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Effect of Herbal Anthelmintic (Garlic + Neem) on the Reproductive Performance of Lactating Cattle

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ABSTRACT: The study was conducted to evaluate the anthelmintic efficacy of Garlic and Neem combination and its effect on the reproductive performance of lactating Karan fries cows. For the study 28 cows were taken which were freshly calved, had parity ranged 1-3 and were not dewormed for at least six months before. They were divided into four groups comprising seven cows in each. The cows of T_1 were kept control provided normal feed, cows in T_2, were provided commercially available synthetic dewormer, cows in T_3 and T_4 were provided with a dose of combination of Garlic and Neem at seven days after parturition and a second dose was supplemented in cows of T_4 at day 60. No changes were made in the regular housing and feeding management of cows. To see the effect of herbal anthelmintic on reproductive traits of KF cows, the reproductive parameters (interval from calving to first observed estrus, calving to day of first service, first service conception rate, number of services per conception and service period) were recorded for each cow. The interval to first observed estrus was found significantly ($p \leq 0.05$) lower in group T_4. Average number of days to first service were found highest in the group T_1. In comparison to group T_1, cows of group T_2 and T_4 received service respectively, 17 and 20.86 days earlier. The average service period in group T_1 was observed 133.71±09.74 days which was 105.28±09.88, 122.57±5.76 and 99.14±5.43 days, in group T_2, T_3 and T_4 respectively. Conception to first service was found highest in T_4 group (57.14%) followed by T_2 and T_3 groups (42.86%), which was 28.57% in group T_1. Number of services per conception was observed lowest in cows of T_4 group (1.42±0.18) which was 2.14±0.34, 1.57±0.20 and 1.85±0.36 in groups T_1, T_2 and T_3 respectively. It was concluded from the study that anthelmintic treated groups had better reproductive performance than the untreated group and also the efficiency of double dose herbal treatment was as better as the synthetic dewormer.

Keywords: Garlic, Neem, Estrous, Service period, Service per conception.

INTRODUCTION

The ultimate goal of dairy management is to remove all those impediments which are coming across the way to achieve the better performance of the animals. Gastrointestinal parasitism is one of the major impediment in achieving optimum performance of animals. Helminths which are a diverse group of parasitic worms, encompassing Nematodes, Cestodes and Trematodes are recognized as a major constraint to livestock production throughout the tropics and elsewhere (Waller, 1997). These infections cause considerable economic loss in terms of productivity in many ways including mortality in heavily parasitized animals (Rinaldi *et al.*, 2011; Wadhwa *et al.*, 2011).

The economic losses with parasitism in cattle are mostly associated with subclinical parasitism, with no obvious signs of parasitism but significant losses in potential production. These losses are often very insidious in nature and often difficult to prove statistically in a consistent manner (Hawkins, 1993).

Helminthic infections were once reported to be responsible for causing nearly one-third of total losses due to all animal diseases (Anon, 1990). It has also been established that a strategic anthelmintic treatment can improve animals performance including reproductive performance (Stuedemann *et al.*, 1989).

To deal with this problem of gastrointestinal parasitism, when it comes to treatment, either they are commonly overlooked as majority of the infected animals show little obvious clinical signs and their effects are gradual and chronic (Raza *et al.*, 2010), thus not drawing the immediate attention of the farmer, or treated conventionally with commercially available chemical anthelmentics. livestock producers are sometimes hesitant to use these anthelmintics due to their associated adverse effect and cost. Another associated issue is emergence of anthelmintic resistance which is a threat to agricultural incomes, and has been reported from all the four corners of the world, to all available

drugs, in all classes of helminthes (Lalchhandama, 2010).

Emergence of anthelmintic resistance along with associated adverse effects and the high cost of synthetic anthelmintics makes it need of the hour to develop alternative approaches. Herbal based anthelmintics could be the best possible alternative of these synthetic anthelmintics, as plants has long been used for ages by farmers and traditional healers to treat parasitism and to improve performance of livestock. Regardless of their wide ethnoveterinary usage scientific evidence on the anti-parasitic efficacy of most plant products is limited. Many *in vitro* studies have been conducted to demonstrate the anthelmintic efficacy of different herbs, some of them reported Neem and Garlic as the most efficacious for *in vitro* anthelmintic activity (Amin *et al.,* 2009). For practical utilization their *in vivo* validation needs to be done. With these considerations the present study was carried out to evaluate the *in vivo* efficacy of Garlic and Neem combination for their anthelmintic potential and also its effect on animal's reproductive performance.

MATERIALS AND METHODS

The present study was carried out at Livestock Research Centre (LRC), National Dairy Research Institute (NDRI), Karnal, India. Neem leaf powder was procured from local market after assessing their quality in consultation with ayurvedic practitioner and drug manufacturer. Garlic bulbs were purchased from the local market and were dried under the shade for a period of 15 days. After drying, the outer husks were removed and the bulbs were ground to fine powder by using electrical mixer. The herbal mixture was prepared after mixing pulverized herbs in specific proportion. The dose was calculated for the respective animal based on their body weight, then Garlic and Neem powder were weighed accordingly in the ratio of 1:5 (based on the dose rate obtained by the *in vitro* standardization).

Twenty eight freshly calved crossbred Karan Fries (Tharparkar × Holstein Friesian) cows, in first to third parity were selected and none of them had been dewormed at least six month before the start of the experiment. Animals were randomly divided into four (4) groups. Animals in control group (T_1) were provided with the routine feeding practices of the farm without any kind of deworming. Animals in treatment groups were fed the same ration as in control group but provided with dewormer as follows- In T_2 group: The synthetic dewormer used was Macfen-plus^{TM}. In T_3 group: Garlic + Neem in the ratio 1:5 was given @ 4g/kg body weight as single dose on day 7 after parturition. In T_4 group: Garlic + Neem in the ratio 1:5 was given @ 4g/kg body weight as single dose on day 7 after parturition and subsequently same dose was repeated on day 60. For *in vivo* efficacy of the herb, fecal evaluation was done for parasitic eggs. Faecal egg count reduction was calculated as per equation of Coles *et al.* (1992). To see the effect of herbal anthelmintic on reproductive traits of KF cows, the reproductive parameters were recorded for each cow.

For calculating days to first observed estrus, groups of cows were observed twice daily in the morning and evening to determine the signs of estrus by the experienced and skilled personnel and estrus chart was prepared for each cow. Service period was calculated by counting the number of days from calving to the service that resulted in pregnancy and this was confirmed by pregnancy diagnosis after 45-60 days of last service. The numbers of service required for successful conception is called as Number of service per conception were recorded. Conception rate is the proportion of cows that were detected in oestrus and inseminated to that were pregnant. It was calculated as per the following equation.

$$\text{First - service conception rate (\%)} = \frac{\text{No. pregnant first service}}{\text{No. bred first service}} \times 100$$

RESULTS AND DISCUSSION

A. Effect of herbal anthelmintic (Garlic + Neem) on nematode control (Fecal egg count)

In all the anthelmintic treated groups, mean EPG values were found significantly ($p \leq 0.05$) lower compared to the control group. In synthetic dewormer group T_2 there was observed the highest reduction of 96.79±2.09 % which was significantly higher than the herbal treated groups T_3 (57.36±11.44%) and T_4 (60.24±7.21 %). The overall mean values of FECR also shows an increase (-14.06±3.34%) in the egg count in the control group, whereas decrease in egg count was observed in all the anthelmintic treated groups. The synthetic dewormer treated group (T_2) and the double dose herbal treated group (T_4) did not show significant difference (83.20±2.76% and 78.85±3.09 %) in the overall FECR which was significantly better than the single dose (T_3) group (56.62±3.39%).

B. Effect of herbal anthelmintic (Garlic + Neem) on reproduction performance of cows

The data (Table 1) on reproduction performance for different groups were recorded and evaluated on the basis of days to first observed estrous, days to first service, service period, service per conception and first service conception rate.

The first observed estrous (DFOE) in T_1 was 78.00±4.88 days and for T_2, T_3 and T_4 were 60.71±9.25, 75.14±8.36 and 59.14±3.01days, respectively. For first observed estrous there was found no significant difference between T_1 and T_3. The treatment group T_4 was found to have significantly ($p \leq 0.05$) lower interval to first observed estrous, however the group T_3 did not found significantly different from either of the groups.

The comparatively early postpartum estrous could be due to better energy status of cows in anthemintc treated groups. Resumption of ovarian cyclicity after parturition depends upon nutritional status, body energy reserves and blood glucose level of the animal. As blood glucose is the main source of energy for ovarian function (Rabiee *et al.,* 1997) and influences *in vitro* bovine thecal steroidogenesis (Stewart *et al.,* 1995), it

might have played a major role in achieving early postpartum ovulation.

Average number of days to first service (DFS) were found highest in the untreated group. In comparision to untreated cows, T_2 and T_4 treatment group cows received service 17 and 20.86 days earlier. Service period (SP) was found significantly lower in T_2 and T_4 groups compared to the untreated group. In comparison to control, cows in T_2 and T_4 group conceived 28.43 and 34.57 days earlier. The higher service period in control group might be due to higher incidence of negative energy balance and subclinical mastitis. Our findings are supported by Gunay and Gunay (2008). They reported that cow suffering with mastitis prior to first postpartum AI and between first postpartum AI and pregnancy diagnosis had significantly ($p \leq 0.05$) extended duration of days open. Conception to first service (FSCR) was found highest in T_4 group (57.14%) followed by T_2 and T_3 groups (42.86%) which was 28.57% in control group. A direct relationship between postpartum energy balance and first ovulation was demonstrated by Canfield *et al.* (1990). Negative energy balance results into increased BUN concentration (Dhaliwal, 2001). Greater serum or plasma urea nitrogen concentration reduces LH binding to ovarian receptors, leading to decrease in serum progesterone concentration and pregnancy rates (Sharma *et al.*, 2006). Number of services per conception (NSPC) was found lower in cows of herbal anthelmintic treatment group, although non significantly. This suggest the favourable action of herbal antelmintic in improving conception rate with minimum services, which might be due to better status of uterine health which further attributed to anti-oxidant and immune-modulatory action of herbs which prevent infections (Ao *et al.*, 2011; Huang *et al.*, 2010). Similar type of findings on reproductive performance improvement with herbal supplementation has been reported by Cui *et al.*, (2014) in Holstein cows. Chandra (2015) reported that the polyherbal mixture reduced the service period around sixty days in Murrah buffalo. Stuedemann *et al.* (1989) reported higher pregnancy rates for anthelmintic treated (98%) animals than that for untreated animals (75%). Also, they reported that the calving rate was higher for anthelmintic treated cows (90%) than for untreated cows (68%).

Table 1: Reproduction parameters of cows in different treatment groups.

Treatment groups	DFOE (days)	DFS (days)	SP (days)	NSPC	FSCR%
T_1	78.00^{b}±4.88	110.57^{b}±4.88	133.71^{b}±09.74	2.14±0.34	28.57
T_2	60.71^{ab}±9.25	93.57^{ab}±8.25	105.28^{a}±09.88	1.57±0.20	42.86
T_3	75.14^{b}±8.36	105.14^{ab}±8.36	122.57^{ab}±5.76	1.85±0.36	42.86
T_4	59.14^{a}±3.01	89.71^{a}±3.50	99.14^{a}±5.43	1.42±0.18	57.14

Means bearing different superscript in a column differ significantly ($p \leq 0.05$).

CONCLUSION

The results of the study lead us to the conclusion that anthelmintic treatment improves the reproductive performance of cattle. The double dose of herbal anthelmintic combination of Garlic and Neem is as efficacious as synthetic dewormer in controlling the gastrointestinal parasites Also the effect of double dose herbal anthelmintic treatment was better than the synthetic anthelmintic treatment on the reproductive performance of cows.

FUTURE SCOPE

Other dose combination of Garlic and Neem and regimen need to be tested so as to come up with a standardized *in vivo* dose.

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Conflict of Interest. The authors declare no conflict of interest pertaining to this manuscript.

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