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PLASMA CONCENTRATIONS OF T_3, T_4, TESTOSTERONE AND CORTISOL IN NIANG MEGHA AND GHUNGROO PIGLETS

R K Mohapatra[2], J Goswami[2], N H Mohan[3], M K Tamuli[4], A V Verma[5], , K K Bonia[6], Ilakhi Deka[7] And D K Sarma[8]

National Research Centre on pig, Indian Council of Agricultural Research, Rani, Guwahati-781 131, Assam, India

[2,6 and7]College of Veterinary Science, Assam Agricultural University, Khnapara, Guwahati-781 022, Assam, India

ABSTRACT

A study was carried out to know concentration of triiodothyroxin(T_3), throxine(T_4), testosterone and cortisol level of these two local breeds pigs like *Niang Megha and Ghungroo breeds of India. All plasma hormones were estimated cortisol and testosterone by using radioimmunoassy method. The result of baseline data revealed that mean values of T3, T4, cortisol and testosterone were varied significantly (P<0.0P) at different age of 2, 3, 4, 5 and 6th months of age of the both the breeds with no significant difference between the breeds, sexes and age groups.*

Key words: Local piglets, Ghungroo, Niang Megha,T_3, T_4, cortisol, testosterone.

INTRODUCTION

Niang Megha is a breed of pig from Garo, Khasi and Jaintia hills of Meghalaya reared for pork and bristle purpose. These animals have typical wild look with erect bristles on dorsal midline of back and small erect ears extended vertically(Annonymous[3] 2015). Ghungroo is an indigenous strain of pig first reported from North Bengal is popular among the local people because of their high prolificacy and ability to sustain in low input system and this breed produces high quality pork utilizing agricultural byproducts and kitchen wastes. Some of these selected sows have delivered litter size of 17 piglets at birth (Annonymous[1], 2012). These two local most prolific monogastric omnivorous animals are of

social choice with greatest interest of customary interest both for ritual and very good source of cheapest meat with highest of some important endocrinological substances in blood of the said important monogastric animals. The quantitative estimation of ovarian hormone in blood mainly progesterone is still known to be a best tool for monitoring the functional state of reproduction or to detect the degree of efficiency of female animals and the serum levels of thyroid secretion directly reflect thyroid function and this hormone explained to have positive role in reproduction of animals through the process of basal metabolism while concentration in blood indicate male behavior (Mcdonald, 1980). Cortisol is considered to be indicator of stress (Lyimo *et al*., 2007). Perusal of available literature revealed lack of information on these hormones in regards to Niang Megha and Ghungroo brdees of pigs. Hence, it was felt to elucidate normal levels of serum hormones like triiodothyroxin(T_3), throxine(T_4), testosterone and cortisol level of these two local breeds.

Six piglets of Niang Megha and six piglets of Ghungroo local breeds of good health and normal physiological status were selected for the present study. Blood samples were collected in heparinised vacutainers from ear vein of each animal of both sexes and two breeds at 2, 3, 4, 5 and 6th months of age. Then blood samples were centrifuged at 3000rpm and plasma samples were stored at -20^0c for analysis. Estimation of plasma T_3, T_4, cortisol and testosterone by using quality radioimmunoassy kits. The result were analyzed according to Snedecor and Cochran (1994) for comparison and interpretation of the resultedvalues.

The mean concentration of plasma concentration of T_3, T_4, cortisol and testosterone of Niang Megha and Ghungroo piglets of the investigation are shown in table 1 and 2 respectively. The result indicated that mean concentration of plasma T_3, T_4, cortisol and testosterone were varied significantly ($p<0.01$) at different age groups of the both Niang Megha and Ghungroo piglets with an increasing trend of concentrations along with advancement of age with no significant difference between the breeds and sexes age groups except mean testosterone which was highest at 5^{th} month and lowest at 2^{nd} week after birth in the both breeds. Pertaining to piglets of Niang Megha and Ghungroo breeds no literature on normal plasma level of these T_3, T_4, cortisol and testosterone had been found. However, it was also reported that T_4 level was lower at the end of fattening ($p<0.01$) with no visible changes were seen in T_3 level during fattening of Polish Landrace×Polish large white pigs

(Kapelanska *el al*., 2004[a]). Kapelanski *et al*.(2004[b]) reported that the concentration of T_4 ranged from 52.80 to 56.08ng/l fatteners and also T_3 concentration was slightly lower in same group of pigs (0.665 *vs* 0.777ng/l). The critical difference test indicated that mean

plasma concentration of T_3 was found to be significantly highest at 6th month both sexes and lowest at 2nd month. Similarly, mean blood concentration of T_4 had significantly higher concentration at 5th and 6th month of all piglets. While both T_3 and T_4 levels in blood were found not to be variable consistently variable as shown in Table 1. These variation of T_3 and T_4 concentrations might be related to the growth and other prevailing environmental factors affecting basal metabolism with no other complications. Hence, these value considered to be normal with concurrent variations of cortisol (Wrutniak, C. and Cabello, G.,1987; Annonymous[4], 20015). While it was opined that the lack of significant correlations between the level of triiodothyroxine could be attributed to the fact that T_3, unlike T_4, is not bound by carrier proteins and consequently, it is several times more biologically active than thyroxine and has a short half-life (Malinowska, 1999). It could also be explained that triiodothyroxine is several times more active than thyroxine and its absolute blood level once determined, cannot be a conclusive criterion for evaluating the intensity of metabolic changes in pigs(Kapelanski *et al*., 2004). Hensch *et al*, (2010) reported 735nmol/l and 754nmol/l of cortisol in serum of piglets at 9 and 11 days respectively after birth. On the other hand critical difference test revealed that mean plasma cortisol levels were found to be highest on 2nd month after birth of both breeds and means were gradually decreasing while they were lowest on 6th month of age. This variation of plasma cortisol levels might be related to adaptation of piglets to surrounding environment Similarly it was reported to be (Anonymous[2], 2014) highest at birth (91.18±9.43-108.15±8.96ng/ml) within 1hour after birth while it was lowest on 3rd day after birth (30.98+2.98-32.66+4.80 ng/ml). Fagundes, (2008) and Nalini *et al*.(2013) reported a significant variation ($p<0.05$) of cortisol levels were observed in local pigs of as an indicator of heat stress while Schwarzenberger *et al*.(1993) reported testosterone concentration 9.4 µmol/l at threeweeks of age of Yorkshire male. Moreover, the critical difference test shown that the mean values of male hormone were found to be significantly lowest on 2nd moth after birth and gradually increased to highest levels on 5th and 6th month after birth. Significantly highest plasma concentration of testosterone might be necessary to continue to help in male development of sexual behavior of growing piglets and it was opined that the influence environmental events immediately

after birth, the role of testosterone on expression of adult sexual behavior could not be nullified(Matuszczyyk *et al*, 1990). Hence, this could be concluded that the present findings of plasma hormones of Niang Megha and Ghungroo piglets studied provided basic information on their variation at different age after farrowing though it requires more precise study under different managemental conditions to achieve clarity of parameters in the present study.

Table 1. Variation of plasma variation of T_3 and T_4 during growth period of Niang Megha and Ghungroo pigs

Breed	Sex	Age of piglets(months)					Age of piglets(months)				
		2	3	4	5	6	2	3	4	5	6
		Mean concentration of T_3(nmol/l)					Mean concentration of t_4(nmol/l)				
Niang Megha	Male	0.428^{a} ±0.03	0.501^{a} ±0.02	0.579^{b} ±0.05	0.794^{c} ±0.03	0.812^{d} ±0.01	39.034^{a} ±4.43	32.606^{b} ±3.63	29.442^{c} ±4.51	39.352^{a} ±6.12	46.916^{d} ±4.78
	Female	0.464^{a} ±0.02	0.694^{b} ±0.01	0.737^{b} ±0.04	0.850^{c} ±0.03	0.753^{b} ±0.06	29.212^{a} ±5.51	31.642^{b} ±6.01	42.532^{c} ±5.86	45.134^{c} ±6.23	45.356^{c} ±6.25
Ghungroo	Male	0.795^{a} ±0.04	0.790^{a} ±0.03	0.700^{b} ±0.05	0.777^{b} ±0.02	0.911^{c} ±0.07	44.554^{a} ±6.30	43.630^{a} ±4.88	44.770^{a} ±5.02	42.202^{b} ±4.48	48.152^{c} ±4.33
	Female	0.657^{a} ±0.01	0.786^{b} ±0.06	0.637^{b} ±0.05	0.703^{c} ±0.03	0.822^{d} ±0.04	35.292^{a} ±4.44	29.804^{b} ±3.73	37.610^{c} ±4.47	40.008^{d} ±5.54	45.952^{d} ±4.66

Table2. Variation of plasma variation of testosterone and cortisol during growth period of Niang Megha and Ghungroo pigs

Breed	Sex	Age of piglets(months)					Age of piglets(months)				
		2	3	4	5	6	2	3	4	5	6
		Mean concentration of cortisol(nmol/l)					Mean concentration of testosterone(ng/ml)				
Niang Megha	Male	205.70^{a} ±11.34	195.80^{b} ±13.54	152.80^{c} ±15.76	115.70^{d} ±16.45	106.50^{d} ±10.33	4.754^{a} ±1.30	6.134^{a} ±1.45	7.738^{b} ±1.54	9.012^{c} ±1.29	7.542^{b} ±1.34
	Female	209.60^{a} ±10.38	208.30^{a} ±12.44	158.00^{b} ±9.53	131.80^{c} ±10.43	118.00^{d} ±8.99	-				
Ghungroo	Male	191.10^{a} ±11.12	177.00^{b} ±10.22	145.10^{c} ±0.95	130.40^{c} ±8.14	93.50^{d} ±7.74	4.712^{a} ±0.98	6.028^{b} ±1.74	7.736^{b} ±0.89	8.080^{c} ±1.55	6.894^{d} ±0.99
	Female	182.70^{a} ±9.31	182.30^{b} ±10.11	137.10^{b} ±0.88	119.30^{c} ±1.01	84.00^{d} ±0.89	-				

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