

NEUTROPHIL: LYMPHOCYTE RATIO OF PURE AND CROSSBRED NIGERIAN INDIGENOUS PIGS

O. O. OLUWOLE

Institute of Agricultural Research and Training, Obafemi Awolowo University, Nigeria.

oluwafulunmike@yahoo.co.uk; 07031567164

ABSTRACT

Pigs play a major role in socio economically by serving as a source of income for rural population and fulfilling an important role in culture and food security. Neutrophil- lymphocyte ratio (NLR) can be defined as the ratio of absolute neutrophil count to the absolute lymphocyte count.

Fifty-one weaners were randomly selected at 9, 17 and 25 weeks of age for haematological analysis. Blood from the jugular veins of these pigs were collected into anti-coagulant bottles and taken to the laboratory for analysis. The blood parameters taken were leukocyte traits represented by neutrophilic count (NEU%) and lymphocyte percentage (LYM%). NLR was calculated by dividing the mean neutrophil counts by the mean lymphocyte count. Haematological data recorded were analyzed by using Analysis of variance (ANOVA) and means were separated by Duncan Multiple Range Test (DMRT). The NLR values were significant between the two breeds where NIP NLR was higher throughout the ages.

INTRODUCTION

Pigs are a genus of even-toed ungulates from the family of Suidae. The name hog commonly refers to as the domestic pig (*Sus domestica*) in everyday parlance. They are omnivores, and despite their reputation for gluttony, they are generally social and very intelligent animals (Myer and Fox, 2011). They play a major role in socio economically by serving as a source of income for rural population and fulfilling an important role in culture and food security. The population of pig in Nigeria increased from 2 million in 1984 to 7 million in 1997 before the widespread of ASF epizootic (Dafwang, 2010). Disease is one of the factors that affect the livestock production in Nigeria (Abubakar, 2003).

Neutrophil lymphocyte ratio (NLR) can be defined as the ratio of absolute neutrophil count to the absolute lymphocyte count. It has been regarded as a marker of the immune response to offending agents or pathogens (Alexander, 2016). He also described it as a useful tool for prediction and prognosis of medical conditions. The use of circulating leukocyte has recently been used for measuring stress and adrenocortical activities, especially NLR in ungulates while heterophil: lymphocyte ratio (HLR) for birds. Sayers (1950) reported that glucocorticoids concentration increases as lymphocyte and Eosinophil numbers tend to decrease while number of polymorphonuclear

leukocytes (neutrophil and heterophil) tends to increase. Zahorec (2001) reported that it is a rapid and simple indicative parameter for systematic inflammation and stress.

This study aims to evaluate the circulating total and differential Leukocyte count- NLR of Nigerian pigs and its hybrid at three post weaning age 9, 17 and 25 weeks.

MATERIALS AND METHODS

Fifty-one weaners were randomly selected at 9, 17 and 25 weeks of age for haematological analysis. Blood from the jugular vein of these pigs were collected into anti-coagulant bottles and taken to the laboratory for analysis. The blood parameters taken were leukocyte traits; neutrophilic count (NEU%) and lymphocyte percentage (LYM%).

Blood was well mixed on a roller mixer and 1:20 dilution of blood was made by adding 20ul (0.02ml) of pigs blood to 0.38ml of diluting fluid (2% glacial acetic acid in distilled water (Turk's solution) colored pale violet with 1% gentian violet) in a 75x10mm tube. The suspension was well mixed and allowed to stand for 1 minute. The cells were counted in the four corner square millimeters of the charged chamber (Improved Neubauer counting chamber) under x10 magnification of a microscope. Leukocyte counts were determined using the improved Neubauer counting chamber (Jain, 1986) while the NLR

was calculated by dividing the mean neutrophil counts by the mean lymphocyte count.

Haematological data recorded were analyzed by using Analysis of variance (ANOVA) and means were separated by Duncan Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

The effect of genotype and age on NLR of hybrid and NIP at 9, 17 and 25 weeks of age are shown in Table 1. The NLR values of Hybrid and NIP at 9, 17 and 25 weeks respectively were as follows: 0.21 ± 0.07 , 0.76 ± 0.10 ; 0.41 ± 0.10 , 0.86 ± 0.13 and 0.56 ± 0.05 , 0.57 ± 0.07 respectively. The graphical presentation of the effect of genotype and age on NLR of the hybrid and NIP is shown in Figure 1. The effect of genotype and sex on NLR of hybrid and NIP were shown in Table 2 below, where the NLR values of Hybrid male and female were 0.31 ± 0.09 and 0.53 ± 0.04 while the NIP male and female were 0.68 ± 0.0 and 0.77 ± 0.08 respectively. The graphical presentation of the effect of genotype and sex on NLR of the hybrid and NIP was shown in Figure 2.

From the report of Oluwole and Omitogun 2016, the Leukocyte count, NEU and LYM, were significantly different ($P < 0.05$) between hybrid and NIP at 9 and 17 weeks of age while there was no significant difference ($P > 0.05$) at 25 weeks of age. It was observed that the LYM values for hybrid were higher than that of NIP while the NEU value for NIP were higher than that of hybrid throughout the ages considered (9, 17 and 25 weeks) as shown in Table 3 below. The normal values of Neutrophil and Lymphocytes were 45 and 40-60. The normal value of NLR for pigs range from 0.50 to 1.13 (Morrow-Tesch and Anderson 1994). Alexander defined Neutrophilia or lymphopaenia when NLR is high and lymphocytosis or neutropaenia when NLR is low. High NLR points to a predominance of inflammatory factors in the aetiopathogenesis of different conditions and possibly indicates subgroups of patients with similar disorder that will benefit from anti-inflammatory agents.

From this study both NIP and Hybrid were in normal range throughout the ages with the exception of Hybrid at 9wks of age. This might be because of the age been close to weaning age (8 weeks) and the piglets were just building up their immune system. There was a report that the

piglets that has higher weight during the weaning age used to have lower NLR because of their introduction into a new social environment and they experienced stress, as indicated by changes in their behavior and physiology (Meese and Ewbank, 1973; Dantzer and Mormede, 1983; Lofstedt, 1986). Most pigs recover from the stress of weaning within 1 to 2 week(s) of age and resume a normal pattern of weight gain (McGlone and Curtis, 1985). Some pigs, however, do not adapt to the new environmental and social situation but develop a chronic stress syndrome. The same observation was observed on the effect of genotype and sex where there was significant on hybrid sex while there was no significant on NIP sex. Male of both breed had higher value of NLR than that of the female NLR.

From the study, it was observed that the NLR values were significant between the two breeds where NIP NLR was higher throughout the ages. The values obtained were collaborated with the normal pigs that Morrow-Tesch and Anderson (1994) worked with. The higher values of NIP NLR may probably be due to their anxiety nature, high tolerance to parasitic load and underlying stress during the recent climatic change especially high temperature during dry season in the tropical region where water dry up on time.

In conclusion, the effect of genotype and age was significant on NLR with the NIP having higher NLR value than that of Hybrid throughout the ages. The NLR value of the weaners at 9 weeks of age was lower in both breeds. The male NLR value was also found to be higher than that of female NLR value in both breeds.

REFERENCES

- Abubakar, M.B., Ngele, D.J.N and Achaji, M.B. (2003). In: *Problems of Annual livestock production in Nigeria. A case study of Akko Local Government Area of Gombe State. Proceedings of the 28th conference of the Nigerian Society for Animal Production*. Pp 71-73.
- Alexander, N.I. (2016). Reference Values of Neutrophil-Lymphocyte Ratio, Platelet-Lymphocyte Ratio and Mean Platelet Volume in Healthy Adults in North Central Nigeria. *J Blood Lymph* 6:143. doi:10.4172/2165-7831.1000143

- Dafwang, I.I., Adebambo, O.A and Adesehinwa A.O. K. (2010). Status of pigs Production and Marketing in Nigeria: An Overview of Current Practises, Problems and Prospects. *Proceedings: First Nigerian International Pig Summit*, 22-25 November, Institute of Agricultural Research Institute, Ibadan. Pp 1-17.
- Dantzer, R., and P. Mormhde. 1983. Stress in farm animals: A need for reevaluation. *J. Anim. Sci.* 57:6.
- Lefstedt, M. 1986. Clinical and physiological effects of weaning in pigs with special reference to post-weaning growth depression. Ph.D. Dissertation. Swedish Univ. Agric.Sci., Uppsala.
- McGlone, J. J., and S. E. Curtis. 1985. Behavior and performance of weanling pigs in pens equipped with hide areas. *J. Anim. Sci.* 60:20.
- Meese, G. B., and R. Ewbank. 1973. The establishment and nature of the dominance Hierarchy in the domesticated pig. *Anim.Behav.* 21:326.
- Morrow-Tesch J. and Andersson G. (1994), Immunological and Hematological Characterization of the Wasting Pig Syndrome. *J Anim Sci.*;72(4):976-83.
- Oluwole O.O. and Omitogun G.O.(2016). Haematological Traits of Nigerian Indigenous Pig and Its Hybrid (50% Large White × 50 NIP) at Post Weaning Ages. *American Journal of Molecular Biology*, 6, 45-52. (U.S.A)
- Widowski T.M. (1989). The Neutrophil:Lymphocyte Ratio in Pigs Fed Cortisol. *Can. J. Anim. Sci.* Downloaded from www.nrcresearchpress.com www.nrcresearchpress.com/doi/abs/10.4141/cjas89-058
- Zahorec R (2001) Ratio of neutrophil to lymphocyte counts—rapid and simple parameter of systemic inflammation and stress in critically ill. *Bratisl Lek Listy* 102: 5-14.

Table 1: Effect of genotype and age on NLR.

Age	Breed	
	NLR(Hybrid)	NLR(NIP)
9wk	0.31±0.07 ^b	0.76±0.10 ^a
17wk	0.52±0.10 ^b	0.86±0.13 ^a
25wk	0.45±0.05 ^a	0.57±0.07 ^a

^{a,b} Mean values for each trait along row with different superscript letters, are different *Level of significance (P<0.05)
NLR-Neutrophil Lymphocyte ratio, NIP-Nigerian Indigenous Pig

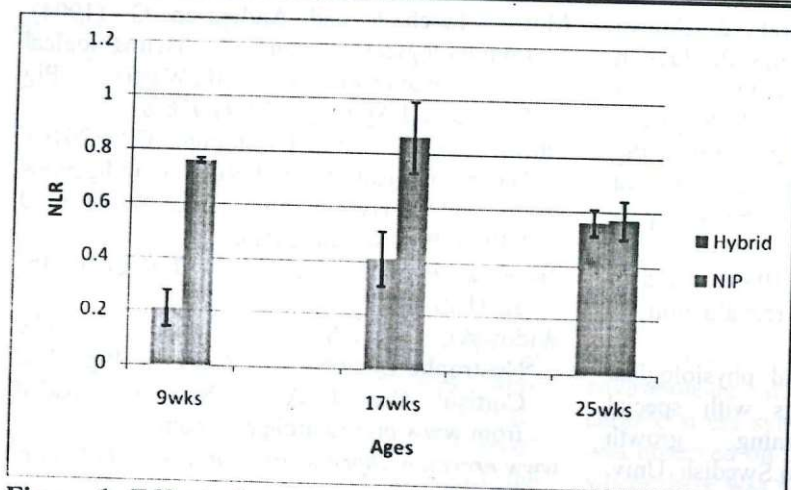


Figure 1: Effect of genotype and age on NLR

Wks-Week NLR-Neutrophil Lymphocyte ratio, NIP-Nigerian Indigenous Pig

Table 2: Effect of genotype and sex on NLR.

Sex	Breed	
	NLR(Hybrid)	NLR(NIP)
F	0.31±0.09 ^b	0.68±0.09 ^a
M	0.53±0.04 ^a	0.77±0.08 ^a

^{a,b} Mean values for each trait along row with different superscript letters, are different *Level of significance (P<0.05)
NLR-Neutrophil Lymphocyte ratio, NIP-Nigerian Indigenous Pig

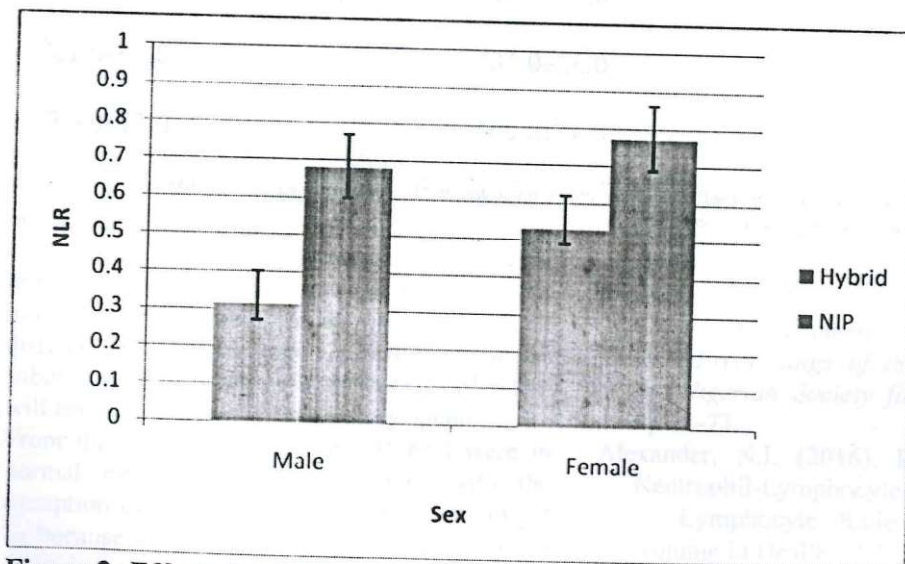


Figure 2: Effect of genotype and sex on NLR

NLR-Neutrophil Lymphocyte ratio, NIP-Nigerian Indigenous Pig