

Comparative Efficacy of Different Treatment Regimens for the Management of Acute Footrot in Sheep of Kashmir Valley

Khadim Hussain Dar^{1*}, Mehrajuddin Naikoo², Abdul Hafiz² and Noori Alam Tufani²

¹Division of Veterinary Surgery and Radiology, Sher-e-Kashmir University of Agricultural Sciences and Technology, Kashmir-190006, India

²Veterinary Clinical Services Complexes, Faculty of Veterinary Sciences and Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology, Kashmir-190006, India

*Corresponding author: Khadim Hussain Dar, PhD Scholar, Division of Veterinary Surgery and Radiology, Sher-e-Kashmir University of Agricultural Sciences and Technology, Kashmir-190006, India, Tel: + 0194-2461271; E-mail: drkhadim23@gmail.com

Rec date: Jun 13, 2015; Acc date: Oct 02, 2015; Pub date: Oct 05, 2015

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Abstract

The present study was conducted to evaluate the comparative efficacy of different treatment regimens for the management of acute footrot in sheep. This study was conducted on 36 adult sheep of both sexes living at an altitude of 1800-2000 meters above sea level, aged between 2.49 ± 1.6 years and weighing 36.7 ± 0.9 kg. Footrot was diagnosed on the bases of physical and clinical analysis and then confirmed laboratorically. The animals were randomly divided into 3 equal groups. The animals of the 1st, 2nd and 3rd group were administered dicrysticin-SLDV @ 2.5 g/animal intramuscularly (IM), oxytetracycline @ 20 mg/kg body weight (b.wt) IM, and enrofloxacin @ 5 mg/kg b.wt. IM, respectively on the days 1st, 2nd and 3rd, besides this the animals in 1st and 2nd group were given melonex @ 0.2 mg/kg b.wt and esgipyrin-N @ 3 ml/animal IM for three days. Along with the above medications animals of all the groups were given 10% copper-sulfate footbath. The mean recovery time in days was shortest in group 2nd (3.03 ± 0.64) followed by group 1st (4.10 ± 0.31), and longest in group 3rd (4.48 ± 0.79) respectively. The mean \pm SE values of rectal temperature and ruminal motility showed significant ($p < 0.05$) differences. Therefore administration of parenteral antibiotics and analgesics in association with footbath is highly effective treatment for the footrot in sheep.

Keywords: Footrot; Small ruminants; Antibiotics; Analgesics; Footbath

Introduction

India ranks sixth in the world in sheep population with an estimated 61.5 million sheep [1]. Sheep farming is the main livestock industry in northern hilly areas of India, such as Kashmir, where it serves as a major source of income for poor, rural communities who farm sheep for mutton and wool [2]. Footrot is a highly contagious and economically important disease of small ruminants caused by *Dichelobacter nodosus*, slow growing anaerobic Gram-negative bacteria [3]. Some other organisms, *Fusobacterium necrophorum* in particular, play an important role in facilitating the development of footrot according to some authors [4] or increasing its severity according to others [5]. The disease is characterized by an exudative inflammation followed by necrosis of the epidermal tissues of the interdigital skin and hoof matrix, which results in separation of the hoof from the underlying soft tissue [6]. Affected animals exhibit lameness, loss of body condition, reduced production of wool and meat, and decreased fertility [7]. Lameness is usually the first sign varying from scarcely noticeable to severe in one or more feet followed by reddening of the interdigital tissue and swelling of the foot, causing spreading of the toes [8]. In the past few years footrot has become one of the biggest challenges for sheep farmers in Kashmir [9]. The main predisposing factors to footrot infection include muddy pastures, frequent rains and injury to feet [10] and other factors include low land farms, high stocking densities, winter housing, routine foot trimming, and inadequate treatment and failure to isolate the affected sheep [11]. Ansari et al. found that there are very few reports

worldwide about the efficacy of parenteral antibiotics for treatment of footrot, with almost no clinical trials conducted in India so far on the efficacy of parenteral antibacterial to treat footrot in sheep. The aim of the present study was to comparative efficacy of different treatment regimens for the management of acute footrot in sheep [6].

Material and Methods

The present study was carried on 36 adult sheep of both the sexes (20 females and 16 males), living at an altitude of 1800-2000 meters above sea level, aged between 2.49 ± 1.6 years and weighing 36.7 ± 0.9 kg. Footrot was diagnosed on the bases of physical and clinical analysis and then confirmed laboratorically. All the animals showed visible nodding of the head, irregular stride with active footrot having a characteristic smell, inflammation of the interdigital space and under-running of hoof horn. Their duration of lameness as reported by farmers and the presence of pus in affected feet were recorded. The physiological parameters like rectal temperature ($^{\circ}$ F) was determined by digital thermometer, heart rate (beats minute^{-1}) was measured by using the stethoscope, respiratory rate (breaths minute^{-1}) was measured by observing the thoracic excursion and ruminal motility was recorded by counting the number of contractions noted by placing right hand in the left para lumbar fossa of the sheep for a period of 2 minutes were recorded 5 minutes before administration of any drug and three days after the administration drugs. The severity of footrot was scored on a scale of 1 to 4 (scores 1-2 early stages of footrot with mild to extensive interdigital dermatitis for acute footrot and scores 3-4 extensive interdigital dermatitis plus under-running of hoof horn for chronic footrot [12]. The animals were randomly allotted to three different treatment groups (Table 1). Animals in 1st groups were

administered dicrysticin-streptomycin large dose vial "SLDV" (procaine penicillin G 15 lac, penicillin G sodium 5 lac, streptomycin sulphate 2.5 g/vial) 2.5 g/animal and melonex (meloxicam 5 mg/ml) @ 0.2 mg/kg b.wt intramuscularly (IM) ones a day for three days respectively, animals in 2nd group received oxytetracycline (oxytetracycline 100 mg/ml) @ 20 mg/kg body weight b.wt IM and esgipyrin-N (phenyl butazone 750 mg, analgin 750 mg, lignocaine hydrochloride 50 mg/ampule) @ 3 ml/animal ones a day for three days respectively, while as animals in 3rd group were given only enrofloxacin @ 5 mg/kg b.wt IM, on the 1st, 2nd and 3rd day and no analgesic. Along with above treatments animals in all the three groups

received 10% copper sulphate solution footbath daily for 5 minutes for seven days. The interdigital tissue was cleaned, debrided, disinfected and footrot was considered acute when there was an active lesion with characteristic foul smell, interdigital inflammation with or without hoof horn separation, no hyperplasia of the sole and/or wall horn and the sheep had been lame for less than 28 days with score 1-2. The efficacy of treatment regimens was evaluated on the basis of clinical response and time to recovery. The data recorded, where statistically analyzed using simple one way analysis of variance (ANOVA test). Significance was set at $p < 0.05$. Data were reported as mean \pm standard error (SE).

Group	Animals	Therapeutic Regimen	Dose and Route	Duration
1st	n=12	Dicrysticin-SDLVA+MelonexB +copper sulfateC	2.5 gm IM 0.2 mg/kgIM 10% Foot bath	Three day Three days Seven days
2nd	n=12	OxytetracyclineD+Esgipyrin-NE+Copper sulfateC	20 mg/kg IM 3 ml IM 10% Foot bath	Three days Three days Seven days
3rd	n=12	EnrofloxacinF+Copper sulfateC	5 mg/kg IM 10% Foot bath	Three days Seven days

Table 1: Study design for therapeutic evaluation of acute footrot in adult sheep (n=36). ^ADicrysticin-SDLV: Sarabhai Zydus Animal Health limited, Ahmedabad, India. ^BMelonex: Intas pharmaceuticals limited, Ahmedabad, India. ^CCopper sulfate: AVA Chemicals Private Limited, Maharashtra, India. ^DOxytetracycline: Zydus Animal Health limited, Ahmedabad, India. ^EEsgipyrin-N: Sarabhai Zydus Animal Health limited, Ahmedabad, India. ^FEnrodac-10: Zydus Animal Health limited, Ahmedabad, India.

Results and Discussion

The mean \pm SE values of rectal temperature and ruminal motility showed significant ($p < 0.05$) differences whereas the changes in heart rate and respiratory rate were non-significant (Table 2). Animals in 1st group showed 100 percent recovery from lameness within 4.10 ± 0.31 days, while as complete healing of lesions was observed in 23.83 ± 2.31 days, and animals in 2nd group also recovered 100 percent from lameness within 3.03 ± 0.64 days with complete healing of lesions in 20.17 ± 1.64 days, thus showed very fast response as compared to 1st 2nd and 3rd which can be attributed to the inclusion of Oxytetracycline and esgipyrin-N in this group whereas animals in 3rd group showed only 97% recovery from lameness within 4.48 ± 0.98 days, with complete healing of lesions within 25.67 ± 1.98 days (Table 3). The prolonged healing time and incomplete recovery from lameness in this group could be attributed to the absence of parenteral analgesic in this group. When compared with 1st day, all the sheep in different groups after 24 hr of treatment had reduced clinical lameness, as reflected in the reduction in the number of footrot-affected feet. The mean time to recovery increased as the severity of lesions increased and therefore from the results of our study it can be observed that sheep with acute footrot when administered parenteral antibacterial and analgesics along with footbath showed significantly more rapid recovery from lameness with complete healing in less time compared to those treated with parenteral antibacterial and footbath in absence of analgesics. There was no difference in time to recovery by age, body condition score, duration lame, or presence of pus in the foot within acutely affected sheep.

Rectal Temperature ($^{\circ}$ F)	104.33 \pm 0.95b	103.23 \pm 0.85a
Heart rate (beats minute-1)	61.67 \pm 2.03ab	63.67 \pm 2.13ab
Respiratory rate (breaths minute-1)	18.63 \pm 1.91ab	19.93 \pm 2.31ab
Ruminal motility/2 minutes	2.83 \pm 0.43b	3.03 \pm 0.25a

Table 2: The (Mean \pm SE) values of various physiological parameters before and after treatment (n=36). Means bearing same superscript in a row differ non-significantly ($p > 0.05$). Means bearing different superscript in a row differ significantly ($p < 0.05$).

Asif et al. reported that although footrot infection has been observed rarely in various domestic and wild animals like cattle, horses, pigs, deer and mouflon but the infection is most common only in sheep and goats [10]. Footrot is a costly disease in the sheep and goat industry as the producer's loose time and millions of dollars each year in an attempt to control it in their flocks or herds [13]. The overall economic impact of footrot was estimated to the tune of Rs 15.82 million annually to the sheep farming in central Kashmir alone by Rather et al. [9]. As there are very few studies in India and particularly in Kashmir on the efficacy of parenteral antibacterial to treat acute and chronic footrot, therefore very little literature is available about the footrot in sheep of Kashmir region [14]. The evidences from clinical trials in Australia suggested that treatment with short acting parenteral antibiotics such as penicillin and streptomycin, lincomycin, lincospectin and erythromycin [15] when administered parenterally are effective against acute footrot and efficacy can be improved by provision of a dry environment for 24 hr after treatment by Egerton et al. [4]. There is evidence from clinical trials in the UK that rapid

Observations	Before Treatment	After Treatment
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recovery from footrot occurs within 3-10 days of administering long acting parenteral oxytetracycline without provision of a dry environment [16]. Sheep with acute footrot treated on day 0 and those with chronic footrot on days 0, 3, 6 and 9 with long acting parenteral oxytetracycline, enrofloxacin and topical application of potassium permanganate solution and monitored for up to 28 days after

treatment showed very good response to the treatment by Kaler et al. [14]. During the study on acute footrot in adult sheep in Kashmir the mean recovery time observed was 3.83 ± 0.64 days in sheep treated with oxytetracycline intramuscularly @ 20 mg/kg body weight along with footbath with 10% zinc-sulfate by Ansari et al. [6].

Observations	1st Group	2nd Group	3rd Group
Recovery time in days (Mean \pm SE values)	4.10 \pm 0.31ab	3.03 \pm 0.64b	4.48 \pm 0.79ab
Complete healing time in days (Mean \pm SE values)	23.83 \pm 2.31ab	20.17 \pm 1.64b	25.67 \pm 1.98ab
Recovery by single therapy (%)	79	87	65
Percentage recovery (%)	100	100	97

Table 3: Comparative efficacy (Mean \pm SE) values of different treatment regimens for acute footrot in adult sheep (n=36). Means bearing same superscript in a row differ non-significantly (p>0.05). Means bearing different superscript in a row differ significantly (p<0.05).

Asif et al. reported that although footrot infection has been observed rarely in various domestic and wild animals like cattle, horses, pigs, deer and mouflon but the infection is most common only in sheep and goats [10]. Footrot is a costly disease in the sheep and goat industry as the producer's loose time and millions of dollars each year in an attempt to control it in their flocks or herds [13]. The overall economic impact of footrot was estimated to the tune of Rs 15.82 million annually to the sheep farming in central Kashmir alone by Rather et al. [9]. As there are very few studies in India and particularly in Kashmir on the efficacy of parenteral antibacterial to treat acute and chronic footrot, therefore very little literature is available about the footrot in sheep of Kashmir region [14]. The evidences from clinical trials in Australia suggested that treatment with short acting parenteral antibiotics such as penicillin and streptomycin, lincomycin, lincospectin and erythromycin [15] when administered parenterally are effective against acute footrot and efficacy can be improved by provision of a dry environment for 24 hr after treatment by Egerton et al. [4]. There is evidence from clinical trials in the UK that rapid recovery from footrot occurs within 3-10 days of administering long acting parenteral oxytetracycline without provision of a dry environment [16]. Sheep with acute footrot treated on day 0 and those with chronic footrot on days 0, 3, 6 and 9 with long acting parenteral oxytetracycline, enrofloxacin and topical application of potassium permanganate solution and monitored for up to 28 days after treatment showed very good response to the treatment by Kaler et al. [14]. During the study on acute footrot in adult sheep in Kashmir the mean recovery time observed was 3.83 ± 0.64 days in sheep treated with oxytetracycline intramuscularly @ 20 mg/kg body weight along with footbath with 10% zinc-sulfate by Ansari et al. [6].

Conclusion

From our study we concluded that the administration of parenteral antibiotics and analgesic in combination with footbath to treat sheep lame with acute footrot in India is highly effective. This is likely to improve welfare and give economic benefits to the poor farmers. Acknowledgement

The authors are highly thankful to the staff of Teaching Veterinary Clinical Services Complex, F.V.Sc & A.H, SKUAST-Kashmir, for their constant encouragement & valuable support during the tenure of this study.

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