Journal of the Andaman Science Association Vol. 25(2):151-155 (2020)
ISSN 0970-4183, Printed in India

Comparative White and Red Blood Cell Profiles of Multiparous Andaman Local Goats Under Field and Farm Conditions

R. R. Alyethodi*, S. Karthik, J Sunder, S.K. Ravi, P. Perumal, P.A. Bala and S.C. Mayuri
Division of Animal Science, ICAR-Central Island Agricultural Research Institute,
Port Blair-744105, Andaman & Nicobar Islands, India
**Corresponding Author: rfq_rahman@yahoo.co.in*

Abstract

Hematological profiles of Andaman local goats of Bay Islands was carried to determine the influence of the feeding system (farm vs field), breed admixture (ALG vs other admixture), and parity (1-3 vs >3) on white and red blood cell profiles. Significant ($P \leq 0.05$) differences were evident in white blood cells (WBC) of farm animals. However there is no significant difference was noted on other studied hematological parameters on feeding system, breed admixture and parity. The present study supports the possible influence of feed composition on the blood cell profiles especially WBC counts in Andaman Local goats and may be useful in the formulation of feeds in the A&N Islands.

Keywords: Andaman Local goats, hematology, parity, feeding system, breed admixture

Introduction

Goats are considered as the best small ruminant in terms of survivability under extremely hard conditions (Al-Bulushi et al, 2017). They were reared under low-cost input by small, marginal farmers, and landless laborers for milk, meat, and wool (Inbaraj et al, 2017). Andaman and Nicobar Islands is an archipelago located in the Bay of Bengal with a hot humid climate and an annual rainfall of 3100 mm (De et al, 2013). The population of goats was about 42.1% and distributed on different islands. Goats are reared mostly under the free-grazing system in forests

jackfruit leaves. They were four distinct goat populations available such as Andaman local goats, Teressa goats, Malabari goats, and their crosses. Andaman local goat is similar to black Bengal goats that are inhabited by local settlers from Bengal. Teressa goats that were mainly located in Teressa islands that are similar to Indonesian Kambing Katchang goats (Kundu et al, 2010) and Malabar goats were native of Kerala (Sunder et al, 2016).

Blood is a rich source of nutrients and provides basic life to all mammals. Hematological parameter analysis provides nutritional status thus can be applied for diagnosis, treatment, and prognosis (De et al, 2013). The values are variable and depend on age, physiology, by region wise and breed (Yadav et al, 2002 and Tambuwal et al,). There are many studies carried on indigenous goats for identifying hematological parameters from around the world such as Kuwaiti's Aradi, exotic Damascus and Barbari goats (Mohammed et al, 2016), Nigerian indigenous goat breeds of semi-arid: Kano Brown, Borno White, and Sokoto Red goats (Njidda et al, 2013), different Omani goat breeds such as Jabali, Jabal Al-Akhdar, Sahrawi, and Sahrawi Musandam (Al-Bulushi et al, 2017) and Martaneshi indigenous race (Vasilika Dini et al, 2017). Hematological profiles of Andaman and Nicobar Islands based on sex are available (Sunder et al, 2016). This study was carried on Andaman local goats to assess the influence of rearing system, parity and breed admixture on blood cell profiles.

Methodology

Experimental animals and sample collection

Random populations of 30 Multiparous Andaman local goats reared by the farmers of different areas of south Andaman are selected randomly for this study. Blood samples were collected aseptically from jugular vein puncture in EDTA vacutainer tubes (BD-vacutainer). Samples were transported to the lab in a portable refrigerator at 4-8 °C. All the samples are assessed for their blood cell profiles (white blood corpuscles -WBC, red blood corpuscles-RBC, Lymphocytes-LYM,

Granulocytes- GRAN, mean corpuscular volume, and MID- less frequently occurring and rare cells correlating to monocytes, eosinophils, basophils, blasts, and other precursor white cells that fall in a particular size ranges) using a hematology analyzer (Prokan electronics)

Data collection and Statistical Analysis

Breed data is collected on Andaman local goat and other admixtures having brown, white colors, etc. Does with one or more kidding records are included in the parity data. Data were expressed as least square mean ± S.E.M. A p-value of ≤ 0.05 was considered significant. The breed effects (Andaman local goat vs other admixture), the effect of parity (1-3 vs >3), and the effect of feeding conditions (Farmers flock vs Farm flock) were analyzed using the PROC GLM model of Statistical Analysis Software (SAS Institute Inc., Cary, NC, USA, 2002). The following model was used for analysis.

$$Y_{ijk} = \mu + A_i + P_j + M_k + e_{ijk}$$

Where: Y_{ijklmn} was the hematological parameter of the doe, μ is overall mean, A_i was the fixed effect of i^{th} admixture group; P_j was the effect of j^{th} parity group, M_k was the k^{th} effect of management group; e_{ijk} is the error fraction.

Results and Discussion

The average values of the blood cellular profile of Andaman local goats have been represented in table 1. The influence of the feeding system (field and farm), breed admixture (Andaman Local goats, and others), and parity (low and high) on blood cell profiles have been represented in table 2. A significant difference was found only on the WBC count of farm animals than from field goats. There were no significant differences were noted on other studied blood parameters according to the feeding system, breed admixture and parity.

Table 1: Average Hematological profile of Andaman Local Goat

Dependent Variable	Mean	Std. Error
WBC (x10³/µl)	21.85625	1.265634516
LYM%	35.05625	1.387322624
MID%	10.125	1.75676075
GRAN%	54.81875	2.460169688
RBC (× 10⁶/µl)	1.149375	0.127270934
Mean corpuscular Volume (fL)	42.70625	0.483258795

Table 2: Hematological profile of Andaman Local Goat

Parameters	Rearing System		Breed Admixture		Parity	
	Field (n=18)	Farm (n= 11)	ALG (n=17)	Others (n=12)	parity low (n=9)	parity high(n=20)
WBC (x10³/µl) *	**20.272[b] ±1.483**	**25.764[a] ±1.409**	22.196± 1.227	21.988± 1.814	22.475± 1.646	21.9± 1.421
LYM%	37.037 ±2.105	33.927± 2.538	34.65± 1.948	38.362± 2.88	41.1± 2.613	34.209± 2.257
MID%	9.288± 1.397	8.155± 1.685	9.006± 1.453	8.788± 2.149	8.308± 1.95	9.191± 1.684
GRAN%	52.975± 3.47	57.918± 3.25	56.344± 2.834	52.85± 4.191	50.592± 3.802	56.6± 3.283
RBC (× 10⁶/µl)	1.121± 0.138	1.109± 0.166	1.118± 0.149	1.007± 0.22	0.993± 0.2	1.098± 0.173
Mean corpuscular Volume (fL)	42.656± 0.507	42.936± 0.612	42.989± 0.548	42.383± 0.81	42.808± 0.735	42.625± 0.635

Values are expressed as LSM±SEM. Values with different superscript indicate significance at p-value ≤ 0.05

The values of WBC count, observed in the present study, were similar to the reported values of Teresa goats from the A&N Islands (Sunder et al, 2016). The WBC counts, reported in this study, are higher than from other reported studies (Piccione et al, 2010, Elitok, 2012, Mohammed et al, 2016, Shaikat et al, 2013 and Egbe-nwiyi et al, 2000). However, higher values, similar to the present study, were also noted in certain Northern Nigerian breeds such as Kano brown (Buck and Boe), Borno white (Doe), and Red Sokoto (Buck and Doe) (Njidda et al, 2013) and certain Omani breeds such as Jabali, Sahrawi and Sahrawi Musandam (Al-Bulushi, 2017).

The present study report influence of the feeding system on the WBC counts while the parity and breed admixtures don't influence WBC significantly. As all the studied animals are healthy with no fever or other symptoms of diseases are reported, the reason for infection as a cause of high WBC count may be omitted. The parasitic load levels are not assessed in any of the studied animals. Oral administration of Albendazole is regularly practiced/advised in the Island goat farmers under AICRP on Goat and all the animals, utilized in this study, are registered animals on this program. The field and farm animals are generally reared in a free-range foraging system. However, the concentrate feeding is largely practiced at farm animals only. Hence, the higher WBC count may indicative of the effect of concentrate feeding on goats or may be due to different forages nourished by the goats under farm and field conditions. Similar to the present study, the influence of feed composition on the WBC count has been reported where the goats fed with a high amount (200g) of *Balanites aegyptiaca* leaves showed higher (20.4 X 10^3 cells /µl) compared to non-feeding of this leaves (16.8 X 10^3 cells /µl) in Red Sokoto Goats (Hyelda et al., 2017). Also, the blood parameters (average Hb (g/dl), PCV (%) and RBC (106 /cm^3) count) were reported high in stall-feed goats than grazing goats group (Patil et al., 2014). Another study report higher WBC count, however non-significant, when yam peel meal is given to goats (Oloche et al., 2018).

The percentage of Lymphocyte, reported in this study, was similar to Teresa goats of A&N Islands (Sunder et al, 2016) and Barbari goats (Mohammed et al, 2013). These values, however, lower than reported values in Black and White Aardi, and Damascus goats (Mohammed et al, 2013), different Omani breeds (Al-Bulushi, 2017) and different breeds of Northern Nigeria (Njidda et al, 2013), black Bengal and Jamunapari goats (Shaikat et al, 2013). The lymphocyte percentages were not significantly influenced by the feeding system, breed admixture and parity. The Granulocytes % (Neutrophils, basophils and eosinophils) value was lower than Black Bengal and Jamunapari goat breeds (Shaikat et al, 2013). Neutrophils % and the MID % (WBC other than lymphocytes and Neutrophils), presented in this study were lower than Teresa goat (Sunder et al, 2016). None of the individual WBC % was influenced significantly by the parity, different breed admixture and under management, conditions show significance.

Mean corpuscular volume (MCV) is the average size of red blood cells or erythrocytes. The present MCV is comparable to Teresa goats (Sunder et al, 2016) and black Bengal and Jamunapari goats (Shaikat et al, 2013). The present value was higher than Sannen goats (Elitok, 2012), Barbari, Black and White Aardi, and Damascus goats (Mohammed et al, 2013), different Omani breeds (Al-Bulushi, 2017), WAD goats (Olayemi et al, 2008). Even the present MCV was lower to Kano brown and Red Sokoto breeds of Northern Nigeria (Njidda et al, 2013).

The present RBC values were similar to Teresa (Sunder et al, 2016) and Sokoto red (Njidda et al, 2013, Hyelda et al., 2017). Even the lower values were majorly noted on Kano brown and Borno white breeds of Northern Nigeria (Njidda et al, 2013). The present values were found lower to multiple other reports; Sannen goats (Elitok, 2012), Barbari, Black and White Aardi and Damascus goats (Mohammed et al, 2013), different Omani breeds (Al-Bulushi, 2017), WAD goats (Olayemi et al, 2008), black Bengal and Jamunapari goats (Shaikat et al, 2013) and the normal expected reference values are between 8-18$10^6$ cells/µl. The larger deviation from the expected range for RBC count observed in this study and also reported in the Teressa goat of this Island (Sunder et al., 2016) indicate the possibility of anemia in the goat populations of A&N Islands and need further interventions. According to parity, different breed admixture and feeding systems

were not significant. It is reported that under intensive management conditions, RBC values of WAD were found higher than extensively managed goats (Olayemi et al, 2008).

Conclusion

Baseline information on white and red blood cell profile of multiparous Andaman Local goats under field and farm conditions were established. The obtained values were comparable with some of the described studies and deviating from some other studies. The present study found significant WBC value change in farm fed animals than field goats. An overall reduced RBC count is noticed in the ALG and other admixtures of A&N Islands which need further interventions. The obtained data can be useful for further studies on Andaman Local goats.

References

Al-Bulushi, S. & Al-Hasani, S.T.A. (2017). Some hematological and biochemical parameters of different goat breeds in Sultanate of Oman "A preliminary study", *Veterinary World* 10: 461-466.

De, A.K, Kundu, A, Kundu, M.S, Sunder, J. and Jeyakumar, S. (2013) Comparative study on haematological traits of endangered Andaman wild pig and other indigenous pig breeds available at Andaman and Nicobar Islands, India, *Veterinary World* 6(10):794-798.

Egbe-Nwiyi, T.N, Nwaosu, S.C. & Salami, H.A. (2000). Haematological Values of Apparently Healthy Sheep and Goats as Influenced by Age and Sex in Arid Zone of Nigeria. *African journal of Biomedical Research 3: 109 – 115.*

Elitok, B. (2012) Reference Values for Hematological and Biochemical Parameters in Saanen Goats Breeding in Afyonkarahisar Province Kocatepe Vet J 5 (1): 7 – 11

Hyelda, A.J., Yahya, M.M., Abakura, J.B., & Wafar, R.J. (2017). Haematological and Biochemical Parameters of Red Sokoto Goats Fed Desert Date (Balanites aegyptiaca) Leaves as Supplement to Urea Treated Maize Stover. Journal of Advances in Biology &

Kundu, A., Jai Sunder, Jeyakumar, S., Verma, S. K., Kundu, M. S., De, A. K., and Srivastava, R. C. (2010). Livestock and Poultry Production Policy for Andaman and Nicobar Islands: A scientific perspective, Central Agricultural Research Institute, Port Blair.

Mohammed, S.A., Razzaque, M.A., Omar, A.E., Albert, S., & Al-Gallaf, W.M., (2016). Biochemical and hematological profile of different breeds of goat maintained under intensive production system. *African Journal of Biotechnology* 15(24):1253-1257

Njidda, A.A, Hassan, I.T. & Olatunji, E.A. (2013). Hematological and biochemical parameters of goats of semi-arid environment fed on natural grazing rangeland of Northern Nigeria. *Journal of Agriculture and Veterinary Science* 3: 1–8.

Nwiyi, E.T.N., Nwaosu, S.C. & Salami, H.A. (2000). Haematological values of apparently healthy sheep and goats as influenced by age and sex in arid zones of Nigeria. *African Journal of Biomedical Research* 3: 109–115.

Olayemi, F.O., Oboye, O.O., Azeez, I.O., Oyagbemi, A.A. & Soetan, K.O. (2009). Influence of management systems and sex on haematology of West African dwarf goat. *African Journal of Agricultural Research* 11: 1199-1202.

Oloche, J., Kume, A.B., & Ayoade, J.A. (2018). Blood

levels of yam peel meal with Ficus polita as basal diets. *Nigerian Journal of Animal Science*, *20*(3), 203-212.

Patil, M., Kumar, P., Teggelli, R.G., & Ubhale, P. (2014). A Study on Comparison of Stall Feeding System of Goat Rearing with Grazing System. *APCBEE procedia*, *8*, 242-247

Piccione, G., Casella, S., Lutri, L., Vazzana, I., Ferrantelli, V., & Caola, G. (2010). Reference values for some haematological, haematochemical and electrophoretic parameters in the Girgentana goat.*Turkish Journal of Animal Science* 34: 197–204.

Shaikat, A.H., Hassan, M.M., Khan, S.A., Islam M.N., Hoque M.A., Bari, M.S. & Hossain, M.E. (2013). Haematobiochemical profiles of indigenous goats (*Capra hircus*) at Chittagong, Bangladesh, *Veterinary World* 6(10):789-793.

Sophia, I., Kundu, A., De, A. K., Sunder, J. & Sejian, V. (2017). Seasonal changes in blood biochemical and endocrine responses of different indigenous goat breeds of tropical island agro-ecological environment, *Biological Rhythm Research* (doi:10.1080/09291016 .2017.1366723).

Sunder, J., Sujatha, T., Kundu, A., Kundu, M.S. and Sophia, I. (2016). Haemato Biochemical Profile of the Teressa Goat: An Indigenous Goat of A&N Islands, India. *J. Immunol. Immunopathol*. 18(1): 47-50.

Sunder, J., Sujatha, T., Kundu A., Kundu, M.S. & Sophia, I. (2016) Haemato-Biochemical Profile of the Teressa Goat: An Indigenous Goat of A&N Islands, India. *Journal of Immunology and Immunopathology* 18: 47-50.

Vasilika, D. Fatgzim, L. & Pëllumb, Z. (2017). Haematological blood parameters in indigenous goats. *Analele IBNA 31: 37-40.*

Yadav, S.P., Kundu, A., Ahlawat, S, P, S., Senani, S., Chatterjee, R.N., Saha, S.K., Bharathi, D., & Kumar, J. (2002). Heamatological parameters of indigenous goat of Andaman. *Indian Veterinary Journal* 79: 665-667.

Received : 15th July 2020 Accepted : 18th November 2020