



ISSN: 2456-2912

NAAS Rating (2025): 4.61

VET 2025; 10(10): 386-389

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www.veterinarypaper.com

Received: 25-09-2025

Accepted: 24-10-2025

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Performance of *Tenyi vo* pig on diet supplemented with stingless bee (*Tetragonula iridipennis*) honey

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DOI: <https://www.doi.org/10.22271/veterinary.2025.v10.i10f.2661>

Abstract

The study entitled performance of *Tenyi vo* pig on diet supplemented with stingless bee honey was carried out to study the effect of stingless bee honey on the performance of *Tenyi vo* pigs. The research observation was conducted using twenty four weaned *Tenyi vo* female piglets age two months, for a period of first farrowing. The treatment groups T₂, T₃ and T₄ were given stingless bee honey at the rate of 0.5 ml, 1.0 ml and 1.5 ml per liter respectively in drinking water on alternate days, and T₁ control group. There was a significant difference ($p < 0.05$) in RBC, WBC, Hb, PCV and MCV among the groups, with T₃ 7.81 $10^6/\mu\text{l}$, 23.50 $10^3/\mu\text{l}$, 15.22 g/dl, 41.3% and 56.55 fl showing the higher value respectively. Thus, incorporating stingless bee honey at 1.5 ml into the diet of *Tenyi vo* pigs is recommended for farmers in Nagaland.

Keywords: *Tenyi vo* pig, stingless bee honey, blood, hematological parameters, north eastern

Introduction

Livestock plays a vital role in Indian agriculture by providing draught power for crop cultivation and transportation. It also contributes substantially to the production of organic manure, thereby improving soil fertility and crop productivity. Furthermore, livestock serves as an important source of food, income, and nutrition, supporting rural households and helping to alleviate poverty (Sothu *et al.*, 2024) ^[19]. In particular, pig rearing constitutes a major livelihood activity among the tribal communities of the North Eastern Region of India. The growing demand for pork, driven by rising per capita income, urbanization, and changing lifestyles and dietary habits, presents a valuable opportunity for the region's inhabitants to enhance their income through pig farming (Laha *et al.*, 2014) ^[6].

Stingless bees are the smallest among honey-producing species, and their honey holds great importance in the lives of tribal farmers, benefiting both humans and livestock by promoting health and well-being (Souza *et al.*, 2006) ^[20]. Belonging to the tribe *Meliponini*, stingless bees encompass several genera, including *Melipona*, *Trigona*, and *Heterotrigona*. These bees are widely distributed across tropical and subtropical regions such as Africa, Southeast Asia, Australia, and South America (Mohd Rafie *et al.*, 2018) ^[11]. In India, *T. iridipennis* and *T. laeviceps* are the most common species found (Rahman *et al.*, 2018) ^[13].

Stingless bee honey (SBH) is highly valued for its diverse medicinal and nutritional benefits and has long been used as a natural remedy for various ailments (Zulkhairi Amin *et al.*, 2018; Souza *et al.*, 2006) ^[26, 20]. Compared to honey produced by *Apis mellifera*, SBH possesses a milder taste and distinctive physicochemical characteristics, including differences in sugar content, water percentage, mineral composition, and ash levels. It is further defined by its specific color, acidity, pH, electrical conductivity, and viscosity (Nordin *et al.*, 2018; Souza *et al.*, 2021) ^[12, 21].

Biochemically, SBH is enriched with bioactive compounds such as flavonoids, antioxidants, and antibacterial agents. These constituents contribute to its remarkable therapeutic potential, including wound healing, anti-diabetic, and anticancer properties (Mohammad *et al.*, 2021; Bafo *et al.*, 2019; Santisteban *et al.*, 2019) ^[10, 4, 14].

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Owing to these complex biological and functional components, SBH may serve as a potent natural supplement capable of enhancing animal growth and overall health. Despite its promising properties, there is a lack of scientific data regarding the effects of SBH supplementation on livestock, particularly on *Tenyi vo* pigs. Therefore, the present study seeks to investigate the influence of stingless bee honey on the growth performance and health parameters of *Tenyi vo* pigs, providing a foundation for future research in this emerging field.

Materials and Methods

A total of twenty four (24) weaned *Tenyi vo* pigs of fifty to sixty (50-60) days of age was selected for the present study from the farm of Indian Council of Agricultural Research All India Coordinated Research on pig (ICAR-AICRP), Department of Livestock Production and Management, School of Agricultural Sciences, Nagaland University, Medziphema Campus-797106, Nagaland. The experimental animals were randomly selected irrespective of body weight and sex. The piglets were divided into four treatments with five animals in each group, the first group as control and the second, third and fourth was provided with the test material stingless bee honey at different levels of: 0, 0.50, 1.00 and 1.50 ml once in two (2) days in drinking water. Four animals from each treatment group were selected and blood samples were collected from the annual through ear vein using sterile syringe and needle (Photo plate 3). About 2 ml of blood sample collected from each animal using ethylene Diamine tetra acetic acid (EDTA) collected into a specimen tube for hematological parameters. Haematological profiles such as red blood corpuscles, white blood corpuscles, haemoglobin, packed cell Volume and mean corpuscular volume were estimated using whole blood samples following standard methods described by Sastry (1989) [17]. All the data obtained were analysed by following a Completely Randomized Design (CRD) using one-way analysis of variance (ANOVA) as per Snedecor and Cochran (1980). The differences between treatments were analyzed by using a one-way analysis of variance (ANOVA) at a 5% significance level to determine the significance and non-significance of the variance of the different treatments. Further, the differences between the feed intake and feed conversion efficiency treatments were analyzed by Duncan's Multiple Range Test (DMRT) method to determine the difference between the treatments.

Results and Discussion

Hematological parameter

The average red blood cell (RBC) counts (Table.1) recorded for groups T₁, T₂, T₃, and T₄ were 5.25, 6.32, 7.81, and 6.45 million cells/ μ l ($10^6/\mu$ l) groups, respectively. The RBC count was significantly higher ($p<0.05$) in the T₃ group ($7.81\times 10^6/\mu$ l) compared to all other groups. The T₄ group ($6.45\times 10^6/\mu$ l) also showed a significantly higher RBC count

than the control (T₁) but was lower than T₃. The white blood cell (WBC) counts for T₁, T₂, T₃, and T₄ were 24.29, 23.56, 24.50, and $16.17\times 10^3/\text{cumm}$, respectively. No significant differences were observed among T₁, T₂, and T₃, which recorded similar values. However, the T₄ group exhibited a significantly lower WBC count ($16.17\times 10^3/\text{cumm}$) compared to the other groups ($p<0.05$). The normal WBC range reported by Sastry *et al.* (2019) [17] is $11-22\times 10^3/\text{cumm}$. The slightly elevated WBC values in *Tenyi vo* pigs may be attributed to their alert temperament and stress during handling or transportation for blood collection. Hemoglobin (Hb) concentrations for T₁, T₂, T₃, and T₄ were 10.25, 11.30, 15.22, and 12.32 g/dl, respectively. The T₃ group exhibited the highest Hb value (15.22 g/dl), significantly different from all other treatments ($p<0.05$). The T₄ group (12.32 g/dl) also showed significantly higher Hb levels than T₁ (10.50 g/dl) but lower than T₃. The T₂ group (11.30 g/dl) showed intermediate values without significant differences from T₁ or T₄. Packed cell volume (PCV) percentages were 38.23%, 35.19%, 41.3%, and 38.89% for T₁, T₂, T₃, and T₄, respectively. The T₃ group recorded a significantly higher PCV (41.3%) than T₁ and T₂, indicating enhanced erythropoiesis and improved oxygen-carrying capacity. The T₄ group (38.89%) showed no significant difference from T₁. Mean corpuscular volume (MCV) values were 51.27, 53.38, 56.55, and 55.89 fl for T₁, T₂, T₃, and T₄, respectively. The T₃ group had a significantly higher MCV (56.55 fl) than the other groups ($p<0.05$), suggesting that Stingless Bee Honey supplementation positively influenced red blood cell size. Similar findings were reported by Xin *et al.* (2018) [24], who observed improved erythropoiesis in pigs fed natural supplements. The Hb and PCV values recorded in this study align with the normal physiological ranges reported by Sastry *et al.* (2019) [17] and are consistent with those of Mili *et al.* (2020) [9], who reported 10.98 ± 0.74 g/dl Hb and $32.98\pm 1.07\%$ PCV in pigs. Higher PCV values generally indicate better health and oxygen transport efficiency. This observation supports the findings of Sahlan *et al.* (2020) [15], who noted that Stingless Bee Honey maintained normal PCV levels in diabetic rats, emphasizing its role in supporting haematological health.

Conclusion

The findings of the present study demonstrate that dietary supplementation with Stingless Bee Honey has a positive influence on the haematological parameters of *Tenyi vo* pigs. Among the treatments, the T₃ group exhibited the most favourable results, with significantly higher values of RBC, haemoglobin, PCV, and MCV, indicating enhanced erythropoiesis, improved oxygen-carrying capacity, and better overall blood health. Although WBC counts remained within or slightly above the normal physiological range, the lower WBC level observed in T₄ suggests that higher honey supplementation may help stabilize immune responses.

Table 1: Effect of stingless bee honey on hematological parameters of different treatment groups.

Hematological Parameters					
Treatments	RBC(10^6 cell/ μ L)	WBC (Cumm.)	Hb (g/dl)	PCV (%)	MCV (fl)
T ₁	5.25 ^a	24.20 ^a	10.50 ^a	38.75 ^a	51.72 ^a
T ₂	6.61 ^{ab}	23.76 ^a	11.35 ^{ab}	35.35 ^a	54.30 ^b
T ₃	7.88 ^c	24.50 ^a	15.02 ^c	44.77 ^b	57.35 ^c
T ₄	6.99 ^b	16.17 ^b	12.60 ^b	39.82 ^a	56.85 ^c
SE(m)	0.21	2.66	0.58	0.70	0.31
CD (P=0.05)	0.68	0.85	0.18	0.22	0.96

^{a, b, c}. Means bearing different superscript in column differ significantly at 5% level of significance

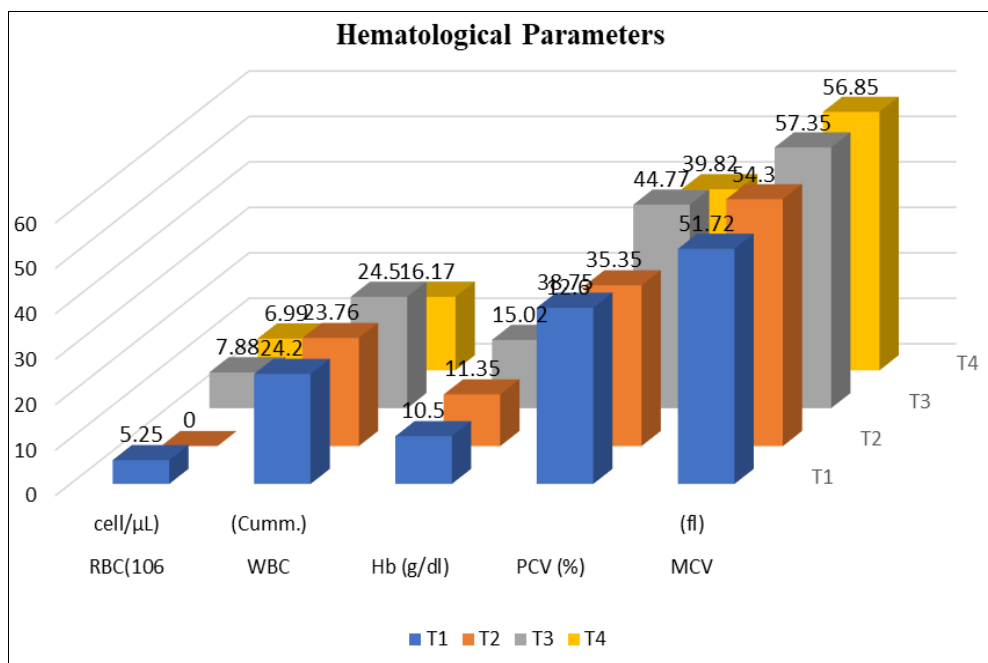


Fig 1: Effect of stingless bee honey on hematological parameters of different treatment groups

Overall, these results suggest that Stingless Bee Honey, when supplemented at appropriate levels, can serve as a natural functional additive to improve haematological health and physiological performance in pigs. Its bioactive compounds likely contribute to improved blood profile and general well-being. Further research is recommended to determine the optimal inclusion level and to explore its long-term effects on productivity and immunity in livestock.

Acknowledgement

The authors would like to express their gratitude to ICAR-AICRP on Pig Nagaland center, for funding this research study. They also acknowledge the support of ICAR-AICR on Pig, Medziphema, Nagaland, for providing *Tenyi vo* pigs for the study.

Conflict of interest

There is no conflict of interest on this article.

Financial Support

Not available

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How to Cite This Article

Singh R, Rutsa MC, Vidyarthi VK, Zuyie R, Nizamuddin, Savino N, *et al.* Performance of Tenyi vo pig on diet supplemented with stingless bee (*Tetragonula iridipennis*) honey. International Journal of Veterinary Sciences and Animal Husbandry. 2025;10(10):386-389.

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