

Diseases characteristic of pre-weaning Bali calf (*Bos javanicus*) in Central Lombok, Indonesia

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ABSTRACT

The aim of the study was to evaluate Bali cattle pre-weaning calf death in Central Lombok. Sick calves were examined their condition, followed by physiology examination. Then feces and blood samples were collected and examined for internal parasites and hematology. The results showed that the newborn calf was 57,2% (61), while calves sick was 16.5% (101) consisted of 7,2% (57) death calves and 9,3% still alive. Calves examination showed that 21, 05 % (12) was under weak conditions, 38.5% (22) with high temperature, 73, 5% (42) calves were found diarrhea. This diarrhea calves consisted of 50,8% (29) diarrhea, 3, 5% (2) diarrhea with blood stain, and 19, 2% (11) diarrhea with high temperature. The results of coproscopy showed that 14.03% (8) calves diarrhea were infected with parasites, such as protozoa (*Eimeria* sp), liver fluke (*Fasciola* sp) and gastro intestine worm (*Trichuris* sp, *Trichostrongilus* sp, and *Bunostomum* sp). Following evaluation of hematocrit, it was found that 33.3% (19) calves higher while 3.50% (2) lower. Following examination of Red Blood Cell, it was found that 98.2% (56) calves showed anemia hypochromic, 28.07% (16) showed anemia microcytic, 15,7% (9) macrocytic anemia, 5.2% (3) anemia hypochromic, 3.5% (2 calves) showed erythropenia. Leucocytes examinations showed that 35.08% (20 calves) showed by lymphocytosis, 7.01% (4 calves) leucocytosis, 1.75% (1 calf) leucopenia and 1.75% (1 calf) lymphocytopenia. It can be concluded that from the ill calves in the middle of the rainy season showed diarrhea with protozoa, liver fluke, and worms infestations. Hematology examination the sick calves indicated that there were anemia, lymphocytosis, dehydration, low content of blood corpuscular. Finally, the sick calves may be infected with parasites, protozoa's, bacteria's and viruses.

Keywords: coproscopy, hematology, calf, Bali cattle.

INTRODUCTION

Mortality in the early live of cattle would be mayor economic losses (Singh et al, 2009; Ferede et al, 2014). These losses would be more significance in small holder farmers, as percentage of calf's death would be higher than that of large number producer. It was also reported that low productivity with

body weight gain at 0.2 kg/ day, may be resulted following recovery from disease. (Dahlanuddin et al 2012).

Calves death were reported can be caused by nutritional, environmental and management factors (Fordyce et al, 2014). Firstly nutrition factor, it was found that when feed was improved by feed supplementation, calves death could be reduced (Jelantik et al, 2009). Secondly management factor, it was reported that low

levels of knowledge of farmers resulted in poor practice and may leads to higher calves mortality (Chang'a et al, 2010). Thirdly environment factor, it was reported that when environmental improvement such as by good hygiene and housing, calves mortality was decreased (Svensson et al, 2006; Moran, 2011), further more in different climate such as in rainy season calves mortality was higher than that of summer and winter (Yeasmin et al, 2014). There are two season dry and wet in the tropic which may lead to calves mortality. Greater loss was reported related to hot and dry weather (Martin et al, 1975) and often as high as 50% (Moran 2011). High calves mortality was also reported in beef cattle in tropical areas Australia up to 67% (Bunter et al, 2012). In tropical areas during drought of dry season it was reported that calves mortality of Bali cattle in Indonesia was reported 30 to 52% (Wirdahayati et al, 2000). During rainy season in tropic would be wet and more humid/ more infection and diseases calves mortalities was reported up to 15% (Dahlanuddin et al 2012). Further information showed that calf morbidity higher in wet season than dry season (65.3% vs. 55.7%), however calf mortality higher in dry season than that of wet season was 33.0% in was 28.1% (Ferede et al, 2014). It was reported that calf death was higher in rainy season up to 42.8% than summer (33.35%) and winter (23.80%) (Yeasmin et al, 2014). It was reported that calf mortality mainly because of rain fall (Martin et al, 1975). Calf mortality of 12.6% caused by microbial and management (Yeasmin et al, 2014), this condition were potential for infection and consequently there are significant number of calves getting sick and deaths. Calf death of small holder dairy farm in Tanzania was reported 20 % (Chang'a et al 2010).

Hence it would valuable to evaluate the evident of calves death and diseases during the rainy season of back yard farming. The aims of the study were to examine the state of physiology unhealthy pre-weaning calves which were evaluated by external examination, laboratory evaluation of fesses for parasites and blood for hematology can be used as a tool bovine medicine (Roland et al 2014). It was expected that by identification of disease, would provide information to prevent excessive death during rainy season.

MATERIALS AND METHODS

Research areas

This research was performed in Central Lombok Island of Indonesia, as warm, humid tropical areas, with two seasons. Rainy season starts from October to April, with rainfall 92-216 mm, 9-17 rainy days per month, while dry season begins from May to September with rainfall 4-60 mm and 0-7 rainy days per month. As a warm and humid area, Lombok Island has average temperature between 26-28°C, 22-24°C at night and 30-32°C with humidity up to 80%. This island is agriculture areas with rice as main production; most of the area is rice fields with irrigation throughout the year. Raising cattle traditionally is part of activities of rice producer in Lombok Island of Indonesia.

Cattle management

Farmers in Lombok raise cattle as backyard farming, in a small number, however for security reasons, farmer raised cattle in one area call group. In Group of farmer, cattle were collected and rise in cattle housing, feed and management was done by individual farmers. There were 36 groups of farmers, each group consist between 10 and 20 farmers and raise cattle between 18 and 66 cattle involved in this study. Cattle were

fed by cutting and carrying grass from rice field areas.

Samples collection

Samples collected for this study were firstly data of sick calves were collected from group. Then calves were examined by 1. Conditions of calves, such as good, medium and low condition. 2. Then physically or physiologically such as respiratory, heart rate and rectal temperature. 3. The calves were examined whether any indication of diarrhea such as diarrhea with high temperature rectal, with blood stain or just only diarrhea. 4. Fecal samples collected from rectum to examine worm's eggs by coproscopy 5. Blood samples collected from jugular's vein for hematology examination.

Physical and external examination

Physical examination was performed include rectal temperature, heart bits and respiratory rates. Examination of rectal temperature was performed swinging thermometer when it showed 35°C then inserted into rectum and ready to read when it was in the rectum for 5 minutes. Examination of heart rate was performed by using stethoscope at the axial of left front leg by counting systolic sound for one minute. Respiratory examination was performed by put right hand in front of calve noses, expiration was count for one minutes it can be feel by hand. Calves normal temperature, heart rate and respiratory rate were 38°C-39, 5°C, and 100-140 per minute and 24-26 per minute. Examination of diarrhea was performed by examining feces consistency with categories normal, diarrhea and diarrhea with blood stain.

Fecal collection and examination

Feces collection was performed by covering hand using glove inserted finger into anus until get approximately more than 5 gram feces. Examination coproscopy consist of

two techniques those are for Nematodes and Trematodes.

Examination of eggs per gram feces for nematodes was performed by 1 gram feces added 10 ml water, grinded (digerus) and filtered for, homogenous part centrifuges 1000 rpm/ 10 minutes. Then pour the supernatant and the filtrate added with sugar saturated aquadest up to 1/3 tube and stirred. Saturated sugar was filled up to 90% of the tube, followed by centrifuge 1000 rpm for 10 minutes, placed vertically, drop saturated sugar until the surface of the tube. At the top surface of the put cover glass for 20 minute, and then put the cover glass on the object glass and examined under microscope. Identify worm eggs by shapes, structure and size then compare to the literature.

Trematodes examination was performed by weighing 3 gram feces added to 50 ml aquadest and stirred nicely, keep steady for 5 minutes, pour the supernatant and the filtrate added with 10 ml aquadest and keep still for 5 minutes and pour it, left 5 ml filtrate. Then drop the filtrate with a drop of methylene blue, stirred and drop in the object glass and examined under microscope. Fasciola sp eggs can be identified when it shows yellow color while Paramphistomas eggs (rumen trematodes) shows bluish color.

Blood samples collection and hematology examination

Hematology examination was performed using whole blood collected from jugularis vein of the calves and dispensed into a 10 ml vacum tube contain ethylene diamine tetra acetic acid (EDTA). White blood cells (WBC) were measured by Cell Count Method for neutrophil), lymphocyte and monocyte. Red blood cells count (RBC), concentration of haemoglobin (HGB), and thrombocytes (PLT) were also measured. All hematology examination was performed

by automatic hematology machine
SYSMEX KX-21...

Data and statistic analysis

Data were analyzed using description as number and percentage (%) as comparison hematology standard (George et al, 2010) was used.

The results of research showed that from 36 groups of farmers totally raised 2161 cattle consist of 1068 cows, with 611 new born calves or 57,2% from total cows, 57 (9,3%) calves was ill during the middle of rainy season and calves mortality 44 heads (7,2%) from the new born calves (Table 1).

RESULTS

Table 1. Description of cattle raised in groups participated in the research.

No	Description	Number	Notes
1	Farmers (group)	36	In Central Lombok Island
2	Bulls (head)	108	For fattening and matting
3	Cows (head)	1068	Have been deliver calf
	Calves (head)	611	Born in that year
4	Calving rate (%)	57.20	Born in that year
5	Weaned calves (head)	449	6 -12 months old
6	Pre weaning calves (head)	162	Less than 6 month old
7	Pre weaning calves sick (head)	101	Reported for medication
8	Pre weaning calves sick and die (head/ %)	44(7.2%)	Reported by farmers
9	Pre weaning calves still sick (head/ %)	57(9.3%)	To be used in this study

During middle of rainy season, following examination of calves conditions from 57

calves which have been indicated being low appetite (Table 2).

Table 2. Condition of sick calves the mid of rainy season.

No	Descriptions	Head	%
1	Standing alert	none	None
2	Standing, depressed, slight dehydration	45	78,94
3	Sternal, depressed, moderate dehydration	12	21,05
	Total calves ill	57	100

Physiological examination of the sick calves with low appetite, weak and diarrhea which

have been suffered for between 3 day and 2 weeks showed in Table 3.

Table 3. Results of physiological examination of calves.

No	Physiological examination	Heads	Percentage (%)
1	High respiratory rates	3	5,2
2	High heart rates	4	7,0
3	High rectal temperature	22	38,5

External physical examination results such as diarrhea, bloody diarrhea, diarrhea and rectal temperature presented in Table 4.

Table 4. Results of examination of 57 calves in the middle of rainy season.

No	Examination results	Number (heads)	Percentage (%)
1	Diarrhea	29	50,87
2	Diarrhea with temperature >39,5 °C	11	19,29
3	Diarrhea with blood stain	2	3,50
	Total calves diarrhea	42	73.69
4	No indication of diarrhea	15	26,31
	Total calves sick	57	100

Egg identification showed in Table 5. that infestation *Ascaris sp* in 9 calves, *Fasciola sp* in 2 calves, *Eimeria sp* in 2 calves, Table 5. Identification of parasites infested to the calves from 57 calves reported by farmers.

Trichuris sp in 2 calves, *Trichostrongilus sp* in 1 calf and *Bunostomum sp* in 1 calf.

No	Parasites detected by coproscopy (+ epg)	No / %
1	Ascaris	6
2	Ascaris, Eimeria	1
3	Ascaris, Bunostomum	1
4	Ascaris, Eimeria, Fasciola sp	1
5	Fasciola sp	1
6	Trichuris	1
12	Trichuris, Trichostrongilus	1

By referring to hematology standard of George et al, (2010) the hematology RBC and WBC, solid part of blood can be categorized into low and high levels of hematocrit. Low levels of hemoglobin, Low Table 7. Results of categorize of hematology by comparison with reference of normal range (George et al, 2010).

levels of erythrocytes. Evaluation of WBC consists of Lymphocytosis, Leucocytosis, Leucopenia and Lymphocytopenia (Table7).

Hematology	Categories	Calves (%)	Normal*
Hematocrit (%)	More than 33	19 (33.33)	22-33
Hematocrit (%)	Less than 22	2 (3.50)	22-33
Hemoglobin (g/dl)	Less than 8.5	3 (5.26)	8.5-12.2
Erythrocytes (10 ⁶ /μl)	Less than 5.1	2 (3.50)	5.1-7.6
Lymphocytosis (10 ³ /μl)	More than 5.6	20 (35.8)	1.6-5.6
Leukocytosis (10 ³ /μl)	More than 12	4 (7.01)	4.9-12.0
Leucopenia (10 ³ /μl)	Less than 4.9	1 (1.75)	4.9-12.0
Lymphocytopenia (10 ³ /μl)	Less than 1.6	1 (1.75)	1.6-5.6

*George et al, 2010

DISCUSSIONS

The results (Table 1) showed that calves born in farmers group in central Lombok Island was 57.2% from the total cows which involve in this study. This calving rate was

relatively low which may be improved by implementation Integrated Village Management System (IVMS) which resulted in calving rate of 86.8% (60-100%) in Bali cattle under village conditions (Dahlanuddin et al 2016). To improve calving rates good

mating management can be applied by providing bull with mating schedule.

The results of research showed that calves morbidity and mortality were 9.3% and 7.2% respectively, from the number of calves delivered in that year (Table 1). In comparison with Swedish dairy herds, Bali cattle have lower morbidity and higher mortality, it was reported in Swedish dairy herds that calves morbidity and mortality were 11.0% and 2.6% respectively (Olsson et al 1993). Others report showed that calves mortality was relatively low up to 4.6%. (Gulliksen et al 2009) found that calf mortality varied between 4% and 32% (Perry et al 1984). This wide variation may be because of various on management diseases, preventions and medications (Bendali et al 1999; Ortiz-Pelaeza et al 2008).

During examination of calves, it was found (Table 2) that 21.05% of calves was under weak conditions and (Table 3) showed that 6.52% had high respiratory rates, 8, and 69% had high heart rates and 47.82% had high rectal temperature. It was reported that bacteria of *Escherichia coli* was isolated of 20.3 % of calves on the first day following calving (Bendali et al 1999) and diseases caused calves mortality were parasites infestations, protozoa's, bacteria's and viruses infection (Faries 2010) with signs of diarrhea 43% (Virtala et al 1996), pneumonia 16.8% (Mulei 1995) and 24% (Virtala et al 1996), septicemia 10% (Virtala et al 1996). Other cases of calves mortalities were musculoskeletal diseases (7.0%), septicemia (6.7%), malnutrition (6.1%), cardiovascular system (3.7%), nervous system (3.2%), liver (2.6%) and poisoning (2.6%) (Mulei 1995).

Table 3, 38.5% had high rectal temperature. It is known that body temperature increase higher than normal because of bacterial infections. When body temperature higher

than normal it may be indicated of bacterial infection (Roland et al 2014),

Following examination of calves (Table 4), it was found that diarrhea with blood stain was 3.50%, diarrhea with rectal temperature higher than 39.5°C was 19.29%, diarrhea was found 50.87% and no sign of diarrhea was 26.31%. The other research results showed that 52 % diarrhea was detected at first week 15 % was detected at second week after calving (Bendali et al 1999). Enteritis was lead calves mortality up to 44% (Sivulaa et al 1996). It was reported that there was no effect of season to diarrhea, however change of feed and management may stimulates intestine microbes to develop becomes pathogen (Curtis et al 1988).

The results of research show that examination of coproscopy (Table 5) showed infestation of *Fasciola sp*, *Eimeria sp*, *Trichuris sp*, *Trichostrongilus sp* and *Bunostomum sp*. Previous research showed that disturbance of gastro intestine usually detected in calves 1-30 days of age (Mulei 1995). Calves death of gastroenteritis, 31.3% caused by colibacillosis, salmonellosis, coccidiosis, helminthiasis, and blood (Mulei 1995). It was reported that protozoa such as cryptosporidia, coccidia has been isolated (Faries 2010) with signs of diarrhea with blood stain.

Hematocrit evaluates percentage solid part of the whole blood; the sick calves may show high or low percentage of hematocrit. In this study it was found that a high level of hematocrit which is more than 33% was found in 19 calves or 33.33%. It seems that 19 calves indicate that they suffer of dehydration or blood loss. On the other hand there was low hematocrit when solid parts of blood less than 22 %. It was found in 2 calves or this 3.50% of calves may suffer of protein deficiency and low corpuscular content of blood and hence, resulted in low hematocrit. It was reported that calves

mortality on the age of 14 weeks, showed low blood hematocrit (Donovan et al 1986). It was found that by referring hematological standard of George et al (2010) there are categories of hematological examination varied widely lower and higher than the normal conditions (Table 6 and 7). The most common cause of calves sick can be categorized as suffer of anemia, it was shown by: Firstly, evaluation of low MCHC it was found in 56 calves or 98.24% indicated that the calves suffer of anemia hypochromic of corpuscular erythrocytes. Secondly, evaluation of low MCH, it was found in 16 calves or 28.07% indicates that the size erythrocytes in blood circulation relatively small called microcytic anemia. Thirdly, higher MCV was found in 9 calves or 15.78%, indicated that the erythrocytes in blood circulation was in large size which called as macrocytic erythrocytes. Fourthly, low levels of hemoglobin concentration, it was found in 3 calves or 5.26% indicated that the calves suffer of anemia called hypochromic erythrocytes. Fifth, low levels of erythrocytes, it was found in 2 calves or 3.50%, it is indicated that the calves suffer anemia by low number of erythrocytes. Under normal condition erythrocyte and hemoglobin can be classified as normocytic or normal size cells and normochromic or normal color. Under anemia conditions erythrocyte may show microcytic hypochromic or macrocytic hypochromic. Leucosytosis and leucopenia were found in the study, leukocytosis was found in 4 or 7.01% of calves while leukopenia was found in 1 calf or 1, 75%. Single WBC parameter alone is difficult to be used as definite diagnostic tools without other hematologic parameters (Roland et al 2016). Hence, other hemogram information was required to confirm WBC as diagnostic tools. Lymphocytosis is when more than $5.6 \times 10^3/\mu\text{l}$ lymphocytes were found in 20 calves or 35.08% of calves, it is indicated

that there is infection occurring. Increasing of lymphocyte concentrations may show healing phase of infectious virus disease, chronic antigen stimulation (Roland et al 2014). When lymphocyte increases, this may be because of viral infection (Xu et al 1993; Faries 2010) or may be response of cancer diseases (Ferrer et al 1978). Lymphocytopenia is when less than $1.6 \times 10^3/\mu\text{l}$ lymphocytes were found in 1 calves or 1.75% of calves indicated on the blood circulation have less lymphocytes. Lymphocytopenia can be causes by viral or bacterial infection, immune suppression, chronic renal insufficiency (Roland et al 2014).

During the rainy season it shows that wet and watery areas increase the risk of infection which may lead to diarrhea and pneumonia (Agerholm et al 1993; Lundborg et al 2005) of calves. Hygiene the surrounding and daily management is a risk factor to diarrhea, respiratory diseases, bacterial and virus infections (Lundborg et al 2005). Infection of *Escherichia coli* leads calves mortality 50.9% to 74.6% from total death calves (House 1978). Studies showed that Rotavirus has been isolated from 47.4 % (Bendali et al 1999), Corona virus from 16.5 % samples (Bendali et al 1999) which related to calves diarrhea.

CONCLUSIONS

It can be concluded that mortality pre-weaning calves was 7,2% (44 heads) and 1,9% (12 heads) sick under weak conditions with diarrhea, diarrhea with blood stain and diarrhea with rectal temperature higher than 39.5°C . Following coproscopy it was identified that the sick calves were invested with protozoa (*Eimeria sp*), liver fluke (*Fasciola sp*) and gastro intestine worm (*Trichuris sp*, *Trichostrongilus sp* and *Bunostomum sp*). Following hematology RBC examination it was found that anemia hypochromic 98.24%, anemia microcytic 28.07%, anemia macrocytic, 15.78%,

hypochromic anemia 5.26%, erythropenia 3.50%, dehydration, 33.33%, low corpuscular content 3.50% from sick calves. Hematology study of WBC, it was found that lymphocytosis 35.08%, leukocytosis 7.01%, leukopenia 1.75%, lymphocytopenia 1.75% from the number of sick calves. Following hematology evaluation related rectal temperature higher than 39°C showed lymphocytosis. It shows that the sick calves probably not only because of parasites and bacteria's but also may be infected by viruses. It is indicated low levels of knowledge of farmers and poor calf management; it showed that intervention from local husbandry office to improve knowledge and medication.

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