

TESTING NEEM PRODUCTS ON GOATS IN INFOTERNAK, PERAK – A PRELIMINARY TRIAL FOR NEEM CAPSULES, NEEM JUICE, NEEM EXTRACT & NEEM DECOCTION FOR WORM CONTROL

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ABSTRACT. Four types of products made from Neem namely, neem leaf decoction, neem capsule, neem fresh juice and neem extract were given to 4 groups of goat for a period of 10 weeks to evaluate the effectiveness of these products in controlling natural gastrointestinal helminth infection. During the course of the study, faecal egg counts, Packed Cell Volume and FAMACHA readings were monitored weekly. Results of feeding these products were variable when compared to untreated control animals, however, a 40-60% worm control was observed. Further testing is required to fine tune these products for use in the field especially where anthelmintic resistance deems drugs to be ineffective.

INTRODUCTION

Throughout the world, gastrointestinal parasites pose as one of the major health limitations for grazing animals. The focus of this paper addresses the most

significant group of nematode parasites, that is the strongyles. These parasites mainly affect grazing livestock which cause major losses in production and mortality of the stock in Malaysia (Sani and Chandrawathani, 1996). Despite the remarkable achievements in the discovery and developments of anthelmintic drugs, nematode parasitic disease remains one of the greatest limiting factors to successful, sustainable ruminant livestock production worldwide (Perry and Randolph, 1999). This is particularly a problem in sheep and goats where the highly pathogenic parasite, *Haemonchus contortus*, is prevalent. Due to high levels of anthelmintic resistance in Malaysia, the use of anthelmintic drugs is now under threat. Herbal deworming remedies from indigenous medicinal plants has also received some research attention, particularly in relation to the Neem tree (*Azadirachta indica*) (Chandrawathani *et al.*, 2000). Neem is used traditionally by small-holder farms in Malaysia especially by the Indian community.

Native to India, the Neem tree is widely planted and is a naturalised evergreen tree found throughout Asia. Preliminary studies showed that feeding Neem foliage is safe, eco-friendly, cheap and palatable to sheep. Belonging to Meliaceae family, Neem is characterised by dense rounded crown of pinnate leaves with flowers and fruits. Neem is a natural source of insecticides, pesticides, and agrochemicals (Brahmachari, 2004). For centuries, Neem has been the pick for Indian traditional medicine for various therapeutic purposes (Anon., 1997; Mallick & Rahman, 1989). Neem has been reported to contain several biologically active constituents such as azadirachtin (Naganishi, 1975), meliantol (Lavie *et al.*, 1965) and salanin (Shin-Foon, 1984). Azadirachtin has been proven to inhibit 68% of *Haemonchus contortus* eggs from hatching (Pessoa, 2001).

The aim of this project is to determine the effectiveness of neem products, prepared by the Veterinary Research Institute (VRI) and Universiti Sains Malaysia (USM), to alleviate the helminthiasis problem in local goats. If this mode of worm control is successful, it would reduce drug costs and in turn increase profits for farmers, as drugs are becoming increasingly expensive and ineffective due to anthelmintic resistance.

MATERIALS AND METHODS

Animals

This study was carried out from January to March 2013, for 10 weeks at Ladang Infoternak Sungai Siput (U), Perak using 25 adult female goats of Saanen breed. The goats were randomly allocated into 5 groups including 1 control group with 5 animals in each group. All animals were managed according to routine practice, whereby they were grazed for 5-6 hours on improved pasture paddocks and housed on raised floor pens at night. Water ad lib and concentrates were given daily. All the goats were treated with the 4 different neem products based on body weight and monitored once a week for helminth faecal egg counts for 8 consecutive weeks. The mean weight of the goats was 39.38 kg. The McMaster faecal egg count (FEC) was the diagnostic test conducted to estimate the number of helminth eggs in a gram of goat faeces (epg).

Neem Products

The neem products used for the treatment consisted of neem leaf decoction, neem capsules, and neem fresh juice which were prepared by the Parasitology and Haematology Section of the Veterinary Research Institute (VRI), Ipoh. Adding to the list, another product was the neem extract which was prepared by University Sains Malaysia (USM), Penang.

1) **Neem Leaf Decoction**

Fresh neem leaves were collected from trees growing in the grounds of the VRI. Ten grams of the leaves were soaked in 100 ml of distilled water for 2 days (48 hours) and kept in room temperature. The leaves were drained and the remaining fluid was stored to be fed directly to the goats. The feeding regime is 10 ml of decoction fluid per 20 kg of animal weekly for 10 weeks before grazing or feeding. As the average weight of the animal is 40 kg, thus, the dose prescribed was 20 ml per animal.

2) **Neem Capsules**

Fresh neem leaves were oven-dried until the leaves were completely dry and crunchy. The leaves were ground into very fine powder and capsulated at a rate of 3 grams of neem leaf powder per capsule. The capsules were then stored at room temperature and fed orally to the goats. The feeding rate is 1 capsule per 5 kg of animal weekly before grazing and feeding for 3 weeks consecutively. The dose prescribed was 8 capsules per animal.

3) **Neem Fresh Juice**

A total 100 grams of fresh neem leaves was blended with 1000 ml of distilled water into a smooth, fine juice. The juice was stored in a closed container at 4°C to be fed directly to the goats the next day. The feeding rate is 5 ml per kg of body weight of the animal once only during the course

of the study. The dose given was 200 ml per animal of 40 kg each only once in the first week.

4) **Neem Extract**

The mature neem leaves, were freshly harvested, washed and carefully cleaned by using running tap water and then left to air-dry under the shade for two days. The dried leaves were ground into a powder. An amount of 240 grams of powder was mixed with 1200 ml of sterile distilled water in 2000 mL conical flask and heated by using water bath at 70°C for 6 hours. The resulting extract was filtered through filter paper (Whatman No. 1, USA) and concentrated later by using a rotary vacuum evaporator (Heidolph Rotary Evaporator, USA) at 40°C. The concentrated extract was left to dry in the oven at 40°C for 48 hours. The resulting sediment was stored at 4°C until used. The feeding regime is 14.15 grams of the extract diluted with 250 ml of distilled water and 50 ml of the water extract was given to each goat with an average body weight of 40 kg.

Parasitology Analysis

At the commencement and end of the study, the live-weight, packed cell volume (PCV) for each goat was recorded, in addition to scoring the colour of the conjunctiva of each goat, based on FAMACHA chart (van Wyk *et al.*, 1997). During the course of the study, rectal faecal samples were collected every week from each goat. Three grams of

faeces were used in McMaster technique to estimate the faecal egg count (epg). After 10 weeks, the study was terminated. The weight, PCV and FAMACHA estimates of each goat were again measured. Graphical analysis was done for all the parameters.

RESULTS

Generally the results show a trend towards a lower egg count after treatment with some of the products. Figure 1 shows the mean faecal egg count of animals given the neem decoction fluid weekly. In the first 4 weeks, there was a drop in faecal egg count, and after that fluctuating between 1200-600 epg till end of the trial. In comparison to the control group, the treated animals fared better in terms of egg counts where control animals had higher egg counts for 7 weeks of the study period.

Figure 2 shows the mean egg counts of the neem capsule treated animals which was fed for the first 3 weeks of the study, indicating a general lower egg count compared to the control animals after the 5th week of treatment.

Figure 3 shows the mean faecal egg counts of neem juice treated animals which was low for the first seven weeks and after which it raised again as compared to the control animals, probably because it was given only 1 dose in the first week of study.

Figure 4 shows the mean faecal egg count of the neem extract group of animals which was erratic and similar to faecal egg counts of the control group. As the treatment was given only once at the start of the study, further assessment is needed to elucidate the reasons for its ineffectiveness.

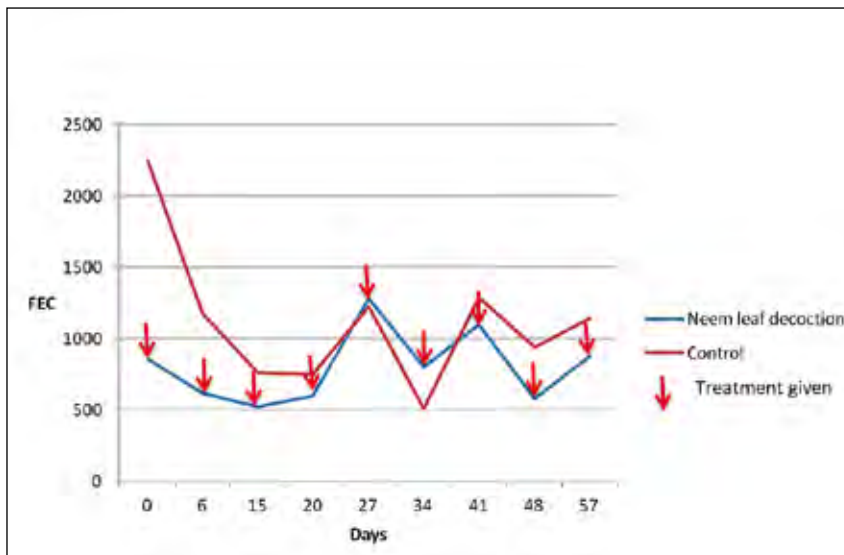


Figure 1: The mean faecal egg count of animal treated with neem leaf decoction compared to untreated control.

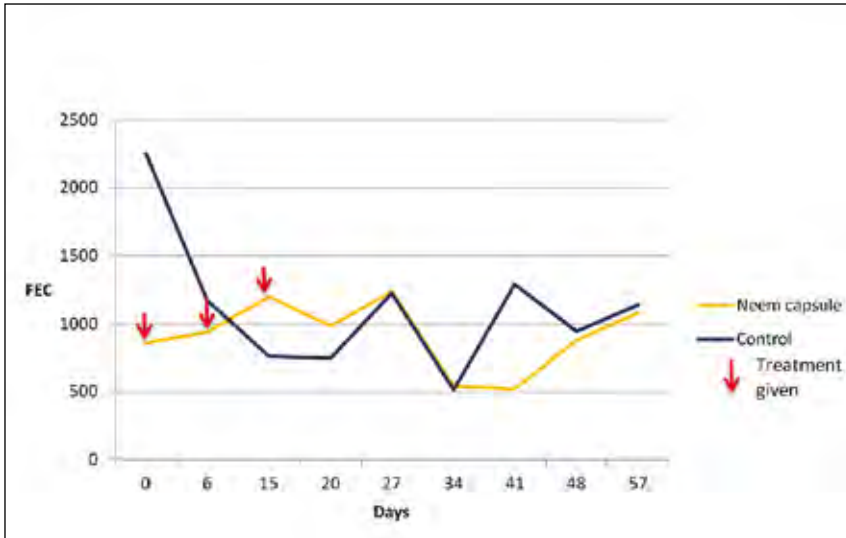


Figure 2: The mean faecal egg count of animals treated with neem capsule compared to untreated control.

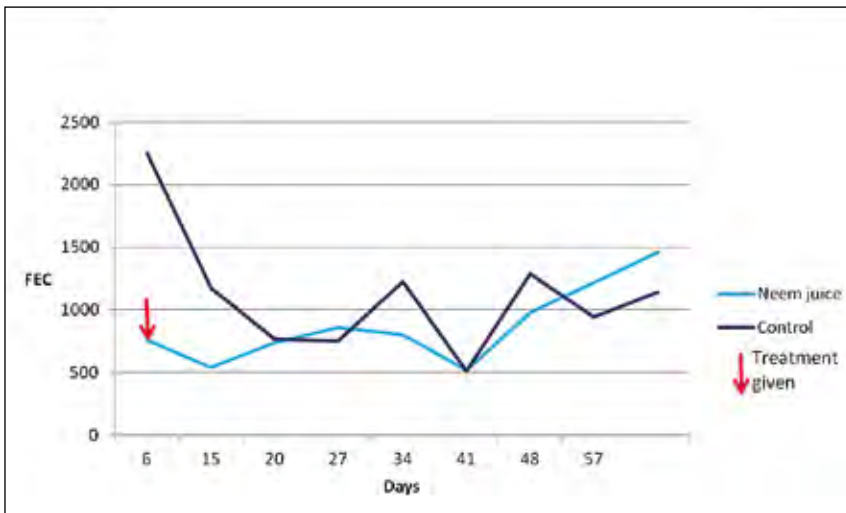


Figure 3: The mean faecal egg count of animals treated with neem juice compared to untreated control.

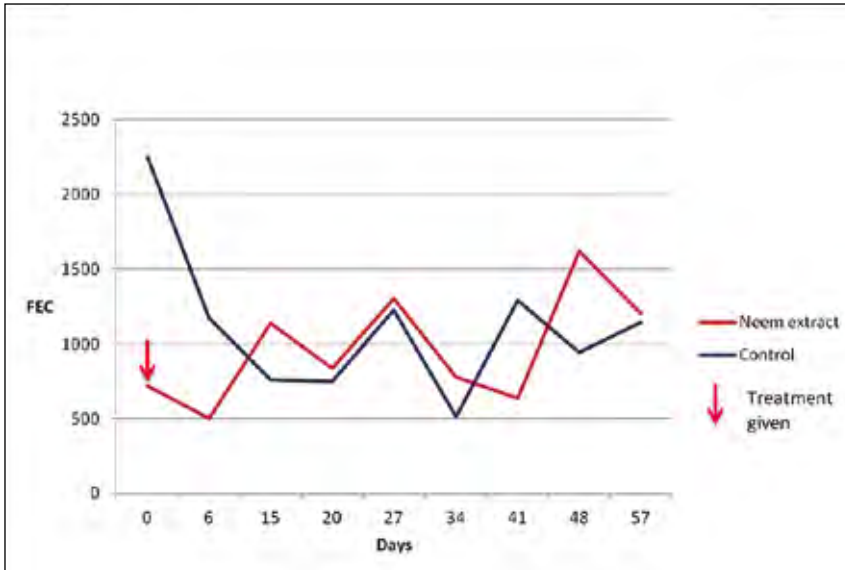


Figure 4: The mean faecal egg count of animals treated with neem extract compared to untreated control.

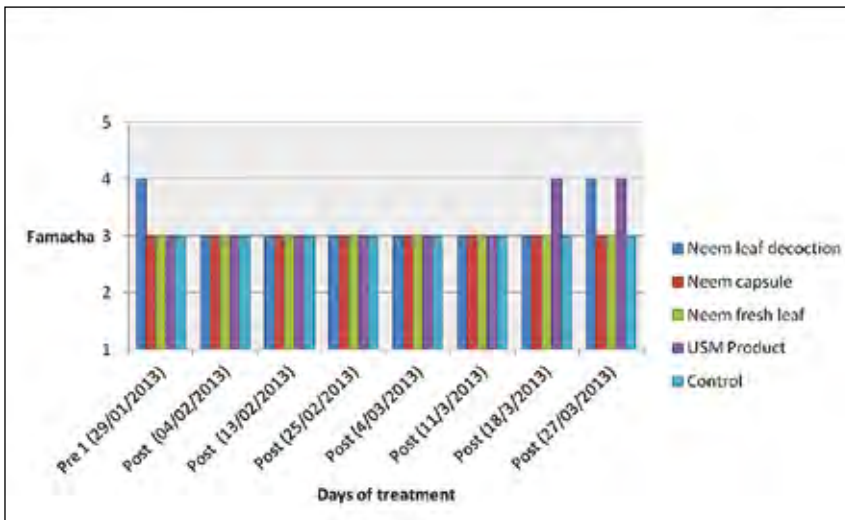


Figure 5: The mean FAMACHA reading for all treatment group.

Generally, in assessing all neem based products, it was found that the neem leaf decoction shows a satisfying reduction in the faecal egg count of goats when compared to mean faecal egg counts of control animals. Figure 5 shows the FAMACHA readings recorded for the entire duration of the project. From Figure 5 it is observed that the FAMACHA reading remains almost constant for all treatment groups throughout the project. It has also been observed that the range of FAMACHA reading for the farm is between 3 to 4, indicating all animals were anaemic.

DISCUSSION & CONCLUSION

Overall, this study has shown that neem products have the capacity to reduce worm egg counts from 40-60% over the study period especially for neem juice, neem decoction and neem capsule. As the feeding and management was optimal, effects of helminthiasis may be masked even in the control groups. However, for the neem extract, the effectiveness needs to be further evaluated. In terms of product preparation, neem decoction is the simplest and cheapest followed by neem juice and neem capsules. Neem extract requires an elaborate laboratory processing which could be a deterrent in producing cheap, effective products for animals. However, there is a great vacuum in the availability of natural, local herbal remedies for worm control in livestock. With the advent of drug resistance for worm control, it is

imperative that natural, herbal remedies be available for farmers so as to minimise the ill effects of helminthiasis and improve productivity. This preliminary study will pave the way for more product assessment in order to make available simple solutions for farmers with regards to worm control.

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