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The impact of herbal additions amla (*Emblica officinalis*) and giloy (*Tinospora cordifolia*) on the haematological parameters of magra lambs in the semi-intensive management system under the arid zone of western Rajasthan

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Abstract

The aim of this study was to determine the effect of herbal feed additives amla (*Emblica officinalis*) and giloy (*Tinospora cordifolia*) on biometrical measurements of Magra lambs in the semi-intensive management system. The experiment was performed on twenty eight magra lambs of three to four months of age under the semi intensive system, which were randomly distributed into four experimental groups of seven lambs in each group in a randomized block design (RBD). Herbal feed additive Amla (*Emblica officinalis*) fruit powder with seed and Giloy (*Tinospora cordifolia*) stem powder were supplemented at level of 1.5g/kg body weight with concentrate as oral/feed supplemented in T₁ and T₂ group, respectively except control group and T₃ in semi-intensive management system. Group T₃ was supplemented with the combination of Amla (*Emblica officinalis*) fruit powder and Giloy (*Tinospora cordifolia*) stem powder at the level of 0.75g/kg body weight with concentrate as oral/feed. At the end of experiment, no significant changes were found in hematological parameters though; they were within normal hematological range.

Keywords: RBC, WBC, lymphocyte, haemoglobin, platelet

Introduction

The hematological parameters of Magra lamb were evaluated to assess its overall health and physiological condition. These parameters included red blood cell count, white blood cell count, hemoglobin levels, and platelet count. The results provided valuable insights into the lamb's immune system function, oxygen-carrying capacity, and potential presence of any underlying diseases or infections. Furthermore, the red blood cell count indicated the lamb's ability to transport oxygen to various tissues, while the white blood cell count reflected its ability to fight off infections and diseases. The hemoglobin levels gave a measure of the lamb's oxygen-carrying capacity, ensuring proper tissue oxygenation. Additionally, the platelet count provided information on the lamb's ability to form blood clots, which is crucial for preventing excessive bleeding. Overall, these hematological parameters played a crucial role in understanding the overall health and well-being of the Magra lamb.

Materials and Methods

Blood samples from the test lambs were taken in the morning, before the lambs were fed or given water. The samples were taken at monthly intervals by puncture of the jugular vein after aseptic measures. The blood thus collected was collected in sterilized test tubes containing a sufficient amount of anticoagulant. Hematological examinations were performed shortly after blood collection. To separate the serum, the blood was collected in a second tube without anticoagulant and held at an angle. These tubes were incubated at 37°C for 1 hour. Blood clots were broken and tubes were centrifuged at 2500 rpm for 30 minutes. The serum was pipetted into small Pyrex tubes and stored for further analysis of serum albumin (ALB), serum globulin, total serum protein (TP), serum glucose, serum creatinine, serum cholesterol, serum triglyceride, and blood urea nitrogen.

Hematological parameters

Haemoglobin percent, Packed cell volume, Total leucocytes count, Differential leucocytes count and Total erythrocyte count were determined by Fully Automated Hematology Analyzer Model DM-5200.

Results and Discussion

Haemoglobin percent

The mean values of haemoglobin% (Hb) of lambs under various treatment groups at monthly intervals of experiment and overall mean for entire experimental period have been presented in Table 01.

The average values of haemoglobin% (Hb) at 30 days in control, T₁, T₂ and T₃ treatment groups were found to be 9.88, 10.14, 10.17 and 9.82% respectively while at 60 days the values were found to be 10.01, 10.20, 10.23 and 9.75% for control, T₁, T₂ and T₃ treatment groups in the semi-intensive system. At the 90 days haemoglobin% (Hb) in control, T₁, T₂ and T₃ treatment groups were found to be 9.98, 9.96, 10.12 and 9.74%, respectively which differed non significantly with each other. The overall mean contents of haemoglobin (g/dl) were found to be 9.87, 10.00, 10.05 and 9.72 in lambs of control, T₁, T₂ and T₃ treatment groups, respectively in the semi-intensive system. The statistical analysis of variance revealed no significant effect of supplementation of herbal feed additives at each month of experimental period and also on overall mean haemoglobin concentration of experimental lambs in the semi-intensive system.

Table 1: Average values of haemoglobin (%) at different time intervals in different treatment groups in the semi-intensive system

Treatment groups	Period (months)				
	0	I	II	III	Mean
C	9.61	9.88	10.01	9.98	9.87
T ₁	9.68	10.14	10.20	9.96	10.00
T ₂	9.66	10.17	10.23	10.12	10.05
T ₃	9.59	9.82	9.75	9.74	9.72
SEM	0.02	0.09	0.11	0.08	0.07

Note: Means with different superscripts in a column differ significantly

The results obtained in semi-intensive system for haemoglobin percent level in control, T₁, T₂ and T₃ group lies within the normal range of 9 to 15 g percent (Radostitis *et al.*, 2007) [5]. It could be concluded that supplementation of the herbal feed additives Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) in the diets of Magra lambs had no adverse effect on haemoglobin percent concentration in semi-intensive management systems. It indicates that these herbal feed additives may have potential as natural and safe alternatives to synthetic supplements for improving the overall health of lambs in different management systems. The present findings are in accordance with Manju (2010) [4], Ganai (2011) [3] and Chaturvaedi *et al.* (2013) [2]. Chaturvaedi *et al.* (2013) [2] reported no significant difference in haemoglobin values (g/dl) in Barbari kids on *Emblica officinalis*, *Ocimum sanctum*, *Curcuma longa* and *Cleridendrum phlomidis* supplementation.

Packed cell volume (%)

The mean values of packed cell volume (PCV) of lambs under various treatment groups at monthly intervals of experiment and overall mean for entire experimental period have been presented in Table 02.

The average values of packed cell volume at 30 days in control, T₁, T₂ and T₃ treatment groups were found to be 31.71, 31.77, 32.03 and 31.11% respectively while at 60 days the values were found to be 31.31, 31.32, 31.30 and 31.16% for control, T₁, T₂ and T₃ treatment groups in the semi-intensive system. At the 90 days packed cell volume in control, T₁, T₂ and T₃ treatment groups were found to be 32.58, 30.91, 32.81 and 30.20%, respectively which differed non significantly with each other. The overall mean contents of packed cell volume (PCV) (%) were found to be 31.36, 31.03, 31.62 and 30.89 in lambs of control, T₁, T₂ and T₃ treatment groups, respectively in the semi-intensive system. The statistical analysis of variance revealed no significant effect of supplementation of herbal feed additives at each month of experimental period and also on overall mean packed cell volume (PCV) concentration of experimental lambs in the semi-intensive system.

Table 2: Average values of packed cell volume (%) at different time intervals in different treatment groups in semi-intensive system

Treatment groups	Period (months)				
	0	I	II	III	Mean
C	29.85	31.71	31.31	32.58	31.36
T ₁	30.12	31.77	31.32	30.91	31.03
T ₂	30.32	32.03	31.30	32.81	31.62
T ₃	31.09	31.11	31.16	30.20	30.89
SEM	0.27	0.20	0.04	0.64	0.16

Note: Means with different superscripts in a column differ significantly

It could be concluded that supplementation of the herbal feed additives Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) in the diets of Magra lambs had no adverse effect on packed cell volume (PCV) in semi-intensive management systems.

The results obtained in semi-intensive system for packed cell volume (PCV) in control, T₁, T₂ and T₃ group lies within the normal range of 27 to 45 percent (Radostitis *et al.*, 2007) [5]. The present findings are in line with findings of Manju (2010) [4] who reported non significant differences in PCV on supplementation of Shatavri, Brahmi, Bhringraj and Jiwanti in Marwari Rams. Similarly, Ganai (2011) [3] who reported effect of supplementation of Bhringraj non significant for PCV in goats and Arya (2019) [1] also reported non significant of Amla on Magra lambs.

Total Erythrocyte Count (10⁶/mm³)

The mean values of total erythrocyte count (TEC, 10⁶/mm³) of lambs under various treatment groups at monthly intervals of experiment and overall mean for entire experimental period have been presented in Table 03.

The average values of total erythrocyte count (TEC) at 30 days in control, T₁, T₂ and T₃ treatment groups were found to be 8.94, 9.11, 9.28 and 9.25% respectively while at 60 days the values were found to be 8.91, 9.08, 9.15 and 9.11% for control, T₁, T₂ and T₃ treatment groups in the semi-intensive system. At the 90 days total erythrocyte count (TEC) in control, T₁, T₂ and T₃ treatment groups were found to be 9.04, 9.13, 9.13 and 9.09%, respectively which differed non significantly with each other. The overall mean contents of total erythrocyte count (TEC) were found to be 9.01, 9.18, 9.25 and 9.17 in lambs of control, T₁, T₂ and T₃ treatment groups, respectively in the semi-intensive system. The statistical analysis of variance revealed no significant

effect of supplementation of herbal feed additives at each month of experimental period and also on overall mean total

erythrocyte count (TEC) concentration of experimental lambs in the semi-intensive system.

Table 3: Average values of total erythrocyte count ($10^6/\text{mm}^3$) at different time intervals in different treatment groups in semi-intensive system

Treatment groups	Period (months)				
	0	I	II	III	Mean
C	9.15	8.94	8.91	9.04	9.01
T ₁	9.40	9.11	9.08	9.13	9.18
T ₂	9.44	9.28	9.15	9.13	9.25
T ₃	9.22	9.25	9.11	9.09	9.17
SEM	0.07	0.08	0.05	0.02	0.05
Note: Means with different superscripts in a column differ significantly					

It could be concluded that supplementation of the herbal feed additives Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) in the diets of Magra lambs had no adverse effect on total erythrocyte count (TEC) in semi-intensive management systems.

The results obtained in semi-intensive system for total erythrocyte count (TEC) in control, T₁, T₂ and T₃ group lies within the normal range of 9 to 15 million/ mm^3 (Radostitis *et al.*, 2007).^[5]

The present findings are in agreement with Chaturvedi *et al.* (2013)^[2] as they reported no significant difference in RBC level in Barbari Kids on *Emblica officinalis*, *Ocimum sanctum*, *Curcuma longa* and *Clerodendrum phlomidis* supplementation. Arya (2019)^[1] also reported no significant effect of supplementation on Amla on RBC level in Magra lambs.

Total Leukocyte Count ($10^3/\text{mm}^3$)

The mean values of total leukocyte count (TLC, $10^3/\text{mm}^3$) of lambs under various treatment groups at monthly

intervals of experiment and overall mean for entire experimental period have been presented in Table 04.

The average values of total leukocyte count (TLC) at 30 days in control, T₁, T₂ and T₃ treatment groups were found to be 10.94, 11.15, 10.88 and 10.80% respectively while at 60 days the values were found to be 10.88, 11.02, 10.87 and 10.55% for control, T₁, T₂ and T₃ treatment groups in the semi-intensive system. At the 90 days total leukocyte count (TLC) in control, T₁, T₂ and T₃ treatment groups were found to be 10.74, 10.84, 10.66 and 10.56%, respectively which differed non significantly with each other. The overall mean contents of total leukocyte count (TLC) were found to be 10.83, 11.01, 10.82 and 10.69 in lambs of control, T₁, T₂ and T₃ treatment groups, respectively in the semi-intensive system. The statistical analysis of variance revealed no significant effect of supplementation of herbal feed additives at each month of experimental period and also on overall mean total leukocyte count (TLC) concentration of experimental lambs in the semi-intensive system.

Table 4: Average values of total leukocyte count ($10^3/\text{mm}^3$) at different time intervals in different treatment groups in semi-intensive system

Treatment groups	Period (months)				
	0	I	II	III	Mean
C	10.76	10.94	10.88	10.74	10.83
T ₁	11.05	11.15	11.02	10.84	11.01
T ₂	10.85	10.88	10.87	10.66	10.82
T ₃	10.87	10.80	10.55	10.56	10.69
SEM	0.06	0.07	0.10	0.06	0.07
Note: Means with different superscripts in a column differ significantly					

The results obtained in semi-intensive systems for total leukocyte count (TLC) in control, T₁, T₂ and T₃ group lies within the normal range of 4 to 12 thousand/ mm^3 (Radostitis *et al.*, 2007)^[5]. The present findings are in agreement with Chaturvedi *et al.* (2013)^[2] as they reported no significant difference in WBC values in Barbari Kids on *Emblica officinalis*, *Ocimum sanctum*, *Curcuma longa* and *Clerodendrum phlomidis* supplementation. Arya (2019)^[1] also reported no significant effect of supplementation on Amla on WBC level in magra lambs.

Differential Leukocyte Count (DLC)

The data of DLC values recorded in different treatment groups have been presented in Table 05 in the semi-intensive system. The overall mean values of lymphocyte (%) were found to be 55.80, 56.78, 56.70 and 57.18% in control, T₁, T₂ and T₃ treatment groups, respectively in the

semi-intensive system. The overall mean values of neutrophils (%) were found to be 42.55, 42.98, 42.89 and 42.65% in lambs of control, T₁, T₂ and T₃ treatment groups, respectively in the semi-intensive system. The overall mean values of monocytes (%) were found to be 2.14, 2.22, 2.14 and 2.10% in lambs of control, T₁, T₂ and T₃ treatment groups, respectively in the semi-intensive system. The overall mean values of eosinophils (%) were found to be 3.89, 3.83, 3.76 and 3.82% in lambs of control, T₁, T₂ and T₃ treatment groups, respectively in the semi-intensive system. Further, the basophil count was recorded zero in all the monthly observations. The statistical analysis of variance revealed no significant effect of supplementation of herbal feed additives at each month of experimental period and also on overall mean of different leukocyte i.e. lymphocyte, neutrophil, monocyte and eosinophil count of experimental lambs in the semi-intensive system.

Table 5: Average values of differential leukocyte count at different time intervals in different treatment groups in semi-intensive system

Treatment groups	Period (months)				
	Lymphocyte count (%)				
	0	I	II	III	Mean
C	55.77	54.03	57.06	56.35	55.80
T ₁	56.37	57.28	56.84	56.64	56.78
T ₂	56.21	56.17	57.40	57.00	56.70
T ₃	56.35	56.99	57.91	57.45	57.18
SEM	0.14	0.74	0.23	0.24	0.29
Treatment groups	Period (months)				
	Neutrophil count (%)				
	0	I	II	III	Mean
C	43.11	41.57	42.51	43.00	42.55
T ₁	42.96	42.98	42.98	42.98	42.98
T ₂	43.14	42.24	43.20	42.97	42.89
T ₃	42.97	42.18	42.78	42.66	42.65
SEM	0.05	0.29	0.15	0.08	0.10
Treatment groups	Period (months)				
	Monocyte count (%)				
	0	I	II	III	Mean
C	2.15	2.27	2.03	2.12	2.14
T ₁	2.08	2.66	2.07	2.08	2.22
T ₂	2.06	2.40	2.05	2.06	2.14
T ₃	2.09	2.18	2.08	2.04	2.10
SEM	0.02	0.11	0.01	0.02	0.03
Treatment groups	Period (months)				
	Eosinophil count (%)				
	0	I	II	III	Mean
C	3.74	4.09	3.92	3.83	3.89
T ₁	3.84	3.78	3.80	3.91	3.83
T ₂	3.78	3.87	3.64	3.77	3.76
T ₃	3.92	3.78	3.87	3.73	3.82
SEM	0.04	0.07	0.06	0.04	0.03

Note: Means with different superscripts in a column differ significantly

It could be concluded that supplementation of the herbal feed additives Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) in the diets of Magra lambs had no adverse effect on lymphocyte, neutrophil, monocyte and eosinophil count in semi-intensive management systems. These findings are fall in line with findings of Arya (2019) [1] who reported no significant effect of Amla on lymphocyte, neutrophil, monocyte and eosinophil count of experimental lambs.

Conclusion

It could be concluded that supplementation of the herbal feed additives Amla (*Emblica officinalis*) and Giloy (*Tinospora cordifolia*) in the diets of Magra lambs had no adverse effect on haematological parameters of magra lambs in the semi-intensive management system.

Future scope

The inclusion of Amla and Giloy in the diets of Magra lambs actually showed no effects on their overall health and well-being. Further research is necessary to explore other potential benefits of Amla and Giloy in the diets of Magra lambs or to identify alternative supplements that may have a more pronounced impact on hematological parameters.

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