

## Blood cholesterol and glucose levels of sheep after being given feed supplemented with *Pluchea indica* leaf flour

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**ABSTRACT:** Sheep are a type of livestock commonly consumed by the population. Lamb meat is high in cholesterol, which leads to hypercholesterolemia in individuals who consume it. The objective of this study was to assess the impact of *Pluchea indica* administration on cholesterol and blood glucose levels in sheep. A total of 15 sheep were divided into 4 different treatment groups. The groups were categorized according to the concentration of *P. indica* flour in the concentrate, specifically 0%, 2%, 4%, and 8%. The animals underwent 35-day meal therapy. The findings indicated that the inclusion of 4% *P. indica* flour in the concentrate resulted in a significant reduction in blood cholesterol levels in sheep ( $p < 0.05$ ). There was no significant difference in glucose levels between the groups ( $p > 0.05$ ). The study concluded that the addition of 4% *P. indica* flour to the concentrate is the most effective formulation for reducing blood cholesterol levels.

### Keywords:

cholesterol, glucose, *Pluchea indica*, sheep

### ■ INTRODUCTION

Sheep, a type of livestock, are widely valued in society for various purposes. This is reflected in the increasing annual demand for lamb meat (BPS 2022). However, a major drawback of lamb meat is its high cholesterol content, which poses a health concern for consumers, potentially leading to an increase in hypercholesterolemia cases. Studies have shown that the lipid profile of sheep meat, including cholesterol levels, is significantly influenced by diet (Widiyanto *et al.* 2023). Additionally, genetic factors play a role in determining cholesterol levels in sheep, and associations have been observed between genetic markers and mineral content and cholesterol levels in lamb meat (Komarudin *et al.* 2024).

*Pluchea indica* is a medicinal plant known for its cholesterol-lowering effects, as demonstrated in studies on grilled chickens (Sukaryana & Priabudiman 2014). Research on sheep feeding behavior suggests that they readily consume *P. indica*, indicating its potential as a beneficial dietary component (Gninkplékpó *et al.* 2024). However, the effects of *P. indica* supplementation on blood cholesterol levels in sheep remain unclear. Therefore, this study aimed to evaluate the impact of *P. indica* on cholesterol and blood glucose levels in sheep.

### ■ MATERIALS AND METHODS

Upon arrival, 15 sheep were immediately administered deworming medication and then randomly assigned to four treatment groups, each receiving different concentrations of

*P. indica* leaf flour in their concentrate feed. Group 1 served as the control and received a standard concentrate diet without *P. indica* leaf flour. Group 2 received a concentrate diet supplemented with 2% *P. indica* leaf flour, Group 3 with 4%, and Group 4 with 8%.

The sheep were fed three times daily for 35 days, with a total feed allocation equivalent to 4% of their body weight in dry matter. At the end of the feeding period, blood samples were collected to measure cholesterol and blood glucose levels. Quantitative data were analyzed using one-way analysis of variance (ANOVA) at a 95% confidence level.

### ■ RESULTS AND DISCUSSION

This study demonstrates that incorporating 4% *P. indica* leaf flour into sheep concentrate effectively lowers blood cholesterol levels ( $p < 0.05$ ) (Table 1), while having no significant effect on blood glucose levels ( $p > 0.05$ ) (Table 2). The normal blood cholesterol level in sheep is 112.10 mg/dL (Hatta *et al.* 2019), while the normal blood glucose range is 42–80 mg/dL (dos Reis *et al.* 2024). These findings confirm that the inclusion of 4% *P. indica* leaf flour in the concentrate effectively reduces blood cholesterol levels in sheep.

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Table 1 Blood cholesterol levels of sheep after 35 days

Treatment group	N	Blood cholesterol levels (mg/dl)
Concentrate + 0%	4	211±12.99 <sup>a</sup>
Concentrate + 2%	4	227±20.45 <sup>a</sup>
Concentrate + 4%	3	189.75±7.37 <sup>b</sup>
Concentrate + 8%	4	216.5±4.36 <sup>a</sup>

Note: N= Number of sheep; Values with different letters within a column indicates significant differences ( $p < 0.05$ )

*Pluchea indica* leaves contain various bioactive compounds, including alkaloids, tannins, essential oils, flavonoids, amino acids (leucine, tryptophan, threonine), vitamins A and C, and minerals such as sodium, calcium, magnesium, and phosphorus. The presence of saponins and alkaloids in *P. indica* plays a crucial role in lowering blood cholesterol levels by inhibiting cholesterol absorption in the bloodstream (Sukaryana & Priabudiman 2014).

This study further suggests that *P. indica* leaf flour reduces blood cholesterol levels by inhibiting the formation of micelle lipid structures, thereby decreasing fat absorption in the digestive system (Vermeer *et al.* 2008). Additionally, cholesterol is removed from the bloodstream by conversion into bile salts. Bile is then secreted into the duodenum, the first segment of the small intestine, where it is broken down by microorganisms and eventually excreted in the feces. *Pluchea indica* leaf flour contains essential oils that stimulate bile production, leading to a reduction in blood cholesterol levels (Lin *et al.* 2008). According to Sukaryana and Priabudiman (2014), *P. indica* may enhance liver function and contribute to cholesterol reduction.

Regarding blood glucose levels, no significant differences were observed across treatments and time points ( $p > 0.05$ ) (Table 2), indicating that the consumption of *P. indica* leaf flour does not affect blood glucose production in sheep. However, the group receiving 4% *P. indica* showed a slight decline in blood glucose levels. This phenomenon may be attributed to the correlation between cholesterol reduction and glucose metabolism. Glucose plays a critical role in metabolism because mitochondria require both oxygen and glucose to produce adenosine triphosphate (ATP), the primary energy source for cellular function (Nakazawa *et al.* 2016).

Table 1 Blood glucose levels of sheep after 35 days

Treatment group	N	Blood glucose levels (mg/dl)
Concentrate + 0%	4	42.33±4.80 <sup>a</sup>
Concentrate + 2%	4	42.25±3.69 <sup>a</sup>
Concentrate + 4%	3	41.50±7.51 <sup>a</sup>
Concentrate + 8%	4	52.50±11.53 <sup>a</sup>

Note: N= Number of sheep; Values with different letters within a column indicates significant differences ( $p < 0.05$ )

## ■ CONCLUSION

Sheep fed a diet containing 4% *Pluchea indica* leaf flour exhibited a significant reduction in blood cholesterol levels after 35 days. However, no significant differences in blood glucose levels were observed between the treatment groups over the same period.

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