

## EFFECT OF SUPPLEMENTATION OF LEMONGRASS OIL (*CYMBOPOGON CITRATUS*) ON HAEMATO-BIOCHEMICAL PARAMETERS OF GROWING KIDS

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Received: 14.07.2023; Accepted: 07.01.2024

### ABSTRACT

The study was conducted on eighteen (18) growing kids of four to six month of age. The experimental kids were selected and randomly divided into three groups viz.  $T_0$ ,  $T_1$  and  $T_2$  with six kids each for 90 days. The diets were formulated as per ICAR, 2013 standard feeding practices in group ( $T_0$ ). The experimental group  $T_1$  was supplemented with Lemongrass oil @ 0.25% of concentrate mixture. The experimental group  $T_2$  was supplemented with Lemongrass oil @ 0.50% of concentrate mixture. The blood samples were collected from the experimental kids on 0<sup>th</sup>, 30<sup>th</sup>, 60<sup>th</sup> and 90<sup>th</sup> days. The observations regarding haematological parameters like Hb, PCV, and TLC and blood biochemical parameters like BUN, SGOT, SGPT, Albumin, and Total protein were recorded during the experimental period. The average values of Hb, PCV and TLC were observed as  $11.46 \pm 0.16$ ,  $11.39 \pm 0.16$  and  $11.28 \pm 0.14$  (g/dl),  $32.20 \pm 0.22$ ,  $32.12 \pm 0.31$  and  $31.90 \pm 0.27$  (%) and  $9.69 \pm 0.04$ ,  $9.66 \pm 0.050$  and  $9.67 \pm 0.04$  ( $\times 10^3/\mu\text{l}$ ) for the treatment groups  $T_0$ ,  $T_1$  and  $T_2$ , respectively. The mean values of Hb, PCV, TLC, BUN, SGPT, SGOT, Albumin, and Total protein in treatment groups  $T_0$ ,  $T_1$  and  $T_2$  were recorded. No significant effect was observed on haematological and biochemical parameters of growing goats when diets were supplemented with different levels of lemon grass oil. It can be concluded that feeding of lemongrass oil at 0.25% and 0.50% of concentrate mixture can be done without any adverse effect on the blood biochemical parameters of goats.

**Keywords:** Blood Parameters, Concentrate mixture, Kids, Lemongrass oil

**How to cite:** Rathod, A.B., Bhalerao, S.M., Khanvilkar, A.V., Shende, T.C., Barate, A.K., Borse, V.A., Thorat, S.K., Garande, S.B. and Saranya, A. (2025). Effect of supplementation of lemongrass oil (*Cymbopogon citratus*) on haemato-biochemical parameters of growing kids. *Haryana Veterinarian*. 64(2): 75-78.

The goat (*Capra hircus*) is one of the oldest domesticated farm animals. The goat is basically a primary source of livelihood of people below poverty line owing to their short generation intervals, greater rates of prolificacy. Natural herbal supplements are used in animal feed to improve production efficiency, protect the environment, and satisfy consumers' expectations for safe food. The scarcity and high prices of high-quality feeds in many underdeveloped nations severely restrict ruminant output. In order to increase meat production, faster growth, it is necessary to provide adequate, balanced nutrition to every animal. Furthermore, the cost of conventional feeds and fodder is high and also increasing day by day which leads to under-feeding. Essential oils (EOs) are concentrated extracts of aromatic oily liquids from various plant materials. Various naturally occurring essential oils have been intensively studied to determine their potential as growth promoters in livestock and poultry (Burt, 2004).

Essential oils have broad range of effects on rumen fermentation and nutrient digestibility. Various studies have shown that essential oils have potential to favourably alter rumen metabolism (McIntosh *et al.*, 2003; Fraser *et al.*, 2007). Lemongrass (*Cymbopogon citratus*) belongs to Poaceae family and is used mainly as medicinal herb in Asia, Africa, Australia and other countries. Lemongrass

(*Cymbopogon citratus*), a medicinal herb in Asia, has recently gained interest as a nutritional supplement and is widely used in human foods. Further, lemongrass has antioxidant and antibacterial properties (Wanapath *et al.*, 2008). The Citral, which is a major constituent of lemongrass, is essential for the synthesis of vitamin A. Lemongrass oil (LGO) contains citric acid around 62.7% along with geranyl acetate (5.27%) and trans geraniol (3.66%) as major constituents. Supplementation of lemongrass powder has a broad range of effects on rumen fermentation and animal health (Wanapath *et al.*, 2008). Lemongrass oil has the potential to reduce methanogenesis (Singh *et al.*, 2018). Lemongrass oil supplementations in pig and poultry have showed similar growth promoting effects like that of antibiotic without causing any adverse effect (Mukhtar *et al.*, 2012; Tartrakoon *et al.*, 2002). Most of the studies on supplementation of lemongrass oil in ruminants are *in-vitro* based and available *in-vivo* studies are of short duration with discrepancy in their results.

### MATERIALS AND METHODS

The experiment was performed on eighteen (18) growing kids for the duration of 90 days. Selection of animals was done on the basis of age, sex, and weight of individual animal. Growing kids between 4-6 months of age were selected for the experimental purpose and randomly divided into three experimental groups viz.  $T_0$ ,  $T_1$

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and T<sub>2</sub> with six kids in each. The diets were formulated as standard feeding practices as per (ICAR, 2013) in group (T<sub>0</sub>). The experimental group T<sub>1</sub> was supplemented with Lemongrass oil @ 0.25% of concentrate mixture. The experimental group T<sub>2</sub> was supplemented with Lemongrass oil @ 0.50% of concentrate mixture. The blood samples were collected from the experimental kids on 0<sup>th</sup>, 30<sup>th</sup>, 60<sup>th</sup> and 90<sup>th</sup> days. The haemato-biochemical estimations were carried out at the Central Instrumental Facility (CIF) of Krantisinh Nana Patil College of Veterinary Science Shirwal. All the experimental kids were stall fed during the experimental period. The shed used for housing of kids was having proper ventilation system, good flooring and also good drainage system. Before starting the experiment, prophylactic treatment was given to all the experimental animals such as deworming with broad spectrum anthelmintic. For estimations of biochemical parameters diagnostic kits manufactured by Robonik® manufactured and marketed by ROBONIK (India) Pvt. Ltd. were used. The blood biochemical estimations were performed on Semi-Automatic Biochemical Analyzer (Model-Erba Mannheim, CHEM 7). The methodology and the set of reagents used in respect of each parameter were as per the recommendations of the manufacturer of the analyzer system. The blood biochemical analysis was done for Blood urea nitrogen (BUN), SGPT (ALT), SGOT (AST), Serum albumin and Serum total protein. The research trial on animals was conducted with ethically acceptable manner without any harm to the animals involved in trial. Data obtained from different

response parameters were subjected to one way ANOVA as per completely randomised design using SPSS statistics software for windows 2019.

## RESULTS AND DISCUSSION

The haematological and blood biochemical parameters findings are presented in Table 1 and 2. The average values of Hemoglobin observed as 11.46±0.16, 11.39±0.16 and 11.28±0.14 for the treatment groups T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>, respectively. The mean values of Hb observed during experimental period are found non-significant among treatment groups. A study conducted by Hussain *et al.* (2020) on Shami goats found interesting results. Hemoglobin concentration was not affected significantly (P≥0.05) by treatment with an alcoholic extract of anise seeds and lemongrass during the 25 and 50 days of the experiment, but after 75 days of treatment, the Hb concentration increased significantly (P≤0.05) in blood of the lemongrass treated animals compared to the control group. In contrast to our study, a recent study by Al-Janabi *et al.* (2023) found that the effect of dietary supplementation of lemongrass at rates of 1%/kg dry matter of concentrated feed in male Awassi lambs resulted in a significant increase (P≤0.05) in the hemoglobin (Hb) concentration compared to the control group.

The average values of PCV observed are 32.20±0.22, 32.12±0.31 and 31.90±0.27 for the treatment groups T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>, respectively. The mean values of PCV observed during experimental period are found non-

**Table 1. Details of effect of Lemongrass oil on Haematological parameters of Goats**

Days	Treatment Group			P-value
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	
<b>Haemoglobin (g/dl)</b>				
0	11.26±0.42	11.23±0.39	11.28±0.45	NS
30	11.48±0.34	11.50±0.37	11.15±0.71	NS
60	11.71±0.22	11.43±0.88	11.47±0.50	NS
90	11.39±0.98	11.39±0.63	11.23±0.37	NS
Mean±SE	11.46±0.16	11.39±0.16	11.28±0.14	NS
<b>Packed Cell Volume (%)</b>				
0	31.87±0.35	31.94±0.73	32.65±0.64	NS
30	31.96±0.50	32.55±0.48	31.58±0.64	NS
60	32.05±0.43	32.09±0.69	31.75±0.34	NS
90	32.93±0.47	31.88±0.68	31.61±0.56	NS
Mean±SE	32.20±0.22	32.12±0.31	31.90±0.27	NS
<b>Total Leukocyte count (×10<sup>3</sup>/μl)</b>				
0	9.71±0.11	9.69±0.09	9.62±0.11	NS
30	9.67±0.11	9.70±0.07	9.68±0.11	NS
60	9.71±0.09	9.64±0.12	9.70±0.08	NS
90	9.67±0.08	9.62±0.12	9.68±0.08	NS
Mean±SE	9.69±0.04	9.66±0.05	9.67±0.04	NS

NS: Non Significant

**Table 2. Details of effect of Lemongrass oil on Blood Biochemical parameters of Goats**

Days	Treatment Group			P-value
	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	
<b>Blood Urea Nitrogen (mg/dl)</b>				
0	13.76±0.12	13.89±0.11	13.85±0.16	NS
30	14.06±0.31	13.82±0.09	14.04±0.35	NS
60	14.02±0.25	14.04±0.31	13.82±0.14	NS
90	13.77±0.26	13.86±0.15	14.01±0.24	NS
Mean±SE	13.90±0.15	13.90±0.09	13.93±0.11	NS
<b>SGPT (U/L)</b>				
0	13.66±0.42	13.23±0.35	13.58±0.44	NS
30	13.45±0.46	13.74±0.44	13.78±0.41	NS
60	13.72±0.56	13.87±0.41	14.01±0.31	NS
90	13.56±0.49	13.81±0.39	13.76±0.44	NS
Mean±SE	13.60±0.22	13.66±0.19	13.78±0.19	NS
<b>Serum SGOT (U/L)</b>				
0	337.09±4.41	335.59±6.70	334.05±6.57	NS
30	333.34±4.29	341.47±6.53	341.13±6.51	NS
60	340.32±6.93	339.50±5.27	344.26±8.36	NS
90	342.33±6.37	340.17±5.94	346.00±8.31	NS
Mean±SE	338.27±2.71	339.18±2.89	341.36±3.62	NS
<b>Albumin (g/dl)</b>				
0	3.02±0.24	3.11±0.25	3.10±0.06	NS
30	3.15±0.12	3.16±0.15	3.08±0.22	NS
60	3.14±0.22	3.06±0.23	3.04±0.17	NS
90	3.13±0.13	3.15±0.07	3.11±0.20	NS
Mean±SE	3.11±0.09	3.12±0.08	3.08±0.08	NS
<b>Serum Total Protein (g/dl)</b>				
0	7.50±0.04	7.48±0.09	7.59±0.15	NS
30	7.59±0.16	7.58±0.15	7.54±0.20	NS
60	7.62±0.14	7.60±0.14	7.59±0.14	NS
90	7.64±0.20	7.60±0.31	7.54±0.29	NS
Mean±SE	7.59±0.10	7.57±0.09	7.56±0.09	NS

NS: Non Significant

significant among treatment groups. A study conducted by Hussain *et al.* (2020) to determine the effect of alcoholic extract of anise seeds and lemongrass on Shami goats found that the packed cell volume was not affected significantly ( $P \geq 0.05$ ) by treatment with an alcoholic extract of anise seeds and lemongrass during the 25<sup>th</sup> and 50<sup>th</sup> day of the experiment. But after 75 days of treatment, the PCV increased significantly ( $P \leq 0.05$ ) in the blood of the lemongrass treated animals compared to the control group. In contrast to our study, a recent study by Al-Janabi *et al.* (2023) found that the effect of dietary supplementation of lemongrass at rates of 1%/kg dry matter of concentrated feed in male Awassi lambs resulted in a significant increase ( $P \leq 0.05$ ) in the Packed cell volume compared to the control group. The average values of TLC observed are  $9.69 \pm 0.04$ ,  $9.66 \pm 0.050$  and  $9.67 \pm 0.04$  for the treatment groups T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>, respectively. The mean values of TLC

observed during experimental period are found non-significant among treatment groups. In contrast to our study, Al-Janabi *et al.* (2023) reported significant decrease ( $P \leq 0.05$ ) in the numbers of white blood cells compared to the control group but not significantly altered at 0.5% level of supplementation. The mean values of Hb, PCV and TLC observed during experimental period are found non-significant among treatment groups and were well within the normal physiological range. Besides this, there are fewer studies available on the effect of lemongrass oil on WBC count. So this study thus paves the way for further research to know relation between lemongrass oil in goat. The values of blood urea nitrogen observed are well within the normal physiological range. The average values of BUN observed are  $13.90 \pm 0.15$ ,  $13.90 \pm 0.09$  and  $13.93 \pm 0.11$  for the treatment groups T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>, respectively. The mean values of BUN observed during experimental

period are found non-significant among treatment groups. The present study results are in according with Hussain *et al.* (2020), Al-Janabi *et al.* (2023), Sudan (2021) and Allam & El-Elaime, 2020. The average values of SGPT observed are  $13.60 \pm 0.22$ ,  $13.66 \pm 0.19$  and  $13.78 \pm 0.19$  for the treatment groups T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>, respectively. The mean values of SGPT observed during experimental period are found non-significant among treatment groups.

The present study results are in according with Sudan (2021), Allam & El-Elaime, 2020. In contrast to our study, Al-Janabi *et al.* (2023) reported a significant decrease ( $P \leq 0.05$ ) in the SGPT as compared to the control group. The values of SGOT observed are well within the normal physiological range. The average values of SGOT (U/L) observed are  $338.27 \pm 2.71$ ,  $339.18 \pm 2.89$  and  $341.36 \pm 3.62$  for the treatment groups T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>, respectively. The mean values of SGOT observed during experimental period are found non-significant among treatment groups.

The present study results are in according with Sudan (2021), Allam & El-Elaime, 2020. In contrast to our study, a recent study by Al-Janabi *et al.* (2023) found that the effect of dietary supplementation of lemongrass at rates of 1%/kg dry matter of concentrated feed in male Awassi lambs resulted in a significant decrease ( $P \leq 0.05$ ) in SGOT as compared to the control group. The average values of serum albumin (g/dl) were recorded as  $3.11 \pm 0.09$ ,  $3.12 \pm 0.08$  and  $3.08 \pm 0.08$  for the treatment groups T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>, respectively. The average mean values of serum albumin are statistically non-significant among the treatment groups. The present study results are in according with Sudan (2021), Al-Salam & Almajmaee, 2020 and Al-Janabi *et al.* (2023). The average serum total protein (g/dl) values recorded at monthly intervals during the experimental period were  $7.59 \pm 0.10$ ,  $7.57 \pm 0.09$  and  $7.56 \pm 0.09$  for the treatment groups T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>, respectively. The values of serum total protein are found statistically non-significant among the treatment groups. The present study results are in according with Sudan (2021), Al-Salam & Almajmaee, 2020 and Al-Janabi *et al.* (2023).

## CONCLUSION

It can be concluded that supplementation of lemongrass oil at 0.25% and 0.50% of concentrate mixture can be done without any adverse effect on the blood biochemical parameters of goats.

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