

## Chemical Profile of Boer-Kacang Crossbreed Goats Urine at Sanda Village, Pupuan, Tabanan - Bali

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### Abstract

Boerka Goat is a small ruminant that has the potential to be developed to meet the demand for goat meat products. One of the methods to examine livestock health is through urinalysis. Qualitative urinalysis testing includes an examination of leukocytes, protein, bilirubin, urobilinogen, ketones, nitrites, pH, specific gravity, red blood cells, and glucose. This research aims to identify the chemical profile of boer-kacang goat urine chemical profile. During analysis a total of 16 urine sample of boer-kacang crossbreed goats from Walung Amertha Farm, Sanda Village, Pupuan, Tabanan were analyzed. The urine samples taken were midstream urine. Sampling was carried out once then continue with the dipstick testing about three times on each sample. The analysis data were tabulated and averaged before be presenting in a tabular form with descriptive analysis. The results of the study on the chemical profile of boerka goat urine showed leukocytes positive1+ in 19% goats, bilirubin 1+ in 13% goats, nitrite positive in 6% goats, positive red blood cells in 13% goats, while the specific gravity with an average of 1.002 and the average value of pH with 8.25. Based on the research, it concludes that the urine chemical profile of boer-kacang goat positively contains erythrocytes, leukocytes, bilirubin and nitrite although other profiles such as protein, urobilinogen, ketones and glucose is undetected. Urine specific gravity measured using a dipstick was 1,000 - 1,010 whereas the acidity level/pH is normal.

**Keywords:** Boerka Goats; Urinalysis; Chemical Urine Profile; Dipstick Test

### Introduction

Until now, goats have spread in various regions of the world and various regions in Indonesia. Goats have a strategic role for the community, especially people in rural areas who want to raise goats, which is a common activity carried out by the community. Goats are a type of small ruminant livestock that have good development opportunities to meet the demand for goat meat products [11]. Goats play a role in providing high quality meat as well as a healthy source of fat regardless of age, race, and area of rearing. One type of native Indonesian goat is the kacang goat which has several advantages, such as adaptability and good reproduction. However, the rate of body weight gain is relatively lighter so that to improve the genetic quality of Indonesian local goats, crossbreeding is carried out. Cross breeding is a method of quality improvement to increase livestock productivity.

The Boer goat from South Africa origin has several advantages such as fast growth, adaptability to various environmental conditions, ranging from very cold temperatures of -25°C to very hot temperatures of 43°C, has good reproductive ability and has good meat quality in accordance with body shape, and boer goats are believed to improve the genetic quality of the crosses. Boerka goats are goats resulting from cross-breeding between a male boer goat and female kacang goat. This crossbred goat has a very good and higher growth capacity and live weight and is easily adaptable to Indonesia’s climate conditions. Boerka goat’s reproductive characteristics are derived from kacang goat, while meat weight is derived from Boer goat. Boerka goats are characterized by reddish brown or black hair on the head to the neck and white on the body to the feet. The color pattern on the hair of the boerka goat is the influence of the genes that carry the phenotypic traits of the kacang goat parent and the boer goat male. The birth weight of boerka goats is around 2.6 - 2.8 kg, heavier than the birth weight of kacang goats which ranges from 1.6 - 1.8 kg. Boerka goats weigh between 10 - 12 kg, while kacang goats only weigh 6 - 8 kg [3].

Livestock health is a very important factor that can affect the growth, reproduction and production of livestock. One way that can be used to determine the health of livestock is by urinalysis. Only with a small sample of urine could be used for qualitative urinalysis tests such as: examination of leukocytes, protein, bilirubin, urobilinogen, ketones, nitrites, pH, specific gravity, red blood cells and glucose. Urinalysis is one way that could be used to check the body condition of goats and is important in diagnosing diseases related to changes in urine composition such as diabetes mellitus by measuring glucose and ketone concentrations, liver disease based on bilirubin measurements [14,17]. However, until now there have not been many publications reporting the examination of the health status of kidney function through chemical urine examination (urinalysis) using a dipstick on boerka goats.

Urinalysis can support the search for a disease or deviation that occurs in animals through urine so that the diagnosis can be confirmed accurately. Chemical analysis of urine is generally carried out by means of a test, dipstick which is a test that uses a specially made stick consisting of a strip to detect glucose, protein, bilirubin, urobilinogen, pH, specific gravity, red blood cells, ketones, nitrites, and leukocytes. The use of a dipstick in urinalysis is not so difficult to do, besides that the results can be obtained in just a few minutes [18]. This study aims to examine the profile and status of the chemical levels of boerka goat urine.

**Research Methodology**

This study used urine samples from 16 boerka goats fed local forage and additional Indigofera. The materials and tools used in this study were dipstick kits (Combur10 Test® Roche, Diagnostics GmbH, Mannheim, Germany), urine tubes, 2L bucket, hand gloves, masks, label paper and tissue. This research was conducted using the observation method which emphasizes the observation of the amount of substances contained in the urine. The variables observed in this study were: Leukocytes (Leu/μL), protein (mg/dL), bilirubin (mg/dL), urobilinogen (mg/dL), ketones (mg/dL), nitrite (+ or -), pH, specific gravity, red blood cells (+ or -) and glucose (mmol/L). Samples were taken once in the morning at 7:00 - 9:00 WITA. Urine collection using the storage method was carried out on goats that were urinating at the midstream stage. Each sample will be tested up to three times. The results of this study will be tabulated and averaged and the results will be presented in tabular form and analyzed descriptively. This research was conducted at the Walung Amerta Farm in Sanda Village, Pupuan District, Tabanan Regency, Bali Province of Indonesia from October to December 2020.

**Result and Discussion**

The results of chemical examination of boer and kacang goat crossbreed urine at Walung Amertha farm was presented in table 1.

No	Leu	Prot	Bil	Ubg	Keton	Nitrit	SG	pH	Eri	Glu
1	-	-	-	-	-	-	1,000	8	-	-
2	-	-	1+	-	-	-	1,000	8	-	-
3	-	-	-	-	-	-	1,010	6	-	-
4	-	-	1+	-	-	-	1,000	8	-	-
5	1+	-	-	-	-	+	1,000	8	2+	-
6	1+	-	-	-	-	-	1,000	9	-	-
7	-	-	-	-	-	-	1,000	9	-	-
8	-	-	-	-	-	-	1,000	8	-	-
9	1+	-	-	-	-	-	1,000	8	-	-
10	-	-	-	-	-	-	1,000	9	-	-
11	-	-	-	-	-	-	1,005	8	1+	-

12	-	-	-	-	-	-	1,000	8	-	-
13	-	-	-	-	-	-	1,000	9	-	-
14	-	-	-	-	-	-	1,005	9	-	-
15	-	-	-	-	-	-	1,005	9	-	-
16	-	-	-	-	-	-	1,005	8	-	-
(%)	Positive 18,75%	Negative 100%	Positive 12,50%	Negative 100%	Negative 100%	Positive 6,25%			Positive 12,50%	Negative 100%
Mean and SD							1.002 ± 0,03	8,25 ± 0,77		

**Table 1:** Chemical profile of boer-kacang crossbreed goat urine (n=16) assessed using a dipstick urine.

Notes: Leu= leukocytes; Prot= protein; Bil = bilirubin; Ubg= urobilinogen; SG= specific gravity; pH= acidity level,

Eri= erythrocytes; Glu = glucose; Mean ± standard deviation (SD) (Percentage: observed count/total x 100;

Interpretation: +++=positive, ++=positive, +=negative, ---=negative. Leukocytes 1+ (25 leu /L), 2+ (100 leu/L), 3+ (500 leu/L);

Bilirubin 1+ (1 mg/dL), 2+ (3 mg/dL), 3+ (6 mg/dL); Erythrocytes 1+ (10 eri/μL), 2+ (25 eri/L), 3+ (50 eri/L), 4+ (150 eri/μL);

3+=+, 2+=+, 1+=-, 3-=-, 2-=-, 1-=-.

The evaluation showed that leukocytes were found in the urine of three goat’s samples i.e. number 5, 6 and 9 with levels of 25 leu/L. This situation is an abnormal condition because the urinalysis does not allow the presence of leukocytes in the urine. The discovery of leukocytes in the urine can be caused by pathological and non-pathological conditions such as urinary tract infections, namely acute cystitis, urethritis, acute nephritis, chronic pyelonephritis, renal calculi, urethral calculi, glomerulonephritis and pelvic inflammation and in non-pathological conditions, namely fever and stress due to treatment, and in the field such as not enough drinking water to access [5,18]. An increase in the number of leukocytes indicates the presence of cystitis or pyelonephritis [9]. However, if the number of leukocytes found is only a few, then this is something normal.

Normal urine contains little or no detectable protein due to effective reabsorption by proximal renal tubular epithelial cells. Albumin molecules generally cross the glomerular filtration barrier but will be reabsorbed, therefore the presence of albumin in the urine can indicate an increase in glomerular barrier permeability as a result of infection or kidney damage [13]. None of the 16 goats examined in this study showed proteinuria.

The results of urine bilirubin examination were negative in 14 goats, but positive in two goats, samples number 2 and 4 with a level of small 1 mg/dL. The amount of bilirubin in the urine depends on the degree of impaired liver function [2]. Bilirubinuria as measured by dipstick urinalysis to measure the level of conjugated bilirubin. The pathological causes of bilirubinuria are bile duct obstruction, hepatic necrosis, leptospirosis, acute hepatitis, acute cholestasis, and hemolytic diseases such as immune-mediated haemolytic anemia. Conjugated bilirubin is excreted in the bile and then degraded by intestinal bacteria to urobilinogen. Most of the urobilinogen is then oxidized to urobilin, but a small portion is reabsorbed and excreted in the urine.

Urobilinogen examination showed negative results in all boerka goats examined. Measurement of urinary urobilinogen can be useful in detecting the presence of liver disease early. Small amounts of urobilinogen are commonly found in the urine, but elevated levels of urobilinogen indicate liver damage or abnormal breakdown of red blood cells.

Ketones are acidic chemicals, formed when fat is broken down a lot. This may also occur as a result of the animal experiencing prolonged vomiting, fasting and starvation. The presence of ketones in the urine when fat metabolism increases due to an insufficient supply

of energy in the form of carbohydrates, this happens in the case of starvation. The absence of ketonuria in this study showed that the feed used local forage and indigofera was able to meet the energy needs of goats on the Walung Amertha farm and showed that the goats received an adequate supply of feed and received adequate energy supply [12].

The presence of nitrite in the urine is generally associated with infection. Most of the microbes that cause urinary tract infection (UTI) such as *Escherichia coli*, *Klebsiella* and *Pseudomonas* can convert nitrate to nitrite in urine. However, the absence of nitrite in the urine does not mean that there is no infection in the urinary tract because some bacteria are unable to convert nitrate in the urine into nitrite [16]. About 50% of urine samples contained bacteria, but the urine nitrite test was negative [1]. The results of this study indicate that sample number 5 is also positive for leukocytes with levels of 25 leu/L and erythrocytes with levels of 25 eri/ $\mu$ L.

The normal value of goat specific gravity ranges from 1.020 - 1.040 [14]. Hyposthenuria is the normal kidney's ability to dilute urine [10]. Values in this range can be normal if the animal has a need to excrete extra water, but will be abnormal in an animal that needs to retain water due to dehydration. The specific gravity of urine in this state of hyposthenuria can be produced by primary polydipsia, lack of antidiuretic hormone (ADH), or the inability of the kidneys to respond to anti diuretic hormone/ADH. The specific gravity found in boerka goats in Sanda village does not necessarily reflect the actual specific gravity because the dipsticks urinalysis that are commonly circulated in the market (for humans) are not good at measuring the specific gravity of urine in animals. Therefore, it is recommended to use a refractometer to measure the specific gravity of animals [18].

The acidity/pH level of urine found in this research ranges from 5 - 8, and the pH value of goat urine ranged from 7.5 to 8.5 [14]. The value of urine pH reflects internal homeostasis in order to maintain acid-base balance so that the body's pH remains constant and is indispensable for the interpretation of urine chemistry and for sediment findings. The level of pH of urine is also influenced by the feed consumed, high protein feed makes urine more acidic, feed with lots of leaves makes urine alkaline [16]. In general, herbivores have alkaline urine because the feed they eat is forage. The level of pH values lower than the normal range may result from starvation, respiratory acidosis, diarrhea and vomiting, increased protein breakdown and severe azotemia [6]. If the pH value is less than 6.0 it could cause by systemic acidemia [10].

Red blood cells were found in the urine of two goats, namely sample number 5 with a level of 25 eri/ $\mu$ L and number 11 with a level of 10 eri/ $\mu$ L, while the other 14 samples showed negative results. This situation is not normal because the urinalysis does not allow the presence of erythrocytes in the urine. The presence of blood in the urine is an abnormal condition, generally associated with problems that occur in the urinary tract such as cancer, kidney damage and the presence of stones. Blood in the urine can be an indication of a clotting problem or a side effect of anticoagulants [8].

The presence of glucose in the urine or glucosuria may occur while the female is pregnant, and during physiological stress (because it increases corticosteroids). The renal threshold for glucose is 10 - 11 mmol/L and the presence of glucose in the urine indicates blood glucose levels exceed 10 - 11 mmol/L [4]. As recently reported [7], that glucose is filtered freely in the glomerulus and then reabsorbed in the proximal tubule, thereby keeping glucose from being used as an energy source. Although glucosuria is a sign of hormonal disorders, glucosuria is not a diagnostic (measurement) and examination of peripheral blood samples in fasting animals needs to be done to confirm that a disorder has occurred [16]. In this study, no glucosuria was found in all boerka goats examined.

## Conclusion

Based on the results of this study, it can be concluded that of the 16 boerka goats examined, all were negative for protein, urobilinogen and ketones, 1+ positive leukocytes were found in 19%, 1+ bilirubin in 13% goats, nitrite positive in 6% goats, cell positive red blood cells in 13% of goats, while the specific gravity with an average of 1.002 and an average pH value of 8.25.

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