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Use of ethno veterinary medicine viz. *Aloe vera* gel and turmeric powder for maggot wound healing in crossbred (Tamworth x Deshi) pigs

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Abstract
In tropical country like India during pre-monsoon and monsoon season maggot infestations are very common. Among the various diseases of pigs maggot wound causes a great loss to the farmers. The maggot wound though formed mostly at external body coat and natural orifices, does affect the appetite and predisposes secondary infection. In unattended cases, the production drastically reduces and sometimes animals die. For successful treatment of maggot wounds low cost ethno veterinary medicine may be practiced. In the present study 15 male and 15 female crossbred (Tamworth x Deshi) pigs suffering from maggot wounds were treated with *Aloe vera* gel and turmeric powder paste at the ratio of 1:1 for 7 days. The wounds started healing on 3rd day onwards and on 8th day wounds were completely cured. None of the animals died during experimental study period. Ethno veterinary medicine viz. *Aloe vera* gel and turmeric powder could be used cost effectively in crossbred pigs against maggot wounds.

Keywords: *Aloe vera* gel, crossbred pigs, ethno veterinary medicine, maggot wound, Tamworth & Deshi, turmeric powder

Introduction
Maggot wounds in pigs are very common due to unhygienic condition and lack of proper care to the animals. In an organized farm, pigs are maintained with proper care with attention to the incidences of maggot wounds. Among the various diseases of pigs, maggot wound infestation causes a substantial loss to the farmers. The maggot infestations are prevalent in tropical India during pre-monsoon and monsoon season [5]. The skin and body condition score reflects overall health status of pig [16]. The skin affections in pig mostly occur due to the results of mange, ring worm infection, greasy pig disease, diamond skin disease, physical damage by the environment, ergot poisoning or zinc deficiency [21]. The risk factors for setting of skin infections are varied in outdoor and confined pigs and mostly dependant on environments and management practices. The maggot wound though formed mostly at external body coat and natural orifices, does affect the appetite and predisposes secondary infection. In unattended cases, the animals lost its production potential and often died [16]. Cargill and Davies (1999) [4] opined that a variety of diseases, parasites and disorders affect skin of pigs that resulted in economic losses through sub-optimal growth rates.
Ethno veterinary medicine provides low-cost alternatives to allopathic drugs [9]. In addition, ethno veterinary medicines cover people's knowledge, skills, methods, practices and beliefs about the care of their animals [14]. In many poor rural areas ethno veterinary medicines can play an important role in animal production and livelihood development and often becomes the only available means for farmers to treat ill animals [2]. Use of ethno veterinary medicine, one can minimize the monetary loss owing to treatment courses using antibiotics, antiseptics, anti-inflammatory drugs and antihistamines [12, 19, 20]. Thus, it is necessary to study indigenous knowledge and evaluate the ethno veterinary treatments in animal health care.
Considering the above facts the present study was carried out in an organized pig farm to find out the use of ethno veterinary medicine like *Aloe vera* gel and turmeric powder for maggot wound healing in crossbred (Tamworth x Deshi) pigs.

Materials and Methods
To cater the need of the farmers of Jharkhand and adjacent states, ICAR Research Complex for Eastern Region, Ranchi was maintaining a pig research unit with about 80 pigs.

During the two year study period from March 2015 to February 2017 in total 30 Tamworth & Deshi crossbred pigs of both sexes (15 Male and 15 Female) infected with maggot wounds were considered for study at Institutes Pig Research Unit. Uniform standard management practices were adopted throughout the year. Routine vaccination and deworming were done periodically. The animals were housed in a cemented floor with 3 feet high side wall. Washing of floor was done daily at 9.00 AM and excreta were removed twice daily both at morning and evening. The initial body, weight, final body weight and average daily body weight gain were taken using weighing balance during experiment. The herbal paste was prepared from *aloe vera* gel and turmeric powder in 1:1 ratio (Fig. 1 & 2). The infected wounds were treated with herbal paste. After each application fresh paste was prepared and applied twice daily.

Results and Discussion

The infected pigs were kept in isolation. Before starting the experiment the initial body weight of the pigs were taken and after completion of experiment the final body weight was also taken to find out the average daily body weight gain. The average daily body weight gain was only 198.23±25.77gm for male and 197.41±24.31gm for female pigs (Table 1). The pigs were eating less feed and drinking of water was also reduced. They become dull, restless and lethargic. The maggots were removed by applying turpentine oil on the wounds and the lesion was wiped with cotton dipped in potassium permanganate solution (Fig. 3 & 4). The herbal paste was applied for 7 days continuously both at morning and evening (Fig. 5). After 3 days, the wound was gradually started healing and on 8th day the wounds were healed up completely (Fig.6). All the maggot wounds were healed up properly without any untoward incident and no mortality was observed during experiment.

Table 1: The Average Daily body weight gain of crossbred (Tamworth x Deshi) pigs during maggot wound infection period

Particulars	Initial body weight (kg) at first day of treatment	Final body weight (kg) at the end of treatment	Average daily body weight gain (gm)
Male (N=15)	70.67±10.12	72.26±9.56	198.23±25.77
Female (N=15)	68.54±9.31	70.12±9.82	197.41±24.31

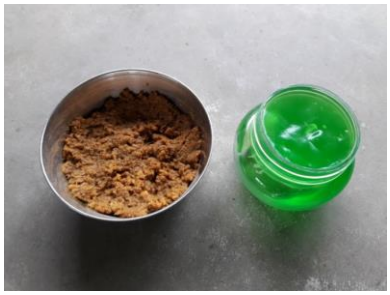

Fig 1: Turmeric powder and *Aloe vera g*el

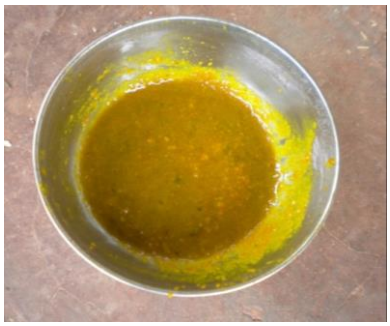

Fig 2: Turmeric and *Aloe vera* gel Paste

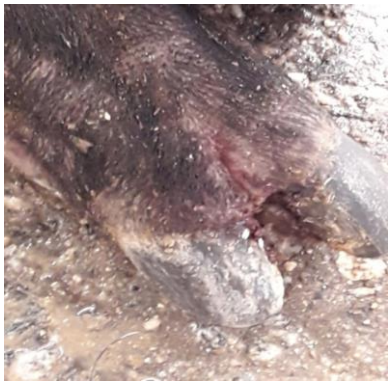

Fig 3: Maggot wound in front leg of pig

Fig 4: Maggot wound in hind leg of pig

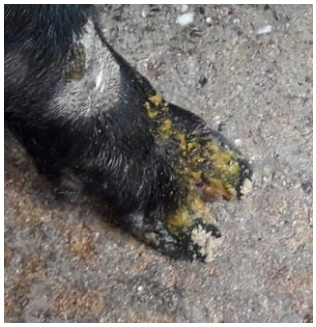

Fig 5: Treating maggot wound with *Aloe vera* gel and turmeric paste in front leg of pig

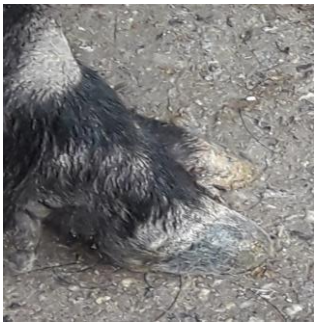

Fig 6: Cured maggot wound in front leg of pig

Aloe vera extract shows beneficial effects on wound healing by decreasing the inflammatory phase and supplying more mature granulation tissue which finally promotes healing and may be caused to produce a sound well-remodeled scar [1]. Because *Aloe vera* extract contains tannic acid and a type of polysaccharide [17] that help wound healing process. The *Aloe vera* leaf gel has beneficial effects on wound healing by antioxidant properties which can be attributed to some compounds including indoles, and alkaloids [15]. *Aloe vera* contains non-flavonoid polyphenols compounds phytosterols, and indoles that may encourage antibacterial properties which may help to alleviate the wound healing in infected wounds. [15]. Chitra *et al.,* (1998) [7] have reported the different mechanisms for wound healing of *Aloe vera* which mainly attributed to enhancing collages turnover rate and level of lysyl oxidase. *Aloe vera* contains six antiseptic agents: lupeol, salicylic acid, urea nitrogen, cinnamomic acid, phenols and sulfur. They all have inhibitory action on fungi, bacteria and viruses. Aloe vera contains anthraquinones that are known for anti-virus properties which inactivates various enveloped viruses. Glucomannan, a mannose-rich polysaccharide and gibberellin, a growth hormone interacts with growth factor receptors on the fibroblast thereby stimulating its activity and proliferation which in turn significantly increases collagen synthesis after topical and oral *Aloe vera* application [3]. *Aloe vera* gel changed collagen composition and increased the degree of collagen cross linking due to this accelerated wound contraction and increase breaking strength of scar tissue [10].

Turmeric contain curcumin (diferuloylmethane), is the main curcuminoid responsible for imparting yellow colour. Turmeric has anti-inflammatory, anti-oxidant, anti-carcinogenic and anti-infectious effect. The wound healing activity of curcumin is due to its multifaceted effect viz., anti-inflammatory [6], anti-infectious [10, 11] and antioxidant [13, 18] activities. Topical application of curcumin has been found to promote re-epithelialization and improves neovascularization. Farahpour *et al.,* (2014) [8] observed that topical application of differential levels of hydroethanolic extract of turmeric rhizome remarkably accelerated wound healing activity by increasing in the rate of wound contraction and re-epithelialization, tensile strength value and collagen deposition in rat as an *in vivo* experimental wound models, and suggested to use various types of wounds in animal and human beings. Brahma *et al.,* (2020) [3] reported that ethno veterinary medicine prepared out of turmeric powder and *Aloe vera* gel was found very effective in treating Orf in goats.

Conclusion

Maggot wound reduces feed consumption, body weight gain, feed efficiency and may cause mortality of pigs. To reduce the economic loss and promote successful pig farming, maggot wound in pig may be reduced by practicing ethno veterinary medicine. The hygiene and sanitation is the paramount importance for prevention of maggot wound in pigs. During pre-monsoon and monsoon period, flies may be minimized in pig sty for reducing maggot wounds. *Aloe vera* gel and turmeric powder paste could be economically and successfully used for healing of maggot wound.

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