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Comparative haematological studies of Pygmy Hogs (*Porcula salvania*) in captivity

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Abstract
Pygmy hog (*Porcula salvania)* is one of the most endangered wild suids. It was presumed to live in tall grasslands in Himalayan foothills. The species was found only in reserved and protected habitat of north-west Assam during 1971. Total 29 blood samples were collected from apparently healthy animals from Research and Breeding Centre and Pre-release centre of Pygmy Hog Conservation Programme. From each animal 2 ml of blood was collected from cephalic vein using anticoagulant. The haematological parameters like haemoglobin (Hb), packed cell volume(PCV), total erythrocyte count(TEC), total leucocyte count (TLC), differential leucocyte count(DLC), mean corpuscular volume(MCV), mean corpuscular haemoglobin concentration (MCHC) and mean corpuscular haemoglobin (MCH) were studied. Data were analyzed using SAS System.
The mean haematological values of Hb, PCV, TEC and TLC of the male pygmy hogs were numerically higher than those of the females in both the habitats; although the variations were non-significant.

Keywords: Pygmy Hog, captivity, male-female and hematology

Introduction
Pygmy hog (*Porcula salvania)* is one of the most endangered wild suids. The pygmy hog was once abundant in Himalyan foothills from Uttar Pradesh to Nepal, now confined to small isolated pocket of Manas Tiger Reserve and reintroduced population in Sonai-Rupai Wildlife Sanctuary and Orang Rajib Gandhi National Park of Sonitpur and Darrang District of Assam, India respectively (Narayan and Deka, 2012) [3]. Pygmy hog is an important indicator species whose rapid disappearance is involved to the degradation of their preferred grassland habitat. Its preferred habitat has been the tall, dense, riverine grassland areas where they feeds on roots, tubers and other vegetable matters and occasionally insects, earthworms and other invertebrates. The modification and destruction of its habitat for agriculture, human settlements, overgrazing by cattle, uncontrolled seasonal burning etc. had led to its gradual disappearance from the forest. There is paucity of literature on haematological values of pygmy hogs. Deka and Bhattacharyya (1984) [1] reported some aspects of haematological values of pygmy hogs at different age groups and at pre and post-parturition periods. The present communication deals with studies of some haematological parameters of pygmy hog. The purpose of the study was to establish a healthy population after released into their natural habitat under reintroduction programme.

Materials and methods
The blood samples were collected from the animals that were kept in captivity at Research and Breeding Centre (R&B) and Pre-release Centre, Potasali of "Pygmy Hog Conservation Programme. Twenty nine (29) animals were selected for release in batches to Sonai Rupai wildlife sanctuary in Sonitpur district of Assam. Out of the 29 animals, 14 blood samples from Pre-release centre and 15 samples from Research and Breeding centre were collected to evaluate their haematological profile. For the purpose of re-introduction, those animals were kept in Pygmy Hog Conservation Programme (Pre-release) Centre, Potasali, near Nameri national park, Sonitpur district, Assam for acclimatization. The animals were kept in this simulated natural habitats intended to encouraging natural foraging, nest building and other behaviours for few weeks before release. From each animal 2 ml of blood was collected from cephalic vein using EDTA as anticoagulant @ 1-2 mg/ml of blood. The haematological parameters like haemoglobin (Hb), packed cell volume (PCV), total erythrocyte count (TEC), total leucocyte count (TLC), differential leucocyte count (DLC), mean corpuscular volume

(MCV), mean corpuscular haemoglobin concentration (MCHC) and mean corpuscular haemoglobin (MCH) were studied using the method described by Schalm (1909) [5]. Data were analyzed using SAS System.

Results

Different haematological values of the pygmy hogs according to their age in different habitats are shown in Tables 1, 2, 5 and 6 and in male and female in respective habitat in Table 3, 4, 7 and 8.

Table 1: Haematological values of Pygmy hogs of up to **2** years of age in Research and Breeding (R&B) Centre

Animal No.	Sex	Hb%	PCV%	TEC x10^6	TLC x10^3	L	N	E	M	B	MCV	MCHC	MCH
125	F	10.2	48	5.28	9.55	61	36	2	1	0	90.90	21.25	19.32
210	F	10.6	52	7.17	8.15	55	35	10	0	0	72.52	20.38	14.78
211	F	13.4	54	6.06	7.79	45	47	6	2	0	89.26	24.81	22.15
215	F	11.6	54	6.50	8.50	53	43	3	1	0	83.07	21.48	17.84
216	F	14.4	58	7.81	8.45	65	32	2	1	0	74.26	24.82	18.44
223	M	12.0	50	6.5	10.25	70	29	1	0	0	76.92	24.0	18.46
224	M	14.2	52	6.91	7.30	60	34	4	2	0	75.25	27.30	20.55
231	F	13.2	52	6.49	7.25	61	33	5	1	0	80.12	25.38	20.34
232	M	14.6	60	7.25	14.10	58	36	6	0	0	82.75	24.33	24.14
235	F	14.0	54	8.00	7.25	62	33	4	1	0	67.50	25.92	17.50
Mean ± SE		12.82 ±0.51	53.4 ±1.12	6.79 ±0.26	8.86 ±1.9	59 ±2.17	35.8 ±1.69	4.3 ±0.83	0.9 ±0.23	0	79.25 ±2.34	23.96 ±0.71	18.95 ±0.33

Table 2: Haematological values of Pygmy hogs of above 2 years of age in Research and Breeding (R&B) Centre

Animal No.	Sex	Hb%	PCV %	TEC x10^6	TLC x10^3	L	N	E	M	B	MCV	MCHC	MCH
199	M	13.8	52	7.04	9.60	62	30	7	1	0	73.86	26.54	15.74
200	M	11.0	50	6.55	8.85	70	27	2	1	0	76.34	22.0	16.79
206	M	13.6	60	7.16	7.40	48	45	4	2	1	83.92	22.67	17.9
116	F	12.8	55	7.24	11.25	68	25	4	2	1	75.97	23.27	17.68
176	M	15.0	62	8.15	5.50	68	40	0	0	0	76.07	24.19	18
Mean ± SE		13.24 ±0.66	53.8 ±2.29	7.23 ±0.26	8.52 ±0.98	61.6 ±3.87	33.4 ±3.88	3.4 ±1.18	1.2 ±0.37	0.4 ±0.24	77.23 ±1.73	23.73 ±0.86	18.21 ±0.49

Table 3: Haematological values of Male Pygmy hogs in Research and Breeding (R&B) Centre

Animal No.	Hb%	PCV%	TEC x 10^6	TLC x 10^3	L	N	E	M	B	MCV	MCHC	MCH
176	15.0	62.0	8.15	5.50	60	40	0	0	0	76.07	24.19	18.40
199	13.8	52.0	7.04	9.60	62	30	7	1	0	73.86	26.54	19.60
200	11.0	50.0	6.55	8.85	70	27	2	1	0	73.34	22.00	16.79
206	13.6	60.0	7.16	7.40	48	45	4	2	1	83.92	22.66	18.99
223	12.0	50.0	6.50	10.25	70	29	1	0	0	76.92	24.00	18.46
224	14.2	52.0	6.91	7.30	60	34	4	2	0	75.25	27.30	20.55
232	14.6	60.0	7.25	14.10	58	36	6	0	0	82.76	24.33	20.14
Mean ± SE	13.46 ±0.54	55.14 ±1.99	7.08 ±0.21	9.00 ±2.6	61.14 ±2.86	34.42 ±2.44	3.43 ±0.97	0.85 ±0.34	0.14 ±0.14	77.45 ±9.78	24.57 ±0.73	18.99 ±0.18

Table 4: Haematological values of Female Pygmy hogs in Research and Breeding (R&B) Centre

Animal No.	Hb%	PCV%	TEC x 10^6	TLC x 10^3	L%	N%	E%	M%	B%	MCV	MCHC	MCH
116	12.8	55.0	7.24	11.25	68	25	4	2	1	79.20	23.41	18.50
125	10.2	48.0	5.28	9.55	61	36	2	1	0	90.90	21.25	19.32
210	10.6	52.0	7.17	8.15	55	35	10	0	0	72.52	20.38	14.78
211	13.4	54.0	6.06	7.79	45	47	6	2	0	89.26	24.81	22.15
215	11.6	54.0	6.50	8.50	53	43	3	1	0	83.07	21.48	17.84
216	14.4	58.0	7.81	8.45	65	32	2	1	0	74.26	24.82	18.44
231	13.2	42	6.49	7.25	61	33	5	1	0	80.12	25.38	20/34
235	14.0	54.0	8.00	7.25	62	33	4	1	0	67.50	25.92	17.50
Mean ± SE	12.53 ±0.55	52.13 ±1.76	6.81 ±0.2	8.52 ±0.8	58.75 ±2.61	35.5 ±2.41	4.5 ±0.93	1.13 ±0.23	0.12 ±0.13	79.20 ±2.86	23.43 ±0.75	18.50 ±0.76

Table 5: Haematological values of Pygmy hogs of up to 2 years of age in Pre-Release Centre

Animal No.	Sex	Hb%	PCV%	TEC x 10^6	TLC x 10^3	L%	N%	E%	M%	B%	MCV	MCHC	MCH
1/6	M	12.8	52	6.45	11.44	56	40	2	2	0	80.62	24.61	19.84
1/7	M	13	56.0	7.00	12.35	49	45	4	2	0	80.00	23.31	18.57
1/10	F	12.4	55.0	6.25	13.43	58	36	5	1	0	88.00	22.54	17.84
2/2	F	12.0	44.0	6.0	7.82	60	35	3	2	0	73.31	27.27	20.0
2/4	M	15.2	60.0	7.45	8.23	62	24	7	2	0	80.53	25.33	20.40
2/5	F	13.4	60.0	6.50	6.56	67	26	4	2	1	92.30	22.33	20.62
4/12	F	12.6	50.0	6.0	6.59	65	25	7	2	1	83.33	25.20	21.0
4/13	F	13.2	56.0	7.0	6.56	55	40	4	1	0	80.0	23.57	18.86

4/14	M	13.0	58.0	7.25	7.65	65	30	3	2	0	80.0	22.41	17.93
Mean ± SE		13.06 ±0.30	54.55 ±1.72	6.65 ±0.18	8.96 ±0.85	59.67 ±1.92	33.44 ±2.52	4.33 ±0.58	1.78 ±0.15	0.22 ±0.15	82.01 ±1.81	24.06 ±0.56	19.45 ±0.39

Table 6: Haematological values of Pygmy hogs of above 2 years of age in Pre-Release Centre

Animal No.	Sex	Hb%	PCV%	TEC x 10^6	TLC x 10^3	L%	N%	E%	M%	B%	MCV	MCHC	MCH
1/8	F	13.2	55.0	6.88	9.33	69	24	5	2	0	79.94	24.0	19.19
1/9	F	11.0	49.0	5.74	6.53	57	35	5	2	1	85.37	22.49	19.16
2/1	F	16.4	60.0	8.96	9.54	56	34	9	1	0	66.96	27.33	18.30
2/3	M	12.0	54.0	6.26	10.12	67	31	1	1	0	86.26	22.22	19.17
4/11	F	12.4	49.0	6.12	12.61	70	26	3	1	0	80.06	25.31	20.26
Mean ± SE		13.0 ±0.92	53.4 ±2.06	6.79 ±0.57	9.63 ±0.98	63.8 ±3.02	30 ±2.17	4.6 ±1.33	1.4 ±0.24	0.2 ±0.2	79.72 ±79.71	24.27 ±0.95	19.24 ±0.31

Table 7: Haematological values of Male Pygmy hogs in Pre-Release Centre

Animal No.	Hb g%	PCV%	TEC x 10^6	TLC x 10^3	L%	N%	E%	M%	B%	MCV	MCHC	MCH
1/6	12.8	52.0	6.45	11.43	56	40	2	2	0	80.62	24.61	19.84
1/7	13.0	56.0	7.50	12.34	49	45	4	2	0	74.67	23.31	17.33
2/3	12.0	54.0	6.26	10.12	67	31	1	1	0	86.26	22.22	19.17
2/4	15.2	60.0	7.45	8.23	62	24	7	2	0	80.53	25.33	20.40
4/14	13.0	58.0	7.48	7.65	65	30	3	2	0	77.54	22.41	17.38
Mean ± SE	13.2 ±0.53	56.0 ±1.41	7.03 ±0.28	9.96 ±0.5	59.8 ±3.28	34 ±3.76	3.4 ±0.03	1.8 ±0.2	0	79.92 ±1.93	23.57 ±0.61	18.82 ±0.63

Table 8: Haematological values of Female Pygmy hogs in Pre-Release Centre

Animal No.	Hb g%	PCV%	TEC x10^6	TLC x 10^3	L%	N%	E%	M%	B%	MCV	MCHC	MCH
1/8	13.2	55.0	6.88	9.33	69	24	5	2	0	79.94	24.0	19.19
1/9	11.0	49.0	5.74	6.53	57	35	5	2	0	85.37	22.49	19.16
1/10	12.4	55.0	7.25	13.43	58	36	5	1	0	75.86	22.54	17.10
2/1	16.4	60.0	8.96	9.54	56	34	9	1	0	66.96	27.33	18.30
2/2	12.0	44.0	6.00	7.82	60	35	3	2	0	73.31	27.27	20.00
2/5	13.4	60.0	6.50	6.57	67	26	4	2	1	92.30	22.33	20.62
4/11	12.4	49.0	7.12	12.62	70	26	3	1	0	68.82	25.31	17.41
4/12	12.6	50.0	6.00	6.59	65	25	7	2	1	83.33	25.20	21.0
4/13	13.2	56.0	7.00	6.56	55	40	4	1	0	80.00	23.57	18.86
Mean ± SE	12.95 ±0.49	53.11 ±1.81	6.83 ±0.32	8.77 ±0.62	61.88 ±1.96	31.22 ±1.98	5 ±0.64	1.56 ±0.18	0.22 ±0.14	78.43 ±2.70	24.45 ±0.65	19.07 ±0.52

Discussion

From the Tables 1 and 2 it was observed that the mean values of haemoglobin (Hb), packed cell volume (PCV) and total erythrocyte count (TEC) in the pygmy hogs above two years of age in the Research and Breeding (R&B) centre were higher (13.24 ± 0.66, 53.8 ± 2.29 and 7.23 ± 0.26 respectively) than those of the pygmy hogs below two years of age (12.82 ± 0.51, 53.4 ± 1.12 and 6.79 ± 0.26 respectively). The variation was however non-significant. Less adaptability to the environment after birth and higher competition for food among different age groups of animals in the R&B centre resulted in inadequate intake of food by the young animals. Besides, the sows' milk is naturally deficient of iron (Jones *et al*. 2006) [2]. All these factors contributed to the lower values of Hb, PCV and TEC in the pygmy hogs below two years of age in the R&B centre, as these haematological parameters are proportional to each other. There are no recorded normal haematological values of pygmy hogs in different age groups. However, Deka and Bhattacharyya (1984) [1] recorded some haematological values of pygmy hogs in the age group of 10 days to 2 years, where they observed Hb (10.8-13.6 g/dl), PCV (36.6-43.6%) and TEC (5.1- 6.million/µl), which were lower than the present values of the pygmy hogs below 2 years of age. Mean corpuscular volume (MCV), mean corpuscular haemoglobin concentration (MCHC) and mean corpuscular haemoglobin (MCH) values had no significant variations in both the age groups. The values related to differential leucocytic counts were also of no variation in the two age groups, though total leucocytic count was slightly higher in the pygmy hogs below two years of age (8,859/µl). However, the values were lower than those recorded by Deka and Bhattacharyya (1984) [1], which ranged from 12.2 to 27.1 thousand/µl.

In the pre-release centre, the mean haematological values between the two age groups had no noticeable variation (Table 5 and 6). It may be due to their quick adaptability to the simulated habitat.

The mean haematological values like Hb, PCV, TEC and TLC of the male pygmy hogs were higher than those of the females in both the habitats, though the variations were non-significant (Table 3, 4, 7 and 8). Higher values of Hb, PCV, TEC and TLC in male pygmy hogs were also described by Deka and Bhattacharyya (1984) [1].

Conclusion

The study revealed that the mean haematological values of Hb, PCV, TEC and TLC of the male pygmy hogs were higher than those of the females in both the habitats, however the variations were non-significant. In respect of age group, the 2 years above group had little higher range of Hb, PCV, TEC but variation was non-significant. The revealed result also implicated good management practices in captivity. The initiative for the re-introduction may be a successful one as the animals with apparently healthy with haematological data consistent with the previous studies.

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