

## Blood Smear Evaluation of Bali Ducks Sampled from Traditional Farming Systems in Bali

Iwan Haryono Utama<sup>1\*</sup>, Sugiyarto<sup>1</sup>, Anak Agung Sagung Kendran<sup>2</sup>,  
Ida Ayu Pasti Apsari<sup>3</sup>, I Nyoman Suarsana<sup>1</sup>, I Gusti Made Krisna Erawan<sup>4</sup>,  
Anak Agung Ayu Mirah Adi<sup>5</sup>, Ida Bagus Oka Winaya<sup>5</sup>, Yoshihiro Hayashi<sup>6</sup>

<sup>1</sup>Departement of Veterinary Biochemistry, <sup>2</sup>Dept of Vet Clinical Pathology, <sup>3</sup>Dept of Vet Parasitology, <sup>4</sup>Dept of Vet Clinical Diagnosis, <sup>5</sup>Dept. of Vet Pathology, Faculty of Veterinary Medicine, Udayana University-Kampus Bukit Jimbaran Kuta Bali, E-mail : [iwanhu2001@yahoo.com](mailto:iwanhu2001@yahoo.com)\* Corresponding author  
<sup>6</sup> Graduate School of Agricultural and Life Sciences, The University of Tokyo, Yayoi 1-1-1, Bunkyo, Tokyo, Japan

### ABSTRACT

Research to confirm the abnormalities of blood corpuscles in Bali ducks based on blood smear examination has been conducted. The research samples consisted of 105 ducks from various regencies in Bali. The blood smear examination was conducted by the method described in this literature and the data was collected and tabulated by means of the descriptive method. Erythrocyte abnormalities were: polychromasia (61.9%), anisocytosis (17.1%), poikilocytosis (21.0%). Abnormalities associated with leukocyte composition were: Lymphopenic (46.7%); Heterophylic (44.8%); Heteropenic (3.8%), also Thrombocyto penia (2.9%) was present in 105 ducks. In conclusion 61,9% ducks examined deal with regenerative anaemia. They also have some blood abnormalities such as basophilia, eosinophilia, heterophilia, heteropenia, lymphopenia, and monocytosis.

Key words : blood smear, ducks

### INTRODUCTION

Bali is an island located in Indonesia with a land mass of 5,632 square kilometres. The island has beautiful sceneries and the Balinese people are full of harmony in their life and culture. Bali is also home to some indigenous species including Bali cattle, Bali dogs, Bali starlings and Bali ducks. Generally, the local community keeps a small flock of ducks as a secondary activity to their main agricultural activities and they are still reared in a traditional way. The ducks are not only kept for their income, but also for ceremonial or religious purposes.

Bali ducks are an ancient breed of considerable significance with some waterfowl authorities believing the Bali duck to be the originator of the Indian Runner. They are good egg layers, producing a white to blue/green egg which weighs between 60–75 grams. Compared with the general morphology of common ducks and domestic waterfowl, Bali ducks are classified as light ducks (Domestic Waterfowl Club, 2003). They are also known as penguin ducks due to their slim body and upright stance (Rasyaf, 1982). According to Baldassare and Bollen (1994),

ducks in Indonesia generally belong to *Anas poecilorrhyncha* (spot-billed duck). Bali ducks have two-major phenotypes, the *sumi*-feathered ducks (*sumi* means: color looks like rice straw, brownish) and the white feathered ducks (Matram, 1984). Although in smaller numbers, there are also black color (*sikep*) ducks. General inspection shows that there are no other morphologically significant differences except the color of the feather.

Little information exists regarding some aspects of avian health and diseases in Bali (including Bali ducks). Even available, the information is yet to be fully established. Data from Bali Provincial Livestock Services showed that the majority of blood-associated health problems in ducks and chickens in Bali is *leucocytozoonosis*. (Farm Animal Data, Bali's Provincial Livestock Services, 2002). In this research we will determine abnormalities in Bali ducks based on blood picture (Harr, 2002; Jain, 1986; Qureshi, 1988).

So, at the first, we are interested in examining peripheral blood smear of ducks to see some abnormalities regarding to blood cell morphology.

**RESEARCH METHODS**

This research was performed by taking 105 productive ducks (aged 8 – 10 month) were from the following 8 regencies in Bali (Badung/20 ducks, Bangli/10 ducks, Denpasar Municipal/25 ducks, Gianyar/10 ducks, Karangasem/10 ducks, Klungkung/10 ducks, Singaraja/10 ducks, and Tabanan/10 ducks) with total 53 male and 52 female ducks. A drop of blood from the wing-vein was smeared on the glass object. The blood smear was fixed in absolute methanol for 5 minutes and stained with Giemsa for 30 minutes. After completion, the stained slide was washed with distilled water and dried (Coles, 1980; Houwen, 2000; Houwen, 2001).

The blood smear examination was focused on erythrocytes with their variation in shapes and morphology, and leukocytes (Demsey and Kennedy, 1999; Phillips, 1999). Data was tabulated and analyzed by means of descriptive methods (Steel and Torrie, 1991).

**RESULTS AND DISCUSSION**

**Examination of Blood smear**

The results of the blood smear examinations are presented in Table 1. It is clear that poychromatophylic erythrocyte /polychromasia is the biggest abnormality (61.9%), showed that the duck undergoes chronic anemia but is still responsive in nature (this responsive anemia is marked by the big number of polychromasia).

This anemia can be caused by non infectious agents such as lead poisoning, the low quality of feed, especially the protein and mineral content such as iron (Fludge, 1997). Hemoglobin abnormality can also be the cause (\_\_\_\_, 2000).

Infectious agents such as blood parasites often causes hemolysis which in turn almost always causes hipochromic anemia, this problem

Table 1. Abnormalities based on the result of the 105 ducks' blood smear.

<b>Abnormalities</b>	<b>Percentage (Rate)</b>
Heterophylia	44,8 (47 of 105)
Heteropenia	3,8 (4 of 105)
Eosinophylia	26,7 (28 of 105)
Basophylia	3,8 (4 of 105)
Limphocytosis	1,9 (2 of 105)
Limphopenia	46,7 (49 of 105)
Monocytosis	43,8 (46 of 105)
Anisocytosis	17,1 (18 of 105)
Poikilocytosis	21 (22 of 105)
Polychromasia	61,9 (65 of 105)
Thrombocytopenic	2,9 (3 of 105)

will trigger polychromatophylia in erythrocytes (Papas, 2002). Research conducted by Apsari *et al.*, (2004) seems to support this data.

The existence of poikilocytosis in erythrocytes is often reflected by abnormalities in bone marrow as a result of myelotropic agents or infectious agents that are not intentionally carried to the bone marrow by macrophage/ monocyte (Coles, 1980; Jones, 1999). Looking at the trace of the histopathological changes in some observed organs, it seems that the infectious agents mentioned above, may be doorment in the cells or tissue of ducks which appear healthy. Another change is also noticeable in the composition of white blood cells, in which heterophylia and monocytosis serves as the biggest abnormality followed by leucopenia (lymphopenia). The process of chronic-active inflammation, amyloidosis and degeneration in the liver support the heterophylia and monocytosis (Adi *et al.*, 2004), and abnormalities in lymphoid system could be indicated by the presence of lymphopenia.

Table 2. Mean and standard deviation (SD) of differential leukocytes from bali ducks.

Sex (ducks)	Differential leukocytes (%)				
	Heterophyles	Eosinophyles	Basophyles	Lymphocytes.	Monocytes.
Female (52)	63,59	2,9	0,83	24,23	6,71
SD	16,44	3,57	1,71	13,18	7,35
Male (53)	68,57	2,74	1,09	25,62	3,62
SD	17,29	3,41	1,72	14,88	3,31
Normal (Lane, 1996)	30-70	0-4	0-5	20-65	0-3

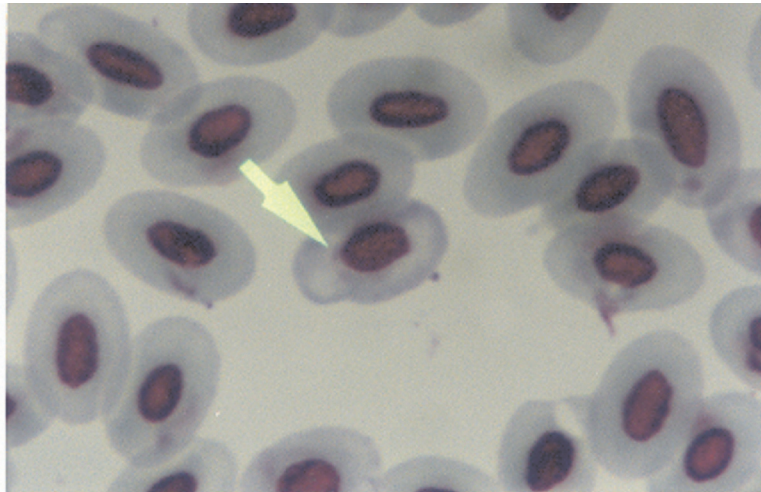


Figure 1. Distribution of leucocytes in 105 male and female ducks, numbers showed mean value of leucocytes.

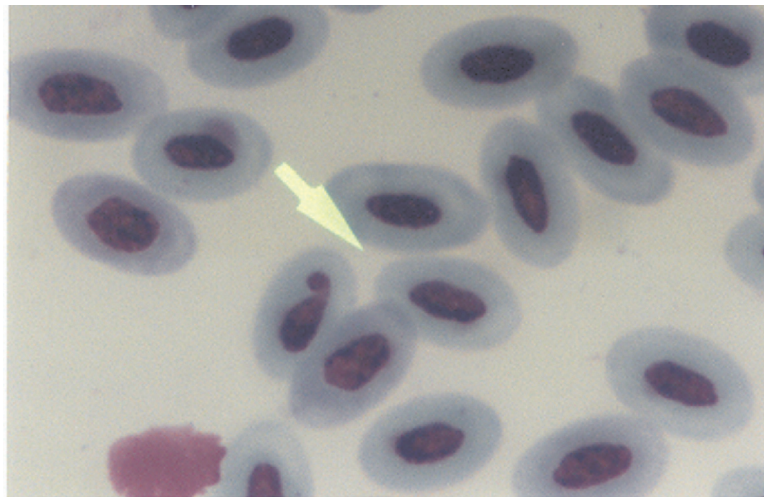


Figure 2. Heterochromatophylic / polychromatophylic erythrocyte in ducks' blood (Abnormal erythrocyte's nucleus)

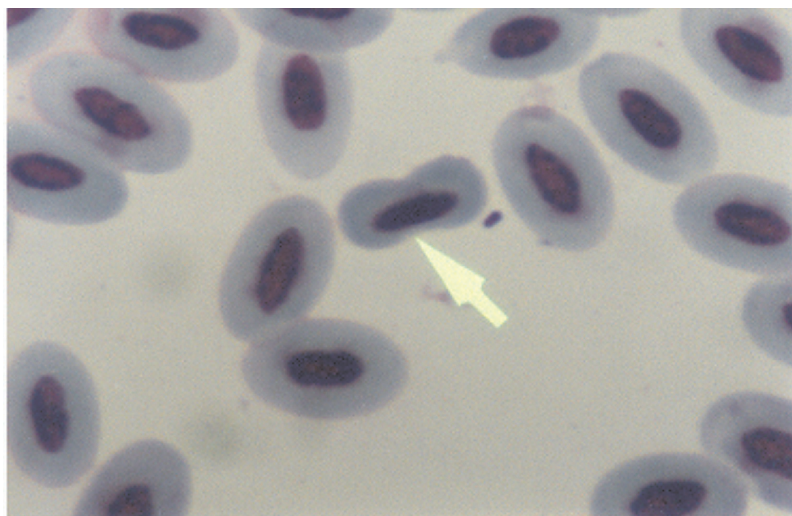


Figure 3. Some abnormalities found in ducks' erythrocytes (poikilocytosis)

Further examination such as response of cellular immune system or detection of infectious agent by polymerase chain reaction (PCR) or histochemistry need to be performed.

### CONCLUSION

Even within those ducks which were clinically healthy, more than half being examined deal with regenerative anaemia. They also have some blood abnormalities such as basophilia, eosinophilia, heterophilia, heteropenia, lymphopenia, and monocytosis.

### REKOMENDATION

Improving feed quality is important, we suggest to give an iron supplemented feed for their ducks.

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### REFERENCES

- Adi AAAM, Winaya IBO, Utama IH, Suarsana N, Erawan IGK, Apsari IAP, Hayashi Y. 2004. Pathological abnormalities of Bali ducks sampled from traditional farming system in Bali. *Jurnal Veteriner* 5 (2) : 40–46.
- Apsari IAP, Utama IH, Suarsana N, Adi AAAM, Winaya IBO, Erawan IGMK, Hayashi Y. 2004. Blood parasites of Bali ducks sampled from traditional farming system in Bali. *Jurnal Veteriner* 5 : 133 –138.
- Baldassarre GA, Bolen EG. 1994. *Waterfowl Ecology and Management*. Toronto: John Willey and Sons.
- Coles EH. 1980. *Veterinary clinical pathology*. 3rd Ed. Philadelphia: WB Saunders and Co.
- Demsey S, Kennedy M. 1999. Avian Hematology. ([www.spjc.edu/hec/vettech/VTDE/avianhemo/avianhemo.htm-25k](http://www.spjc.edu/hec/vettech/VTDE/avianhemo/avianhemo.htm-25k)) 22-9-2003
- Domestic waterfowl club.2003. Light Duck Breeds... to locate via picture. The Domestic Waterfowl Club of Great Britain. (<http://www.domestic-waterfowl.co.uk/page3.htm-37k>) 25/12 2003
- Fludge AM. 1997. Avian blood panel interpretation ([www.californiaavianlab.com](http://www.californiaavianlab.com))
- Harr KE. 2002. Clinical chemistry of companion avian species : A review. *Vet Clinical Pathol.* 31 : 140-151.
- Houwen B. 2000. Blood film preparation and staining procedures. *Lab. Hematol.* 6 : 1-7 ([www.bloodline.net](http://www.bloodline.net)) 14-4-2002
- Houwen B. 2001. The differential cell count. *Lab Hematol* 7 : 89-100.
- Jain NC. 1986. *Schalm's Veterinary Hematology*. 4<sup>th</sup> Ed. Lea and Febiger.
- Jones MP. 1999. Avian clinical pathology. *Vet Clin North Am Exotic Anim Pract* 2 : 663-687.
- Lane AR. 1996. *Avian hematology. Dalam : Rosskof W, Woerpel R. Diseases of cage and aviary birds*. 3<sup>rd</sup>. Ed. Hongkong : Williams and Wilkins. Pp 739 – 772.
- Matram B. 1984. Pengaruh Imbalance Kalori/Protein dan Pembatasan Ransum Terhadap Pertumbuhan dan Produksi Telur Itik Bali. *Disertasi*. Bandung: Universitas Pajajaran.
- Papas AA. 2002. HemPath Descriptions-1 ([www.pathophysiology.uams.edu/Fall02/Hematopathology/HemPath1Dscrp.doc](http://www.pathophysiology.uams.edu/Fall02/Hematopathology/HemPath1Dscrp.doc))
- Phillips KM. 1999. Psittacine Blood Collection and Hematology: Basics for the Veterinary Practitioner. ([www.vet.uga.edu/ivcvm/1999/Phillips/phillips.htm-48k](http://www.vet.uga.edu/ivcvm/1999/Phillips/phillips.htm-48k)) 12-10-2003
- Qureshi MA. 1998. Role of Macrophages in Avian Health and Disease. *Poultry Sci* 77: 978-982.
- Rasyaf M. 1982. *Beternak Itik*. Yogyakarta: Penerbit Kanisius.
- Steel RGD, Torrie JH. 1991. *Prinsip dan Prosedur Statistika, Suatu Pendekatan Biometrik*. Terjemahan Sumantri B. Jakarta: Gramedia.
- \_\_\_\_\_. 2000. Hematology September 2000 ([www.personal.umich.edu/~danielbc/2004/study/HemOncNotes.doc](http://www.personal.umich.edu/~danielbc/2004/study/HemOncNotes.doc))