an area of about 2cm² from each pig, preference being given to areas of incrustation, scaling or erythema. The scrapings were vigorous sufficient to draw blood. On Day 0 of the trial, ear scrapings were again obtained from all sampled animals, including those that by chance had been negative for mites on Day -7 of the trial.

Table 1 - Score index used to determine the clinical significance of sarcoptic mange in pigs

Score	Clinical Significance
0	No pruritus; no active lesion
1: Mild case	Pruritus; no lesions of hyperkeratosis due to mange
2: Moderate case	Pruritus; a few localized moderately thick dry grayish-white crusty lesions
3: Severe case	Intense pruritus: large, thick, grayish, rough dry crusts with coalescence of lesions
4: Advanced case	Intense pruritus: large, thick, grayish, rough dry crusts with coalescence of lesions; scabby areas loss of weight and constant scratching

Table 2 - Relationship between score index and live mite counts with distribution of lesions in pigs with natural infestation of *S. scabiei*

Group	Nº of animals	Distribution of hyperkeratotic skin lesions ^a		Mean score index	Average ear mite counts/cm ² ^a		
		Ear	Legs		Motile mites	Nonmotile mites	Mite eggs
1	15	1/15	12/15	3	>30	0.2 (0-2)	3.2 (0-15)
2	10	0/10	10/10	2	4.3 (0-22)	0.04 (0-2)	0.04 (0-1)
3	5	0/5	0/5	1	1 (0-9)	0	0

^a Although lesions were observed in areas other than the ears and/or legs, with the exception of two sows lesions on the legs were always accompanied by other lesions on the body.

^b Variation in brackets.

Scrapings were again taken on Days 7 and 21 from the left ear and on Days 14 and 28 from the right ear, allowing the mite population in one ear to remain undisturbed in most pigs for intervals of two weeks. Representative portions of the scrapings were placed in individual covered Petri dishes, mixed with 2ml of mineral oil and submitted to the laboratory where they were examined under a stereoscopic microscope. Petri dishes were warmed under a light before examination: motile, nonmotile mites and eggs were counted.

RESULTS AND DISCUSSION

The efficacy of ivermectin at 300 µg/kg against *S. scabiei* infestation in swine, as measured by average clinical evaluation and average live mite count per cm², is summarized in Table 3.

In the treated pigs, lesions began to subside within 7 days after medication and were almost absent on Day 14 after treatment. On the last day of the trial the ears of all pigs were smooth, silky and free of scabs. Pruritus began to disappear in this group from the seventh day onwards and on Day 14 scratching had stopped in all treated animals. At this time, control and treated animals were easily distinguished, once

Table 3 - Efficacy of ivermectin against *Sarcoptes scabiei* infestation in swine

Identification	N° animals	Average clinical evaluation (days)*					Average live mite count per cm²				
		0	7	14	21	28	0	7	14	21	28
Control	10 ^b	3.0	3.0	3.0	3.0	3.0	>30	>30	>30	>30	>30
Treated	15 ^b	2.8	2	- ^d	0	0	>30	4.0	0	0	0
	5 ^c	2.0	1.5	-	0	0	0	0	0	0	0

* Score index.

^b Ear mite count positive.^c Ear mite count negative.^d Lesions sometimes present, but dry and easy to remove; no pruritus.

the control pigs maintained lesions and pruritus throughout the 28 days after treatment.

An average count of > 30 live mites per pig's ear was recorded in the ten control animals and 15 of the treated animals before treatment. Two weeks later, although the mean ear mite count remained unchanged in the control group, it was reduced to zero in the treated group. Our results support the reports of LEE *et alii*, 1980, BORDIN & ABRAHÃO, 1982, ALVA-VALDES *et alii*, 1984 and MARTINEAU *et alii*, 1984, which demonstrated that ivermectin at single dose of 300 µg/kg was highly effective in reducing the number of *S. scabiei* mites in infested pigs, as assessed by mite populations and clinical signs.

Adverse local or general reactions were not observed in any of the pigs following the treatment or during the 28 days of the trial.

Before the trial, as previously noticed, approximately 25% of the animals, mainly the primiparous/multiparous sows, showed typical lesions of skin hyperkeratosis caused by mange. This apparent low percentage was surprising in view of the close contact between the animals. The fact that there was no clinical sarcoptic mange lesions neither in nursing piglets nor in nulliparous sows suggests that hyperkeratosis may be related to a dysfunction of the immune system (CARGILL & DOBSON, 1979; MARTINEAU *et alii*, 1987b). According to MARTINEAU *et alii*, 1987a,b, hyperkeratosis in pigs can be considered a particular form of mange that seems to resemble Norwegian scabies in man, which in swine may be secondary to a nutritional deficiency. It should be emphasized that excellent facilities and management conditions were found on the piggery used in his trial and, except for heavily infected sows, most animals were in good condition. Thus, although mange has often been described as a disease of poor management and has been considered to be more common in poorly fed pigs, it could also be seen in well-fed, well-managed swine herds.

In our experiment, some sows did not have ear lesions or a positive mite count in the ear (Table 2); however, they had extensive lesions on other parts of the body, particularly the hind legs. The fact that few live mites were observed in ears not showing lesions of hyperkeratosis may be helpful in the diagnosis of swine mange. Like COURTNEY *et alii*, 1983 and

MARTINEAU *et alii*, 1984, we also think that pruritus is a better indicator of common scabies infestation than mite recovery, especially in sows and in nursing piglets.

SUMÁRIO

A eficácia e a segurança de ivermectin injetável, na dosagem única de 300 µg/kg, foram avaliadas no controle da sarna sarcóptica suína com lesões de hiperqueratose. Aproximadamente 25% da população adulta de uma criação de suínos apresentava lesões de hiperqueratose. Com a finalidade de obtenção de ácaros para contagem, foram realizados raspados da orelha de 30 animais. No dia 0, administrou-se ivermectin, via subcutânea, em todos animais experimentais. Já no 7º dia pós-tratamento, observou-se início de regressão das lesões e do desaparecimento do prurido. No 14º dia, em todos animais tratados houve cessação do ato de coçadura e a contagem média dos ácaros na orelha foi reduzida a zero. Nos animais controles, as lesões e o prurido persistiram durante os 28 dias do experimento.

PALAVRAS-CHAVE: *Sarcoptes scabiei*, sarna suína, tratamento, ivermectina.

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