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Description of White Blood Cell Difference and Health at Various Levels of Batur Sheep Prolification

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Abstract

Twenty Batur sheep were used in this study to know the description of white blood cells (lymphocytes, neutrophils, eosinophils, basophils, and monocytes) at various levels of prolification. The research material was selected according to the criteria, namely, the average age was 3 years, the condition was 2 months pregnant with at least 2 births at parity. Experimental animals were divided into two groups: 10 animals were categorized as high prolific (number of children ≥2 per birth) and 10 animals were categorized as low prolific (1 child per birth). All experimental sheep were given basal forage and drinking water ad libitum. The observed variables were the differentiation of granulocyte leukocytes which included basophils, eosinophils, and neutrophils, and agranulocyte leukocytes which included lymphocytes and monocytes. The data obtained were analyzed by unpaired student t-test (unequal). The results showed that the level of prolification had no significant effect ($P>0.05$) on changes in lymphocytes, neutrophils, eosinophils, basophils, and monocytes. It was concluded that the appearance of lymphocytes, neutrophils, eosinophils, basophils, and monocytes between low prolific sheep and high prolific sheep were in the normal range with relatively the same concentration.

Keywords: Batur Sheep; Prolification; White Blood Cell Profile; Differentiation; Health

1 Introduction

Batur sheep is one of the local sheep that has superior potential including good meat productivity, relative resistance to environmental conditions, and diversity of germplasm in Central Java (Noviani et al., 2013). Determination of Batur Sheep as one of the local Indonesian livestock breeds originating from Banjarnegara Regency through Decree of the Minister of Agriculture of the Republic of Indonesia No. 2916/Kpts/OT.140/6/2011 dated 17 June 2011. Local sheep are easy to develop, have simple maintenance systems, have high adaptability to various environmental conditions, have a high tolerance to various animal feeds, and breed throughout the year (Almahdy et al., 2000). Batur sheep is the result of a cross between merino sheep and thin-tailed sheep, weights up to twice that of local sheep, namely between 60-80 kg and a maximum weight of 140 kg, and has dense and fine wool, with an original geographical distribution in Batur District, Kabupaten Banjarnegara, Central Java province (Abid 2010). Gayatri and Handayani (2007) further stated that the Batur sheep is one of the livestock producing meat and wool which has the potential to be developed because it has good reproductive properties including age at first marriage: 10-12 months, age at first calving: 15-19 months. and the number of children born: 1 - 2 tails.

A sheep population can be classified as prolific sheep if it has an average number of lambs born (1.75 heads). Prolific nature is the nature of reproduction or the ability to give birth to more than one child per birth, where the prolific nature of each individual varies depending on genetic variations in increasing the speed of ovulation and the number of children per birth (Cemal, I. and Karaca, O. 2007). This is in line with Inounu, (2011), stating that the number of live

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births is determined by the rate of ovulation and its relationship to the level of management applied so that livestock with high prolifications requires adequate management to increase the viability of the offspring.

The real condition in the field is that there are problems that become obstacles in the development of the Batur sheep farming business, namely the high mortality rate in lambs a few days after birth, especially in the birth of twins (2) or more (high prolific sheep), as a result, lamb survives to release. wean only one tail. This is in line with Inounu (2011), which states that one of the drawbacks of prolific traits is the high mortality (mortality rate) of lambs before weaning, small birth weights and weaning weights, low growth rates of calves, and the average weaning weight of sows that give birth to a single (13.1 kg) twins (12.3 kg) and triplets ((10.5 kg). The high mortality in calves of the highly prolific category of Batur sheep is thought to be due to inadequate maternal immunity so the level of Relatively low health, this is in line with FAHMY (1989) reporting that child mortality increases with the increasingly prolific nature of livestock due to stress of lack of feed and decreased body weight of the mother during pregnancy which will affect the production of insufficient milk for several children born and have an impact on decreasing survival of children. Furthermore, the opinion of Fieldman, et al (2000) is that the leukocyte profile can reflect an increase in cortisol levels caused by stress. Roland et al. (2014) stated that total leukocytes play a role in the body's defense and their value will increase in cases of infectious diseases, food poisoning, anaphylactic shock, and central nervous disorders. Thus one way to determine the health condition of livestock is to analyze blood samples, especially white blood cells (leukocytes).

Blood is a part of the body that is in the form of a liquid and plays an important role in physiological and pathological processes examination of blood images in ruminants is needed to determine the health of livestock, evaluate and diagnose disease and evaluate treatment results (Astuti, 2022). This is in line with Junqueira et al (2007), stating that white blood cells function to protect the body against disease germs that attack the body using phagocytes, and produce antibodies. Increased or decreased levels of white blood cells in the blood circulation can be indicated as the presence of inflammatory disease agents and allergic reactions, therefore it is necessary to know the normal description of white blood cells in each individual (Ganong, 2002.). The main function of leukocytes is to protect the body from infection and the formation of antibodies in the body (Gerardo et al., 2009). According to Tambuwall et al., (2002), changes in blood picture can be caused by internal factors such as increasing age, nutritional status, health, stress, estrus cycle, and body temperature, while externally, for example, due to infection with germs and changes in environmental temperature. Animals that experience stress will automatically build self-defense with various forms of defense and in general, the main function of white blood cells is for the immune system, but there are different mechanisms for each white blood cell fraction (Isroli et al, 2013). The body's defense response to stress can be carried out in various ways, one of which is the defense system carried out by white blood cells (Ichsan, 2015). In line with Arifin HD. (2013), states that to detect the level of stress and health status of livestock can be identified from the description of white blood cells (monocytes, neutrophils, eosinophils, basophils, and lymphocytes) which play a role in the body's defense system to fight disease attacks, while the number of leukocytes and leukocyte differentiation can indicate the presence or absence of infection.

Based on this, it is necessary to know the description of white blood cell differentiation at various levels of prolification of Batur sheep, to obtain a solution to increase the resistance of the offspring born so that productivity will increase which in turn will increase the population as planned.

2 Research method

This research was conducted on smallholder farms in Batur District, Banjarnegara Regency, and the Laboratory of Applied Animal Reproductive Physiology, Faculty of Animal Husbandry, Jenderal Soedirman University. The research material consisted of 20 Batur sheep with an average age of 3 years, with at least 2 parties. The study was conducted based on experimental methods designed into 2 (two) groups of observational variables, namely 10 individuals categorized as high prolific (parents always gave birth to twins or more) and 10 individuals categorized as low prolific (mothers always gave birth to only one child). All experimental sheep were adapted to the local environment and were given basal food in the form of field grass while drinking water was given adlibitum. Blood samples were taken from the jugular vein as much as 6 ml using a disposable syringe containing an anticoagulant (EDTA), then put into a test tube and placed in a flask filled with ice. The white blood cell count was performed using the hemocytometer method using Turk diluent, while the white blood cell differentiation calculation was carried out using the blood test method. Measurement of leukocyte count and leukocyte differential was carried out based on Sastradipraja et al. (1989). The observed variables included the differentiation of white blood cells which consisted of basophils, eosinophils, neutrophils, and agranulocyte leukocytes which included lymphocytes and monocytes.

Counting the number of white blood cells was carried out by the hemocytometer method using Turk diluent. Blood samples were taken up to the number 1 limit on the leukocyte pipette and then diluted with Turk diluent up to the number 11 limit. Both ends of the pipette were closed with the thumb and forefinger. The mixture in the pipette is homogenized by inverting the pipette to form a figure eight. The mixture was dripped into the Neubauer counting chamber and covered with a cover glass. White blood cell counts were counted on four squares in the corner of the counting chamber under a light microscope with an objective magnification of 100 times.

Calculation of white blood cell differentiation, using the blood test method. Calculate the percentage by counting as many as 100 leukocytes found in the field of view of the microscope. Each leukocyte found in 10 divisions is entered into each type of leukocyte cell by 10 so that when added up, 10 X 10 becomes 100 leukocyte cells. Calculations to find the absolute number of cells required the number of leukocytes per mm3 of blood, then cross-multiplied by the number of percents for s Identification of monocytes, neutrophils, eosinophils, basophils, and lymphocytes using a light microscope. Monocytes have a plain/non-granular description of the cytoplasm, shaped like the letter "U" or like a kidney, while lymphocytes are also non-granular and pale blue. Neutrophils appear granular, have an unusual shape, and have three cell nuclei. Granulated eosinophils are seen to have two-lobed nuclei and are sometimes colored red. Basophils have many cytoplasmic granules with two lobes that form a "U" shape and are sometimes colored blue. Each type of leukocyte and divided 100%.

2.1 Observed variables

The variables observed in this study were the differentiation profile of white blood cells which consisted of granular leukocytes including basophils, eosinophils, neutrophils, and agranulocyte leukocytes which included lymphocytes and monocytes.

Data analysis was carried out by analyzing unpaired (unequal) student t-tests. If the t count is greater than t table 0.05 (t hit > t 0.05) then there is a significant effect between prolification and white blood cell differentiation. If t count > t table 0.01, there is no significant effect between prolification and white blood cell differentiation (P < 0.01).

3 Results and discussion

3.1 Overview of White Blood Cells / Leukocytes

The study showed that the overall white blood cell count of Batur sheep in the high prolific category had a concentration of 10.68 thousand/mm3 higher than that of Batur sheep in the low prolific category, which was 10.32%. The results of the unpaired (unequal) student t-test statistical analysis showed that the level of prolification had no significant effect (P>0.05) on changes in leucocytes, although numerically, the overall average number of leukocytes in low prolific sheep had a higher percentage than in high prolific Batur sheep.

The concentration of leukocytes in the study was included in the normal range in line with Jain (1993) stating that normal white blood cells (leukocytes) in sheep were between 4-12x103/mL, but slightly higher than normal compared to the results of Smith and Mangkoewidjojo (1998), stating that the leukocyte counts for sheep is between 7–10 thousand/mm3. The concentration of leukocytes in this study can be used as a benchmark that Batur Prolific sheep are in good health and have an adequate level of immunity. This is in line with Astuti, (2022), stating that physiological status can affect the blood chemistry of small ruminants and therefore needs to be considered in evaluating health status to improve livestock welfare, where the main function of leukocytes is to protect the body from infection and disease. formation of antibodies in the body. Furthermore Isroli et al., 2013), stated that the main function of white blood cells in general is for the immune system, but there are different mechanisms in each white blood cell fraction. In this case, the special function of white blood cells is to act as the body's defense against dangerous inflammation, by quickly visiting body cells that are exposed to pathogenic microorganisms as agents that cause infection. Roland et al. (2014) stated that total leukocytes play a role in the body's defense and their value will increase in cases of infectious diseases, food poisoning, anaphylactic shock, and central nervous disorders. Furthermore, Roland et al. (2014) also stated that a decrease in total leukocytes in livestock could be caused by decreased leukocyte production, viral infection, acute inflammation, the presence of cytotoxic substances, bone marrow disorders, and others. Baldy (2003) further stated that the condition of leukocytosis is generally a physiological response to protect the body from attack by microorganisms. On the other hand, leukopenia which shows decreased total leukocytes can be caused by an ineffective formation process. Disturbances in the formation of these blood cells are found because there is the administration of cytotoxic drugs, toxic substances, viral infections, starvation, and replacement of normal bone marrow by malignant cells, such as in leukemia (Baldy, 2003). A significant increase in the percentage of leucocytes can be caused by chronic inflammation due to viruses, adrenal cortex insufficiency disorders, and physiological (fear, anxiety, and pain generally P\increased leucocytes can occur due to chronic disease and increased steroids due to stress. (Arifin 2013). More continued Dharmawan (2002), stated that a decrease in leucocytes could be caused by abnormalities of the spinal cord and severe cachexia due to nutritional deficiencies.

3.2 Description of White Blood Cell (Leukocyte) Differentiation

White blood cells (leukocytes) consist of two types, namely polymorphonuclear leukocytes (granulocytes) and mononuclear leukocytes (agranulocytes). Granular leukocytes include neutrophils, eosinophils, and basophils. Each of these granular leukocytes has its role as the body's immunity. The function of neutrophils is to phagocytize and kill organisms and limit the spread of microorganisms. In this case, neutrophils have the fastest response to leukocytes when bacteria or parasites are present in the body, they will immediately fight the bacteria by releasing lysozymes which destroy bacteria, and protein defensins which act as antibiotics and strong oxidants. The function of eosinophils is as parasitosis, allergy, and other conditions while basophils function almost the same as eosinophils, namely as cells that respond to allergies and prevent blood clots because they contain histamine (Theml 2004; Lawhead and Baker 2005. A description of the differentiation of white blood cells (granulocytes) of sheep Prolific Batur is presented in Table 1.

Table 1 Means of White Blood Cell (Granulocyte) Differentiation in Prolific Batur Sheep

Diferensiasi Leukosit	Normal	Prolifik Tinggi	Prolifik Rendah
Neutrofil(%)	10. -50.	40,60± 0,70	35.50±0,51
Eosinofil(%)	1-10	5,60 ± 0,60	7,80±0,52
Basofil(sel/µL)	0 - 1	0.00 ± 0.00	0,10±0,70

Based on the results in Table 1, shows that the mean and percentage of neutrophils in highly prolific Batur sheep has a concentration of 40.60% higher than that of low prolific Batur sheep of 35.50%, but still within the normal range. The results of the statistical analysis of the student's t-test showed that the level of prolification had no significant effect (P>0.05) on changes in neutrophils, eosinophils, and basophils. This result is in line with Jain's statement (1993) that the normal neutrophil count is 10-50%; 17.50% - 50.00% (Smith and Mangkoewidjojo, 1988), and 11.58% - 22.06% (Fardiki et al., 2021). Neutrophils act as the first line of defense against foreign microorganisms, especially against bacterial infections (gram-negative bacteria and some gram-positive bacteria). The number of neutrophils will decrease due to infections that interfere with or cause the destruction of white blood cells in general (Setiawan et al., 2022). The number of neutrophils in highly prolific sheep was higher than that of low prolific sheep, it is suspected that the presence of the hormone estrogen in highly prolific sheep has a higher concentration and causes very clear symptoms of estrus characterized by high humidity levels in the reproductive organs and will trigger the development of bacteria and viruses. Changes in the appearance of white blood cells can be caused by internal factors such as increasing age, nutritional status, health, stress, estrus cycle, and body temperature, while externally, for example, due to infection with germs and changes in environmental temperature (Piccione et al., 2009)

According to Fardiki et al. (2021) decreased neutrophils in the body can be caused by infections by bacteria, viruses, rickets, and protozoa. Furthermore, Tophianong and Utami (2019) stated that increasing the use of neutrophil cells by tissues in phagocytizing bacteria can reduce neutrophil cells in the body.

Neutrophil concentrations in highly prolific sheep are thought to be related to higher concentrations of the hormone estrogen during estrus which will cause high humidity in the reproductive organs, thus triggering susceptibility to infection by bacteria and viruses. Humaryanto (2017) explained that Estrogen plays a very important role in bone metabolism, influencing the activity of osteoblast and osteoclast cells, including maintaining the work balance of the two cells. Good bone metabolism will affect the bone marrow which functions to produce blood cells in the process of hematopoiesis.

This is in line with Setiawan et al., (2022), saying that neutrophils play a role as the first line of defense against foreign microorganisms, especially against bacterial infections (gram-negative bacteria and some gram-positive bacteria) and neutrophils can decrease in number due to infections that interfere with or cause destruction. white blood cells in general. Dellman and Brown (1992) further explained that neutrophils will die after phagocytes against disease agents and will be digested by lysosomal enzymes, then neutrophils will undergo autolysis and will release degradation substances that enter the lymphatic tissue to release young neutrophils to fight infection. Lack of concentration of neutrophils in the body can be caused by bacteria, viruses, rickets, and protozoa (Fardiki et al, 2021). further Orheruata, and Akhuomobhogbe (2006), stated that the increased use of neutrophil cells by tissues in the process of phagocytosis and the presence of endotoxins from bacterial infections can also cause low concentrations of neutrophil cells in the body.

The mean eosinophil count of low prolific lambs (7.80%) was higher than that of high prolific lambs 5.60%, this indicates that the bodies of high prolific lambs have a relatively low resistance to disease agents. An increase in the number of eosinophils in the blood circulation (eosinophilia) can occur due to diseases caused by parasites, while eosinopenia occurs due to the influence of glucocorticoids (Meyer and John, 2004). Furthermore, Purnomo et al. (2015), stated that the high concentration of eosinophils is one indication of the functioning of an adequate defense system. Eosinophils can fight helminth parasites, and together with basophils or mast cells act as inflammatory mediators and have the potential to damage host tissues. This is in line with Lokapirnasari and Yulianto (2014) stating that eosinophils have two main functions, namely being able to attack and destroy pathogenic bacteria and being able to produce enzymes that can neutralize inflammatory factors. The difference in the average number of eosinophils is suspected by the presence of disease and the difference in the time of eosinophil formation so that it will affect the strength of the sheep in responding to the entry of pathogenic bacteria.

Agranular white blood cells (leukocytes) are divided into two types, namely lymphocytes and monocytes. In blood circulation, lymphocytes have a role as an immune system (immunity) while monocytes act as macrophages which phagocytize foreign microbial particles that attack the body and remaining cells resulting from neutrophil activity (Lawhead and Baker 2005). Lymphocyte function responds to antigens (foreign bodies) by forming antibodies that circulate in the blood or the development of cellular immunity (Fardiki et al., 2021). Furthermore, Setiawan et al., (2022), stated that lymphocytes are found in many lymphoid organs, namely the tonsils, lymph nodes, spleen, and thymus. An overview of prolific Batur sheep white blood cell (agranulocyte) differentiation is presented in Table 2.

Table 2 Mean Differentiation of White Blood Cells (Agranulocytes) in Prolific Batur Sheep

Diferensiasi Leukosit	Normal	Prolifik Tinggi	Prolifik Rendah
Monosit (%)	6.0	1.00 ± 0,43	1.60 ± 0,70
Limfosit(%)	40.0-75.0	52,08± 0.78	55,00±0.72

Based on the results in Table 1, it shows that the average total percentage of monocytes and lymphocytes of highly prolific Batur sheep has concentrations of 1.00 ± 0.43% and 52.08 ± 0.78% respectively, higher than low prolific Batur sheep respectively 1.60 ± 0. 70% and 55.00±0.72%, but still within the normal range. This result is in line with the statement (Jain, 1993), the normal lymphocyte value is 40% -75%, while the normal basophil value is 0-300 cells/μL (Thrall et al., 2001), 0-100 per microliter (Azman, 2022) and <1% or 0--300 grains/μl (Jain, 1993).

The mean basophil concentration of low prolific lambs (0.10%) was higher than that of high prolific lambs (0.00%), this indicated that low prolific lambs had higher body defenses than high prolific lambs. This is in line with Moreira (2013) stating that basophils play an important role in the body's immune response, which starts from contact with an allergic-causing substance by producing chemical mediators such as histamine which then attract other immune cells. Furthermore, Shuaibu and Isidahomen (2014)), stated that basophils that were not found in the blood circulation indicated no allergic reactions. Dharmawan (2002) explained basophils have a role as mediators for the activity of inflammation, and allergies, and possess immunoglobulin. Basophil cells contain heparin, histamine, hyaluronic acid, chondroitin sulfate, serotonin, and several chemotactic factors. Thus the prolific type of single lamb/low prolific Batur sheep has a higher immune system than twin lamb/high prolific in preventing infection caused by parasites. Lawhead and Baker (2005), stated that basophils work ha almost the same as eosinophils, namely responding to allergies and preventing blood clots because they contain histamine.

The mean monocyte count of low prolific lambs (1.60%) was higher than that of high prolific sheep (1.00%), this condition indicated that high prolific lambs were more susceptible to infection. This is in line with Ichsan (2015) stating that monocytes are produced by the bone marrow then go to the bloodstream and finally go to the tissues to become macrophages which respond to signs of inflammation by moving quickly (approximately 8–12 hours) to the infected site, form proteins from a compliment, and secrete substances that affect the process of chronic inflammation. Furthermore Samuelson, (2007),. explained that when monocyte cells are activated, they will express the main proinflammatory cytokines. These cytokines are produced by macrophages which will eventually activate T lymphocytes and suppress the number of cells infected with the virus. According to Weiss and Souza, (2010), the main function of monocytes is phagocytosis of microorganisms (especially fungi and mycobacteria) and debris, as well as antigen processing which is the initiation of the immune response. Furthermore, Firani, (2018) explained that monocytes are classified as mononuclear phagocytes (reticuloendothelial system) and have receptor sites on the surface of their membranes for immunoglobulin and complement. Monocytes phagocytize microorganisms, dead cells, and foreign particles (eg dust that enters the lungs).

In general, the results of this study indicate that the concentration of white blood cell differentiation (neutrophils, eosinophils, basophils, monocytes, and basophils) in highly prolific Batur sheep is lower than in low prolific sheep. The real conditions in the field show that the Batur sheep-rearing system is still managed in a semi-intensive manner so that the provision of forage for pregnant cows is relatively the same as for non-pregnant cows. If highly prolific Batur sheep experience a lack of feed intake, especially during pregnancy, the concentration of leukocytes will increase, as a result, the lambs born in a weak and sensitive condition will be infected by bacteria, viruses, parasites and will also be susceptible to allergies by allergen substances, which in the end the level of relatively high mortality. On the other hand, highly prolific Batur sheep with high leukocyte concentrations will be easily affected by inflammation of the udder (Mastitis), so the mother does not want to breastfeed her child, as a result, the child is stressed and does not get colostrum milk so she does not have maternal antibodies. tall. This is in line with Dharmawan (2002), that decreased leucocytes can be caused by spinal cord abnormalities and severe cachexia due to nutritional deficiencies. Lack of feed when cattle are pregnant will have an impact on the formation of uterine milk and inadequate milk production for the number of children born who will be born. impact on the child's life is not optimal. This is in line with FAHMY (1989) reporting that child mortality increases with the increasingly prolific nature of livestock due to the stress of lack of feed and decreased body weight of the mother during pregnancy which will affect the preparation of the mother to produce milk, thus affecting milk production which is not sufficient for several children. born and have an impact on the vitality of the child born. This is in line with the opinion of Weiss and Wardrop (2010), that the leukocyte profile can reflect increased cortisol caused by stress. The number of leucocytes in the bloodstream can be affected by the rate of production, recirculation, and use or destruction of leucocytes. A decrease in the number of leucocytes (leucopenia) can occur due to the use of corticosteroids, thymectomy, radiation, chemotherapy, decreased production, and acute viral infections. Wallan (2015) states that the appearance of blood in several animal species is influenced by sex, breed, feed quality, and rearing management. Cattle that experience stress will automatically build self-defense with various forms of defense. An increase in the number of white blood cells indicates a body's resistance response to disease-causing agents (Moradi et al 2012).

The condition of pregnant highly prolific Batur sheep experiencing kahecia (thinness) will result in worsening of the locomotor muscles, which will cause delays in the young suckling on their mothers and result in premature death in newborns (Sutiyono, 2013). Malnourished conditions in highly prolific Batur sheep will cause the fetus to struggle to get nutrition which is indeed limited, resulting in low-weight calves with low vitality. In children with low body weight, their body condition is usually weak, slow to stand or unable to stand at all, and unable to suckle from their mother which will cause very high child mortality. This is in line with Shrestha et al. (1992) reported that a decrease in child survival (DHA) was correlated with an increase in the number of children born, whereas in single-birth children the child survival rate (DHA) was 84%. Furthermore, INOUNU et al. (2011) reported a close relationship between birth weight and calf survival, and 60-84% of DHA in prolific lambs was affected by birth weight. Sumaryadi et al (2010) stated that the reproductive capacity of livestock is largely determined by the success of the parents in producing healthy and strong calves during weaning, while the weight of the weaning calves is determined by the calves' birth weight, the survivability of the calves during pre-weaning and the mother's milk production during lactation. Manik, et al. (2015), states that the number of children born to prolific sows is closely related to the environment (feed, management, long dry season). In line with the statement of INOUNU et al., (1997), the viability of embryos from fertilized egg cells to later survive into children who are born is closely related to the level of management applied. The low child survival (DHA) in highly prolific sows is thought to be due to the high number of children born. This is in line with INOUNU et al. (1997) reported that calf mortality in Thin-tailed sheep increased with an increase in the number of lambs born, and 70% of pre-weaning deaths occurred between 1-6 days after birth. Furthermore, Paul et al, (2008) reported that high mortality at the start of birth was caused by the low birth weight of highly prolific mothers. Sutiyono (2013) states that children of highly prolific mothers who are deficient in the feed will generally have lighter birth weights compared to children of mothers who are sufficiently fed and this also causes higher mortality in children born from mothers with poor management. Furthermore, Sutiyono (2013) explained that mothers who receive poor feed during late pregnancy cause a reduction in glycogen content in the fetal muscles and especially the fetal liver. Glycogen storage in the fetus will increase at the end of pregnancy and this glycogen will act as an energy source shortly after birth. Therefore poor maternal nutrition can increase child mortality at birth. Furthermore, Sumaryadi et al (2010) stated that the reproductive power of livestock is largely determined by the success of the parents to produce healthy and strong children during weaning, while the weight of the weaning children is determined by the birth weight of the children, the endurance of the children during pre-weaning and the mother's milk production during lactation.

4 Conclusion

The results showed that the prolification rate of Batur sheep had no significant effect (P>0.05) on the number of white blood cells (leukocytes) and leukocyte differentiation (eosinophils, neutrophils, basophils, monocytes, and lymphocytes). Numerically, the concentration of white blood cell differentiation in highly prolific Batur sheep was lower than that of low prolific lambs. Changes in management to a better level will improve reproductive performance to increase effort and support genetic development and highly prolific Batur sheep populations.

Compliance with ethical standards

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Disclosure of conflict of interest

This paper was prepared on the basis of an agreement and harmonious cooperation between the two of us as the first and second authors, so that there will be no conflict of interest in the future.

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