Efficacy of Ivermectin against Mange and Gastrointestinal Nematodes of Buffalo (*Bubalus bubalis*)


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ABSTRACT


The incidence of mange in dairy buffalo in India has increased significantly in recent years. The authors record an outbreak of mange affecting a dairy herd stocking about 30,000 buffalo and 1,000 cows. The mange mites were either *Sarcoptes scabiei* or *Psoroptes ovis*, or a mixed infestation of both. The morbidity rate was 5-30% varying from group to group, with 100% in a severely affected group. Signs noticed were progressive dermatitis, alopecia, keratinization, skin thickened and wrinkled, intense itching and marked loss of condition often ending in death.

Great losses of young animals from mange and gastrointestinal nematodes are very common in dairy herds in India. In view of their economic importance, the activity of ivermectin against naturally occurring mange and parasitic infections of adult buffalo and buffalo calves was determined. Ivermectin was administered by subcutaneous injection (IVOMEC 1% w/v – MSD AGVET) at a dose of 200 mcg kg⁻¹ body weight. The efficacy was ascertained from the disappearance of mites from skin scrapings and the reduction in numbers of worm eggs in the faeces.

The results of the treatment were dramatic: the mites disappeared within 2 weeks of the drug being administered in the majority of animals, with marked improvement in skin lesions. Four buffalo which had their entire body surface affected with mange needed a second dose on Day 28 for complete recovery. The effect on the nematodes was equally spectacular, with infections of *Neoascaris vitulorum*, Trichostrongylidae, *Oesophagostomum* spp. and *Bunostomum* being eliminated within 1 week of treatment.

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INTRODUCTION

The buffalo (*Bubalus bubalis*) is an economically important animal in India, Pakistan and south-east Asian countries as it provides milk and meat, and draft power for agriculture. Since the first limited survey conducted in 1952 revealed the occurrence of sarcoptic mange in 1.5% of 138 buffalo on a farm (Basu et al., 1952) the incidence of mange has been increasing. Recent successive surveys carried out at Hissar and the surrounding area recorded the occurrence of 82.2% sarcoptic mange in 85 buffalo calves (Srivastava and Chhabra, 1971) and 35.6% in 734 adult buffalo (Singh and Chhabra, 1973), 14.4% sarcoptic and psoroptic mange in 955 buffalo (Datt et al., 1978), 53% psoroptic mange in 667 buffalo (Maske and Ruprah, 1981) and 27.6% sarcoptic mange in 3075 buffalo calves (Tikka Ram and Ruprah, 1986). In 1984, the present authors investigated a severe outbreak of mange in a dairy herd stocking some 30,000 buffalo and 1000 cows at Haibowal — a region of Ludhiana (unpublished). They observed 5-30% animals in different groups affected with sarcoptic and/or psoroptic mange. In a closely herded group, all 32 buffalo were infested. Nooruddin et al. (1986) recorded a prevalence of 6.86% sarcoptic and 38.36% psoroptic mange in 9049 buffalo from Ludhiana and Haibowal dairy herds. Chakrabarti et al. (1981) reported an outbreak of sarcoptic mange affecting 53.4% of 440 buffalo at Calcutta. Shastri and Ghafoor (1974) at Parbhani reported the occurrence of psoroptic mange in 69.8% of 225 buffalo.

Losses of buffalo calves from mange (Bachan Singh, 1937 — cited by Griffiths, 1974) and gastrointestinal nematodes is a common experience in dairy and breeding herds in India.

When the lesions are extensive, often covering the whole of the body, and a large number of animals are involved, as in the 1984 outbreak in the Haibowal dairy herd (present authors, mentioned above), control of mange with topical applications of acaricides achieves limited success. Ivermectin (a macrocyclic lactone produced from *Streptomyces avermitilis*), which has been reported as a highly potent, broad-spectrum and systemic antiparasitic drug by several workers (reviewed by Campbell, 1985), was tested for control of mange and worms in buffalo. The results are reported in this article.

MATERIALS AND METHODS

*Animals*

Twenty buffalo (5–7 years old) and 20 buffalo calves (6–12 months old) showing typical lesions of mange confirmed by microscopic examination of the skin scrapings, were treated with ivermectin. In addition, 10 buffalo and 10 buffalo calves were kept as untreated controls.

The buffalo were of the Murrah breed, and the calves were either Murrah or
Nili-Ravi. The buffalo were treated on the premises of the dairy, and the buf-
falo calves were kept at the Punjab Agricultural University campus, except for
eight calves (four treated and four untreated) which were located on a govern-
ment farm at Gauhati, Assam.

All 30 buffalo and the 22 buffalo calves located at the university came from
the mange-afflicted herd at Haibowal mentioned in the Introduction. The ex-
periment began in 1984 and was concluded in 1985.

**Examination**

Skin scrapings of the animals were collected in wide-mouthed glass vials
containing 10% KOH and examined under a stereomicroscope for mange mites.
The mites were identified from their morphological characters.

Faecal samples obtained from the recta of individual animals were collected
in polythene bags. Eggs per gram of faeces (EPG) were determined with a
McMaster chamber. The ova of Trichostrongylidea and *Oesophagostomum* spp.
were identified as "strongyle"-type. Specific or generic identities of the worms
were determined from the specimens expelled in the faeces following treatment
with ivermectin.

After treatment, the animals were observed daily for clinical improvement
and for frequency of rubbing or scratching of the body. The faeces were ex-
amined at weekly intervals, and the skin scrapings were examined twice a week
for up to 4 weeks, except for those of the buffaloes which were observed for 8
weeks.

**Treatment**

The animals were treated once with ivermectin 1% injectable solution (IVO-
MEC cattle formulation – MSD AGVET) at 200 mcg kg⁻¹ body weight except
for the four most severely infested buffalo which were given a second dose 4
weeks after the first injection because a few live mites were detected in skin
scrapings of the partially healed lesions of some of them. The drug was injected
subcutaneously on the side of the neck.

**RESULTS**

**Pre-treatment findings**

The buffalo had extensive and severe lesions characterized by redness of the
skin, intense pruritus and progressive loss of hair. In advanced cases, the skin
was thickened, roughened and covered with scales and crusts. It had lost sup-
pleness and formed stiff folds over the neck. Skin over the limbs became thick,
hairless and sometimes oedematous. The animals rubbed against posts, cor-
ners and walls, and licked their skin vigorously, laying bare raw bleeding areas. Examination of sections of the skin showed hyperkeratinization.

Examination of the skin scrapings revealed *Sarcoptes scabiei* and *Psoroptes ovis* mites. The incidence varied from 5 to 30% in different sheds. In a severely affected group of 34 animals, morbidity was 100%. Clinical diagnosis was confirmed by microscopic examination of skin scrapings collected by random sampling of the animals in each group.

**Post-treatment findings**

No noticeable local reaction occurred in any animal. Twelve of the treated buffalo 6–8 months pregnant dropped normal calves.

**Effect on mange**

Five of the 20 treated buffalo with lesions over about 50% of the body surface showed a rare live mite in the skin scrapings on Day 10, but by Day 14 the mites had disappeared. The remaining 15 buffalo, which had severe lesions involving almost the entire body surface, were densely infested with the mites. After treatment, there was a progressive decrease in the number of mites found in the scrapings, but a few live mites were still present in the scrapings on Day 28 in four buffalo, which were subsequently given a second dose of the drug. This brought about rapid clinical improvement. By Day 49 no more live mites were observed in the skin scrapings. By Day 56, the lesions had almost completely healed, hair had grown over almost the entire body, and the skin became glossy and regained normal colour and texture.

In buffalo calves, no live mites were observed in the skin scrapings in any of the 20 calves, 1 week after treatment. Skin was still thickened, covered with scales and crusts, and was hairless on Days 10 to 14, but by Day 21 tremendous clinical improvement had occurred and rubbing of the body had stopped completely. The skin progressively regained its normal texture, appeared glossy and started to grow hair.

All of the 10 untreated buffalo and 10 calves had severe progressive lesions. Live mites and eggs were seen in their skin scrapings throughout the study. The skin became thicker and completely hairless and was covered with scales and crusts.

**Effect on gastrointestinal nematodes**

Data on the activity of ivermectin against the nematodes are given in Table 1.

Infections with ascarids, *Trichostrongylidae*, *Oesophagostomum*, *Strongyloides* and *Bunostomum* were completely eliminated as shown by the freedom
TABLE 1

Activity of ivermectin against gastrointestinal nematodes of buffalo and calves

<table>
<thead>
<tr>
<th>Parasite</th>
<th>Treated</th>
<th>Untreated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No animals</td>
<td>EPG Day 0</td>
</tr>
<tr>
<td>Strongylodes papillosus</td>
<td>20</td>
<td>600 ± 107</td>
</tr>
<tr>
<td>Trichuris spp</td>
<td>6</td>
<td>400 ± 115</td>
</tr>
<tr>
<td>Strongyle-type¹</td>
<td>16</td>
<td>1200 ± 85</td>
</tr>
<tr>
<td>Bunostomum phlebotomum</td>
<td>8</td>
<td>400 ± 115</td>
</tr>
<tr>
<td>Neoascaris vitulorum</td>
<td>7</td>
<td>1200 ± 180</td>
</tr>
</tbody>
</table>

¹Haemonchus spp, Trichostrongylus spp, Ostertagia ostertagi, Oesophagostomum radiatum
²As on Days 7, 14, and 21
³EPG on Days 7, 14, and 21 were about the same as on Day 28, the figures have been omitted for the sake of brevity
⁴Occasional egg detected on salt flotation

of the faeces from worm ova. The effect on *Trichuris* was less marked as a few ova were detected in faeces by salt flotation throughout the study. The effect on ascarids was spectacular as the buffalo calves passed large numbers of worms on Days 2 and 3. All the untreated control animals continued to pass ova throughout the period of observation.

**DISCUSSION**

Live mites were not observed in the skin scrapings 7 days after treatment with ivermectin, except in four severely and extensively infested buffalo which required a dose of the drug on Day 28 for complete elimination of the mites from the skin within 1 week. This observation with buffalo is similar to earlier reports for cattle which showed that one dose of the drug provided complete control of *Psoroptes ovis* but living mites were found on the animals up to 14 days after the treatment (Barth and Sutherland, 1980; Bailey et al., 1981; Pouplard and Detry, 1981; Meleney, 1982; Guillot and Meleney, 1984; Wright and Guillot, 1984). The results of the treatment of buffalo were spectacular: the extremely emaciated animals, which were suffering from an intense infestation of mites over almost the entire body, responded dramatically and recovered completely. They progressively regained normal colour and coat, and put on weight.

Mange is known to cause economic losses to cattle producers (Tobin, 1962; Clymer, 1978; Fisher and Wright, 1981). The present outbreak affected a large number of dairy buffalo and cows at Haibowal, inflicting heavy losses on their owners. Mange is a common occurrence in dairy herds of Indian cities, which
comprise thousands of high-yielding animals, mostly buffalo. The dairies are closely herded, providing ideal conditions for the transfer of mites as the animals continually rub against each other. The neglected calves are often decimated by mange. Topical application of chemicals in such dairy herds is neither advisable nor practicable. Thus treatment with one or two injections of ivermectin to eliminate mange is a distinct advance in the control of this highly contagious disease.

Ivermectin showed high activity against gastrointestinal nematodes as large masses of *Neoascaris*, *Oesophagostomum* and *Trichostrongylidae* mainly *Haemonchus* were passed in the faeces within 1 week of treatment. Thereafter, no worms or ova were detected in the faeces during the remaining 3 weeks of observation, whereas untreated animals continued to pass ova in undiminished numbers. This observation is in line with similar reports on infections in cattle (Benz and Ernst, 1979, 1981; Yazwinski et al., 1981; Niec et al., 1982).

The present observations comprise the second report on the use of ivermectin for control of parasites of buffalo, the first one was by Lau and Singh (1985) on its activity against the louse *Haematopinus tuberculatus*. As ivermectin is injectable, treatment is easy and less time consuming than topical application, and the dosage is independent of the animal’s food and water consumption. These attributes make it the ideal antiparasitic drug.

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REFERENCES


