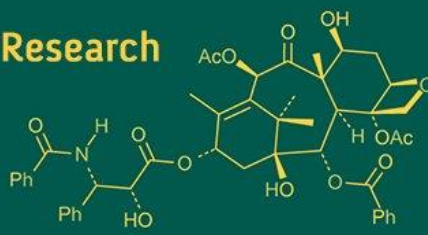


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Effect of dietary supplementation of ardu (*Ailanthus excelsa*) leaf powder on faecal egg count in Pantja goats

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Abstract

This research article shows that gastrointestinal nematode burden in goats significantly impairs metabolic functions, diminishing protein and energy utilization and causing imbalances in essential minerals. The present study was performed on 16 Pantja goat kids (6-8 months old) for an experimental period of 90 days to observe the effect of feeding ardu (*Ailanthus excelsa*) leaf powder on faecal eggs count in Pantja goats. The experimental animals were randomly divided into three treatments and one control group each with four goat kids having approximately same body weight. The goat kids of control group (T₀) were offered 100 per cent concentrate with grazing while those of T₁, T₂ and T₃ groups were fed ardu leaf powder replacing 25, 50 and 75 per cent concentrate respectively. With this dietary feeding schedule, grazing and *ad libidum* water was provided to all the experimental goats during the entire experimental period. Eggs per gram (EPG) were quantified by modified Mc Master egg counting technique which was found to be least in the treatment group fed with ardu leaf powder as compared to control group of goat kids. Result suggest that feeding ardu leaf powder by replacing 75 per cent concentrate in the diet of goat kids may be advised to decrease the parasitic load in Pantja goats.

Keywords: Ardu leaf powder, dietary feeding, eggs per gram, faecal eggs count, Pantja goats

Introduction

Goat production in India is primarily aimed at milk and meat, and it plays a significant role in supporting the livelihood of rural farmers. However, among the various constraints affecting goat production, health problems remain one of the major limiting factors. One of the most common health issues in goats is infection with gastrointestinal parasites. The level of infection is generally assessed through faecal egg count, which shows a direct relationship with worm burden in small ruminants (Cabaret *et al.*, 2021) [4]. High parasitic load negatively influences milk production in goats and consequently affects the economic condition of farmers.

Goats are grazing animals and therefore remain continuously exposed to infective stages of gastrointestinal parasites present in their natural environment (Singh *et al.*, 2025) [30]. Although goats possess a remarkable ability to survive under adverse environmental conditions such as high temperatures, scarcity of water, and seasonal feed shortages (Zvinorova *et al.*, 2016) [31], they are still highly susceptible to gastrointestinal parasitic infections. These parasites are widely distributed, diverse in nature, and often pathogenic, with many species capable of infecting other ruminants as well. Heavy parasitic infestations in goats are commonly associated with poor growth rate, progressive loss of body weight, diarrhoea, dysentery, and anaemia. Young animals are particularly vulnerable, making gastrointestinal parasitism a serious constraint to efficient and profitable goat farming.

Apart from the observable clinical symptoms, gastrointestinal nematodes also exert significant adverse effects on the host's metabolism. They reduce the retention and utilization of dietary protein and energy and disrupt the normal mineral balance within the body (Rupa and Portugaliza, 2016) [25]. The control of these parasites has largely relied on the use of conventional synthetic anthelmintics; however, the increasing global occurrence of anthelmintic-resistant nematode populations has become a major challenge in effective

parasite management (Fissiha and Kinde, 2021) [7]. As a result, there is growing interest in exploring plant-based alternatives as sustainable and environmentally friendly anthelmintic agents in livestock production systems (Khan *et al.*, 2025) [11]. Medicinal plants are rich sources of bioactive compounds, and their extracts often contain multiple phytochemicals that may act synergistically to produce therapeutic effects, which can also help delay the development of drug resistance in parasites (Liu *et al.*, 2020) [15]. Secondary plant metabolites such as phenols, flavonoids, alkaloids, saponins, tannins, terpenoids, and steroids play an important role in disease prevention and control. *Ailanthus excelsa* (Ardu) is a medicinal tree traditionally used in ethnoveterinary and herbal medicine for the treatment of wounds and various skin disorders. It has also been reported to possess astringent, appetite-stimulating, antipyretic, and anthelmintic properties and has been used in the management of ailments such as gout, rheumatism, dyspepsia, bronchitis, and asthma (Lavhale and Mishra, 2007; Anon, 2010) [14, 1]. Phytochemical investigations have revealed the presence of several biologically active constituents in *Ailanthus excelsa*, which exhibit antimicrobial, antioxidant, and anti-inflammatory activities (Kumar *et al.*, 2010) [12]. The plant contains a wide range of bioactive phytochemicals, including quassinoids, alkaloids, flavonoids, terpenoids, and various proteins (Kapoor *et al.*, 1971; Ogura *et al.*, 1977; Sherman *et al.*, 1980; Nag and Matai, 1994; Joshi *et al.*, 2003; Loizzo *et al.*, 2007; Said *et al.*, 2010) [10, 20, 28, 19, 9, 16, 26]. Additionally, compounds such as β -sitosterol and vitexin have been specifically isolated from its leaves (Kapoor *et al.*, 1971) [10]. Owing to this rich phytochemical composition, the plant exhibits a broad spectrum of pharmacological and biological activities, including analgesic, antimicrobial, antidepressant, anticancer, antifungal, antiviral, antioxidant, antiproliferative, hepatoprotective, antiasthmatic, antidiabetic, and antibacterial effects, as reported in various experimental studies (Shrimali *et al.*, 2001; Hukkeri *et al.*, 2002; Joshi *et al.*, 2003; Kumar *et al.*, 2010; Said *et al.*, 2010; Rashed *et al.*, 2013) [29, 8, 9, 13, 26, 24]. Considering these medicinal and biological properties, the present investigation was undertaken to evaluate the effect of

dietary supplementation of Ardu (*Ailanthus excelsa*) leaf powder on faecal egg count in Pantja goats.

Materials and methods

Experimental site

Sixteen growing Pantja goat kids of average age 6-8 months were selected from the Goat Unit, Department of Livestock Production Management, College of Veterinary and Animal Sciences, Pantnagar, Uttarakhand, India.

Experimental Design

The feeding experiment was conducted in a completely randomized design (CRD) which include three treatments and one control group each with four goats. All the goats were individually weighed and randomly divided into one control and three treatment groups consisting of 4 goats in such a way that average weight of goats in each group was approximately same.

Housing and management

The goats used for the experiment were housed in semi-intensive system of housing. Experimental animals of each group were kept in well ventilated pens (3 x 5 sq ft.) with concrete floor. All the housing and managemental conditions were similar for control and different treatment groups in which feed as mentioned in Table 1 and drinking water *ad libitum* were provided to the experimental goats during the entire experimental period. As ardu leaf powder in fresh form were not accepted by the experimental Pantja goats, so the leaves were picked and dried in shade. After drying they were grinded to powder form.

Animals under experiment were provided grazing as well as stall feeding. They were allowed for grazing both morning and evening time during the whole experimental period. Pasture used for grazing mainly contained doob grass (*Cyanadondactylon*), berseem (*Trifolium alexandrinum*), oats (*Avinasativa*) and ber (*Ziziphusindicus*). Concentrate 100 g with mineral mixture (MINFA) was provided to each goat of control group so as to meet the requirement of all the essential nutrients. The goats of T₁, T₂ and T₃ groups were provided ardu leaf powder and concentrate with mineral mixture in addition to grazing as shown in Table1.

Table 1: Dietary treatments for Pantja goats (6-8 months)

Groups	No. of animals	Treatments	Feeding programme		
			Grazing	Concentrate (g)	Ardu leaf powder (g)
1	4	T ₀	<i>ad lib</i>	400	—
2	4	T ₁	<i>ad lib</i>	300 (75%)	90 (25%)
3	4	T ₂	<i>ad lib</i>	200 (50%)	180 (50%)
4	4	T ₃	<i>ad lib</i>	100 (25%)	270 (75%)

Grazing feed sample ardu leaf powder and concentrate were analysed for proximate principles as per the method of AOAC (2015) [12].

Faecal sample collection and analysis

Approximately 2 g of fresh faecal samples were collected directly per rectum at 0, 30th, 60th and 90th day of experiment from all the animals. Immediately after collection of faecal samples they were subjected for faecal eggs count i.e. Eggs per Gram (EPG). To calculate EPG, samples were quantified by modified Mc Master egg counting technique (MAFF, 1971) [17] as follows to estimate the parasitic load in experimental goats.

Statistical Analysis

The data obtained in the present study were analysed statistically by One Way ANOVA. The differences in the means was compared by Least Significant Differences (LSD) at 5% level ($p < 0.05$).

Results and discussion

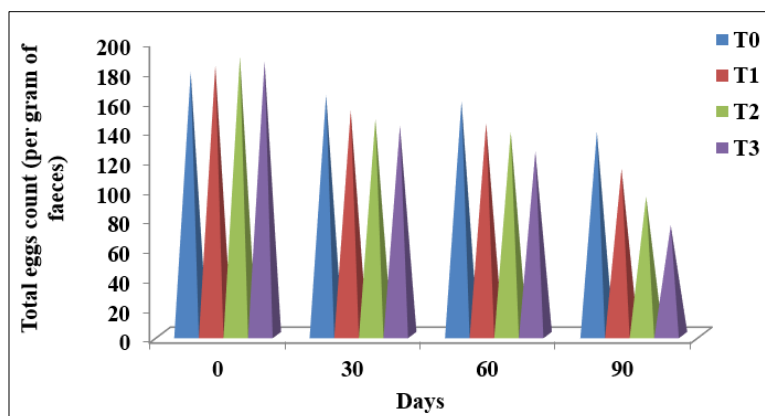
Faecal Eggs count

The mean values of total eggs count (per gram of faeces) in Pantja goats fed different levels of ardu leaf powder are shown in Table 2 and Fig.1.

Table 2: Effect of feeding ardu leaf powder on total eggs count (per gram of faeces) of Pantja goats (Mean $\pm$ S.E.)

Days	Control Group (T ₀)	Treatment Group 1 (T ₁)	Treatment Group 2 (T ₂)	Treatment Group 3 (T ₃)
0	177.87 $\pm$ 5.71	182.25 $\pm$ 3.85	188.12 $\pm$ 4.99	185.12 $\pm$ 3.91
30*	162.50 ^a $\pm$ 1.66	151.75 ^b $\pm$ 1.93	146.12 ^c $\pm$ 2.03	141.50 ^c $\pm$ 1.89
60*	158.25 ^a $\pm$ 1.65	143.12 ^b $\pm$ 0.78	137.50 ^c $\pm$ 1.06	124.12 ^d $\pm$ 0.95
90*	137.50 ^a $\pm$ 1.53	112.37 ^b $\pm$ 4.03	93.62 ^c $\pm$ 2.25	74.25 ^d $\pm$ 2.16

Values with different superscripts row wise differ significantly ($p < 0.05$)

**Fig 1:** Effect of feeding ardu leaf powder on total eggs count (per gram of faeces) of Pantja goats

The dietary feed supplementation of Ardu (*Ailanthus excelsa*) leaf powder showed significant ($p < 0.05$) reduction in faecal egg counts in treatment groups (T₁, T₂ and T₃) of goat kids. Total eggs count were significantly ($p < 0.05$) very less on day 90 of experiment as compared to day 60, day 30 and day 0. The given results showed that feeding ardu leaf powder by replacing 75 per cent concentrate in the diet of goat kids may be advised to decrease the parasitic load in Pantja goats. Our research experiment results presented reduction in total eggs count (per gram of faeces) in ardu leaf powder fed treatment group in may be due to the main active constituents of *Ailanthus excelsa* i.e. ailanthinone and glaucarubinone which are considered as main therapeutic constituents for intestinal worms and internal parasites (Kumar *et al.*, 2010) [12].

Our results are similar to results of Khan *et al.* (2025) [11] who also reported that on quantitative coproculture assay, the addition of powder of ardu plant parts to faecal culture resulted in inhibition of *Haemonchus contortus* in larval development at 200 and 300 mg/g of faeces, suggesting that the material had anthelmintic activity. Our results are similar to results of Mohammed *et al.* (2023) [18] reported that administration of *Ailanthus excelsa* extract resulted in a noticeable decline in faecal egg counts following treatment. The observed reduction in egg load among the treated mice could be attributed to multiple factors, such as a decrease in the overall worm burden, suppression of egg-laying capacity in the surviving female parasites, and possible destruction of some eggs due to host tissue responses and associated immune reactions. Kaempferol (5,4,5,7 tetrahydroxyflavones), Apigenin (4,5,7 trihydroxy flavones) and Luteolin (3, 4, 5, 7-tetrahydroxy flavone) are flavonoids compound found in leaf part of ardu (Kapoor *et al.*, 1971) [10]. Our research results also agree with the results of Baig *et al.* (2020) [3] who reported that dose dependent activity of hydroalcoholic extract of stem bark of *Ailanthus excelsa* (Ardu) at the dose rate of 500 mg/5 ml causes significantly ($p < 0.05$) faster paralysis and death rate of *Pheretima posthuma* (Indian earthworm) as compared to anthelmintic

peprazine citrate (200 mg/100 mL). Thus, Ardu leads to significant ($p < 0.05$) reduction fecal egg counts. Our research results also agree with Ebeid *et al.* (2007) [6] and Seif el-Din *et al.* (2006) [27] who found that antioxidants β -carotene and N-acetylcysteine were observed to enhance the decline in the overall worm population and the number of eggs deposited in tissues. Their administration was also associated with a higher proportion of non-viable eggs and a concurrent reduction in the proportion of eggs progressing to mature developmental stages. Patil *et al.* (2010a,b) [21, 22] documented that anthelmintic activity of *Ailanthus excelsa* has also been evaluated using various solvent extracts, including petroleum ether, ethyl acetate, and methanol, each administered at a concentration of 20 mg/mL against earthworms. Albendazole at 10 mg/mL served as the standard reference drug. Among the tested extracts, the methanolic fraction demonstrated the most pronounced activity, causing paralysis and subsequent death of the worms with efficacy comparable to albendazole. This enhanced activity is likely associated with the presence of polar phytochemicals- such as glycosides, flavonoids, tannins, and other phenolic constituents- identified through phytochemical screening.

Conclusion

The findings of the present study indicate that dietary supplementation of *Ailanthus excelsa* (Ardu) leaf powder effectively reduced faecal egg counts in Pantja goat kids, suggesting a significant decrease in gastrointestinal parasitic burden. The reduction was most pronounced in animals receiving higher levels of leaf powder, demonstrating a dose-dependent response. The observed reduction in parasitic load may be attributed to the presence of bioactive compounds such as ailanthinone and glaucarubinone, which possess known anthelmintic properties. By lowering worm burden, Ardu leaf powder may contribute to improved nutrient utilization, better health status, and enhanced productivity in goats. These results highlight the potential of Ardu leaf powder as a natural, plant-based alternative to

conventional anthelmintics for parasite control in goats. Incorporation of Ardu in the diet may therefore contribute to reduced fecal egg counts, thus leads to improved health status, better nutrient utilization, and enhanced productivity, while also supporting sustainable and eco-friendly livestock management practices.

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Ethical approval

This research project was conducted in accordance with the ethical guidelines and the animal study was reviewed and approved by Committee for Control and Supervision of Experiments on Animals (CCSEA).

Conflict of interest

All the authors declare that there is no conflict of interests regarding the publication of this research article.

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