Indonesian Journal of Veterinary SCIENCES
Vol. 1. No. 2. September 2020, Page. 65-68
DOI:10.22146/ijvs.v1ii1.61877, ISSN 2722-421X (Online)
Available online at https://jurnal.ugm.ac.id/ijvs

Hematology Profiles of Sandalwood Ponies in West Sumba Region on the Transition from Dry to Rainy Season 2019

Dinar Arifianto[1*], Christin Marganingsih Santosa[1], Dorothea Vera Megarani[1], Wahyu Peni Wijayasti[2]

[1]Department of Clinical Pathology, Faculty of Veterinary Medicine, Universitas Gadjah Mada
[2]Indonesian Association of Equine Veterinarian
[*]Email: dinar.arifianto@mail.ugm.ac.id

Received: June 21, 2020, Accepted: August 26, 2020, Published: September 1, 2020

Abstract

Sumba is one of the original habitats of the Sandalwood Ponies and the presence of pony is an important element for the community. The Sumbanese herd their ponies in the savanna and rely on nature as a source of horse feed, so on the dry season the availability of feed will decrease dramatically. This condition can potentially reduce the health status of ponies and increase morbidity or mortality from diseases. The purpose of this study was to determine the hematology profile of Sandalwood ponies in the end of the dry season as health conditions screening. Sampling location was performed in Wanokaka, West Sumba Region. A total of 20 local Sandalwood ponies of various sexes (8 stallions and 12 mares) and ages between 3-8 years of age were used on this study. Three milliliters of blood were drawn through the jugular vein and put in the Ethylene Diamine Tetra Acetic acid (EDTA) tube. Hematological examination was carried out at the Department of Clinical Pathology, Faculty of Veterinary Medicine, Universitas Gadjah Mada, Yogyakarta. Erythrocytes (RBC), hematocrit (PCV), hemoglobin (Hb), leukocytes (WBC), neutrophil (neu), lymphocyte (lim), eosinophil (eos), basophil (bas), monocyte (mon) were examined using the automatic hematology analyzer Abaxis HM 5. Blood smear were done to see the possibility of blood parasites. Hematology examination showed that 20% (4/20) of horses had leukopenia, 55% (11/20) of horses had neutropenia, 50% of the ponies had anemia (10% [2/20] low RBC, 50% [10/20] low hemoglobin, and 20% [4/20] had decreased on PCV), 80% [16/20] hypochromic, 10% (2/20) had thrombocytopenia, and 5% (1/20) had thrombocytosis. Hematology profile of the West Sumba Sandalwood ponies in the transition from dry to rainy season 2019 were dominated by anemia hypochromic and neutropenia. Other abnormalities that observed were thrombocytopenia, thrombocytosis, and leukopenia.

Key words: hematology, sandalwood pony, Sumba

Introduction

Horse has close relationships with Indonesian society and is an important part of history, culture, and the economy. According to the data from Indonesian Directorate of Animal Health (2018), horse population in Indonesia is estimated to be 421.104. East Nusa Tenggara is the province with the second largest horse population (114,514 horse) where Sumba island is the largest population. The types of horses found on Sumba include the Sumba horse or Sandalwood horse, and Timor horse which have the distinctive characteristics with of 100-135 cm of height and categorized as pony (Edwards, 2016). The people of Sumba use pony for riding, transporting goods, herding livestock, racing, traditional ceremonies of "pasola" (the tradition of throwing javelins while riding a pony) and being used as a wedding dowry.

One of horse diseases that is difficult to eradicate and endemic in Sumba is Surra caused by *Trypanosoma sp.* Surra case was first reported in Indonesia on the Java island in 1897 (Partoutomo, 1996). The movement of livestock is one of the transmission routes for surra disease, and blood-sucking flies (*Tabanus sp., Haematopota sp., Crysop sp., Stomoxys sp., And Haematobia sp*.) Play a role in the transmission of these infectious

agents (Jones et. al., 1996). Serological tests have proven that *Trypanosoma evansi* is an endemic disease in Indonesia (Payne et. al., 1991). In 2010-2011 as many as 4.268 livestock in Sumba tested positive for trypanosomiasis, and caused the death of up to 1.760 livestock, consist of 1,159 horses, 600 buffaloes and 1 cow (Dirkeswan, 2012). The model of livestock raising in Sumba tends to release their livestock and rely on nature as a source of animal feed. During the dry season, savanna grass becomes dry and water sources are difficult to find. This condition is potentially decrease the health status and increase risk of being infected with infectious agents. This study was conducted to determine the hematology profile of Sandalwood ponies in the end of the dry season as health conditions screening because hematology profiles give beneficial information about the nutritional, physiological and health status of animals (Gaina et al., 2020).

Material and Method

Blood samples were collected in mid-November 2019, which is the end of the dry season in Sumba. Sampling location was performed in Wanokaka, West Sumba Region. A total of 20 local Sandalwood ponies of various sexes (8 stallions and 12 mares) and ages between 3-8 years of age were used on this study. Three milliliters of blood were drawn through the jugular vein and put in the Ethylene Diamine Tetra Acetic acid (EDTA) tube. The samples were stored in the 5˚C of temperature before examination. Hematological examination was carried out at the Department of Clinical Pathology, Faculty of Veterinary Medicine, Universitas Gadjah Mada, Yogyakarta. Erythrocytes (RBC), hematocrit (PCV), hemoglobin (Hb), leukocytes (WBC), neutrophil (neu), lymphocyte (lim), eosinophil (eos), basophil (bas), monocyte (mon) were examined using the automatic hematology analyzer Abaxis HM 5. Blood smear was made and fixated with methanol. Giemsa 10% staining was used to see the possibility of blood parasites in the smear.

Result and Discussion

Sumba land and vegetation is very dry, and the local people still on a high level of poverty. Horse food only relies on grass by let the horses free all day long in the field. The long dry season that occurred in 2019 caused the availability of grass was very difficult. Lack of food made ponies on Sumba Island become emaciated. Hematology examination shows that 20% (4/20) of the ponies had leukopenia, and 55% (11/20) neutropenia. Neutropenia indicates pathologic conditions. It happen when the number of neutrophils that entering the peripheral blood are

Table Hematology result of 20 Sandalwood ponies in this study

Spl No.	BCS	WBC $10^3/\mu L$	Lim $10^3/\mu L$	Mon $10^3/\mu L$	Neu $10^3/\mu L$	Eos $10^3/\mu L$	Bas $10^3/\mu L$	RBC $10^6/\mu L$	Hb g/dL	HCT %	MCV fL	MCH pg	MCHC g/dL	PLT $10^3/\mu L$
1	2/5	9,63	4,4	0,29	4,27	0,52	0,14	7,66	9,6*	32,29	42	12,5	29,6*	322
2	2/5	9,77	3,3	0,11	6,14	0,17	0,05	6,77	10,5*	33,96	50	15,5	30,9*	212
3	1,5/5	9,68	2,24	0,39	6,37	0,56	0,12	5,59*	8,7*	29,61*	53	15,5	29,3*	166
4	2/5	7,74	3,88	0,67	2,71	0,39	0,09	7,52	10,2*	34,98	46	13,5	29,1*	195
5	2/5	7	3,99	0,36	2,18*	0,37	0,11	8,52	11,3*	36,8	43	13,2	30,6*	357
6	2/5	6,13	3,37	0,14	2,12*	0,41	0,09	7,34	10,5*	35,15	48	14,3	29,9*	203
7	3/5	4,72*	3,66	0,19	0,58*	0,23	0,07	6,85	9,2*	30,82*	45	13,5	30*	288
8	2/5	4,37*	2,65	0,19	1,62*	0,19	0,07	7,12	8,4*	27,62*	39	11,8	30,4*	292
9	2/5	3,81*	3,11	0,02	0,65*	0,02	0	3,82*	5,7*	17,94*	47	15	31,9	56*
10	2/5	6,2	2,57	0,19	2,98	0,43	0,03	8,29	11,8	37,69	45	14,2	31,2	60*
11	3/5	5,62	4,3	0,43	0,59*	0,24	0,08	7,53	11*	37,27	49	14,6	29,5*	264
12	2/5	4,25*	3,1	0,19	0,61*	0,28	0,06	7,85	12,1	41,21	52	15,4	29,3*	321
13	2/5	7,97	3,01	0,17	4,35	0,32	0,12	8,41	12	39,84	47	14,2	30*	405**
14	2,5/5	5,75	2,43	0,39	2,23*	0,62	0,09	7,84	10,4*	35,26	47	13,9	29,4*	339
15	2/5	6,29	3,15	0,27	2,61	0,19	0,07	8,01	12	39,38	49	14,9	30,4*	282
16	3/5	5,96	2,35	0,38	2,77	0,37	0,09	8,9	12,7	44,09	50	14,2	28,7*	248
17	2/5	11,86	4,04	0,4	6,86	0,39	0,18	8,8	11,3*	37,09	42	12,8	30,5*	379
18	2/5	9,41	6,94	0,23	1,8*	0,33	0,1	9,18	12,7	40,78	44	13,8	31,1	244
19	2/5	8,31	6,57	0,03	1,22*	0,36	0,12	9,42	14,6	50,39	53	15,5	28,9*	372
20	2/5	9,21	5,88	0,31	2,86*	0,11	0,05	7,69	10,2*	32,36	42	13,3	31,6	336

Note: Abnormal value is presented in the grey color. Single asterisk mark (*) indicates that result is lower than normal ranges and double asterisk mark (**) indicates that the result is higher than normal range (Weiss and Wardrop, 2010; Southwood, 2013).

Figure Sandalwood ponies and condition of Sumba Island with savanna and rocky land during sample collection (A). Pony with body condition score 2/5 (B)

less than neutrophils that leaving the peripheral blood or decreasing number of neutrophils due to destruction in the microcirculation. This condition can also be caused by increased utilization of neutrophils in inflamed tissues or decreased production of neutrophils by the bone marrow (Tyler et. al., 1987). In horses neutropenia can indicate peracute inflammation and infection as endotoxemia (Muñoz et. al., 2010). Leukopenia can also be associated with digestive disorders, gram-negative bacterial sepsis or endotoxemia (enteritis, colitis), or salmonellosis (White *et. al.,* 2009). This could be related to the lack of edible feed source so that horses will tend to eat whatever plants they could find.

Anemia occurs in 50% of the ponies (10% [2/20] low RBC, 50% [10/20] low hemoglobin, 20% [4/20] low PCV). The most common causes of anemia in horses are chronic blood loss associated with mild and/or moderate parasitism, chronic inflammation, and neoplasia. Reduction of RBC and Hb number can caused by chronic inflammation or infection, internal parasitism, and starvation (Muñoz et. al., 2010). November 2019 was the beginning of the rainy season, so most of the savanna is still dry. The general body condition of the horse is still poor due to the lack of food. Body condition score (BCS) was dominated with score 2/5 (table 1). Hypochromic in 80% [16/20] of the ponies can be caused by iron deficiency (Weiss and Wardrop, 2010). Iron deficiency can be the result from acute blood loss (Smith et. al., 1984) and lack of iron consumption that contain in the grass and forage (Aros et. al., 2017). Thrombocytopenia occurs in 10% (2/20) of the ponies and 5% (1/20) had thrombocytosis. Thrombocytopenia can occur due to effect of bacterial infection, platelet destruction, or decreased platelet production in the bone marrow (Sellon, 1998). Thrombocytosis can associated with chronic infection or inflammation, trauma, iron deficiency, or blood loss anemia, neoplasia or during recovery from a severe thrombocytopenic (Sellon et. al., 1997). In this study, hematology was dominated with hypochromic anemia, so iron deficiency tend to be the main cause of thrombocytopenia. All of the sample were negative from the blood parasites by blood smear examination. It indicates that the ponies free from blood parasite or it has low parasitemia, so it doesn't appear in the smear. Parasites will usually be found on the smear if the level of parasitemia is severe (Elhaig and Sallam, 2018).

Conclusion

Hematology profile of the West Sumba Sandalwood ponies in the transition from dry to rainy season 2019 were dominated by anemia hypochromic and neutropenia. Other abnormalities that observed were thrombocytopenia, thrombocytosis, and leukopenia.

Acknowledgement

Samples in this study were obtained due to the efforts of the field team: Esther Van Herwaarden, Peta Hitchens, Wahyu Peni Wijayasti, Umbu Jara Sipul, Charles el Hage, the Nihi Sumba team, and the Hoba Wawi-Wanokaka community.

Reference

Aros, K., Carrasco, J., Briones, R., and Tadich, T.A. 2017. Haematological and Serum Biochemical Reference Values for Urban-working Equines in Chile. *Austral J Vet Sci* 1, 27-33.

Dirkeswan. 2012. Pedoman pengendalian dan pemberantasan penyakit Trypanosomiasis (Surra). Direktorat Kesehatan Hewan, Direktorat Jenderal Peternakan dan Kesehatan Hewan Kementrian Pertanian.

Edwards, E.H., 2016. The Horse Encyclopedia. Dorling Kindersley Limited, London, 252-253

Elhaig, M.M., and Sallam, N.H. 2018. Molecular survey and characterization of Trypanosoma evansi in naturally infected camels with suspicion of a Trypanozoon infection in horses by molecular detection in Egypt. Microbial Pathogenesis 123, 201-205.

Gaina, C.D., Widi, A.Y.N., and Saputra, A. 2020. Age-Sex Related in Hematological Values of Sandalwood Pony Horses (Equus caballus) in East Sumba, NTT. *Journal of Veterinary and Animal Sciences*. Vol. 3 No2: 103-109.

Jones T. W., R.C. Payne, I.P. Sukanto, and S. Partoutomo., 1996. Trypanosoma evansi in the Republic of Indonesia. Proceeding of the First Internet Conference on Salivarian Trypanosomes. FAO anim prod. 136.

Muñoz, A., Riber, C., Trigo, P., and Castejõn, F. 2010. Hematology and Clinical Pathology Data in Chronically Starved Horses. *Journal of Equine Veterinary Science* Vol 30, No 10. 581-589.

Partoutomo, S., 1996. Trypanosomiasis Caused by Trypanosoma evansi (Surra) in Indonesia. Proceeding of A Seminar on Diagnostic Technique for Trypanosoma evansi in Indonesia. Balitvet, Bogor 1-9.

Payne, R.C., I.P. Sukanto, D. Djauhari, D. Partoutomo, S. Wilson, A. J. Jones, R. Boid, and a.G. Luckins., 1991. Trypanosoma evansi infection in Cattle, Buffaloes and Horses in Indonesia. Vet. Parasitol. 38:109-119.

Sellon, D.C. 1998. Thrombocytopenia in horses. *Equine vet. Educ* 10 (3) 133-139.

Sellon, D.C. Levine, J.F., Palmer, K., Millikin, E., Grindem, and C., Covington. 1997. Thrombocytosis in 24 horses (1989-1994). *Journal of Veterinary Internal Med*icine, 11 (1). 24-29.

Southwood, L.L. 2013. Practical Guide to Equine Colic, First Edition. John Wiley & Sons Inc. 339-342.

Tyler, R.D., Cowell, R.L. Clinkenbeard, K.D., and MacAllister, C.G. 1987. Hematologic Values in Horses and Interpretation of Hematologic Data *The Veterinary Clinics of North America: Equine Practice-Vol.* 3, No.3. 461-484.

Weiss, D.J. and Wardrop, K.J. 2010. Schalm's Veterinary Hematology 6th Edition. Willey-Blackwell. 822-827.

White, N.A., Moore, J.N., Mair, T.S. 2009. *Equine Acute Abdomen*. Teton New Media. Wyoming.