

# The Liver Function of Bali Cattle Reared in Garbage Dump

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**Abstract.** It is important to learn the liver function of Bali cattle reared in landfills. Landfills is an unusual cattle feedlot which in turn will affect the physiological condition of the animals. Early detection of the animal physiological condition through blood plasma examination is one way to determine the animal liver function. This study used 30 Bali cattle reared in landfills (TPA) Suwung South Denpasar. Blood samples were collected aseptically from the 30 Bali cattle and the activity of alanine aminotransferase (ALT) and aspartate aminotransferase (AST) were detected using Refloton test method. Data were analyzed using One Sample T Test. The results showed that activity of ALT was significantly lower ( $P < 0.01$ ) compared to standard ALT value. Whilst the AST was in the range of normal value. ALT is considered more sensitive in determining the liver function compared to the AST value.

**Keywords:** Cattle Bali, ALT, AST, liver

## I. INTRODUCTION

Bali is now experiencing a serious phenomenon that cannot be avoided from the drastic transfer of agricultural land functions. Thus, the habitat of Bali cattle is facing various problems, mainly the limited space and land for feeding. Farming land shifted into residential areas due to increased human population growth. During the dry season the farmer will find it difficult to get enough source for feeding his livestock, so they will find alternative way to overcome this situation. Garbage dump or landfills has become one of the alternative source for feeding cattle in Bali especially in the urban area. As a result, the animals consume household garbage, hotel debris and a variety of factory or industrial waste, including hazardous chemicals or metals [1] [2].

Over time, so in turn this situation will affect the health of Bali cattle. Moreover, when meat from this animal is consumed by humans it can cause serious health problems [3][4]. Suyanto *et al.* [5] found that heavy metal residues such as Pb, Hg, and Cd were in quantities exceeding the threshold limit from carcasses of cattle which were reared in landfills Jatibarang, Semarang, Surakarta and Sragen regency, respectively. When high

concentration of heavy metal waste such as plumb (Pb), mercury (Hg), cadmium (Cd), arsenic (As), and argentum (Ag) is found in the blood, it will further go into the tissues and organs which resulting in the damage of the biological macromolecules [6]. The liver which is the organs that serve to neutralize toxins will work harder and in addition the liver cells will experience necrosis due to the poison itself. The kidneys as well as the excretory organs of various toxins will have problems with their function [7]. Impairment of both of these organs resulting in the failure to excrete the toxins and therefore the toxins will be deposited of in the tissues. This issue is of a concern matter especially when the meat is consumed by human. Heavy metal poisoning pose health hazard. such as anemia and various organ disorders and lead to impaired intelligence [8][9][10]. Therefore, it is necessary to study the liver function of Bali cattle reared in the Suwung Denpasar garbage dump. Examination of the animals blood samples can provide a variety of preliminary information about the abnormalities of apparently healthy animal physiological condition [11].

## II. RESEARCH METHOD

This study used 30 adult female calves that were reared in Suwung, South Denpasar, Bali landfill. Blood samples were collected aseptically from the jugular vein then stored in EDTA tube vacutainer. Activity of ALT and AST was determine using the Refloton method. The procedure of the test: blood sample is dropped onto the ALT and AST stick, then the stick is inserted into the Refloton machine. The result will be showed in the monitor and further printed out [15]. Data obtained were analyzed by One Sample T Tests [12].

## III. RESULTS AND ANALYSIS

The activity of ALT and AST values were analyzed using descriptive analysis and one sample test and compared with the results of Bali cattle studies which were reared in normal habitat [13].

TABLE 1.  
DESCRIPTIVE ANALYSIS RESULTS

Parameter	N	Minim um	Maximu m	Mean	Std. Deviation	standard standard
ALT	30	21.0	50.6	35.444	7.9070	99.21- 109.24
AST	30	40.2	70.1	59.040	7.1071	55.56- 67.05

TABLE 2.  
THE RESULTS OF DESCRIPTIVE  
ANALYSIS AND ONE SAMPLE T TEST

	Mean $\pm$ Std	standard
ALT	35.444 $\pm$ 7.9070**	99.21-109.24
AST	59.040 $\pm$ 7.1071 <sup>ns</sup>	55.56-67.05

\*: highly significant differences ( $P < 0.01$ )

ns: not significantly different ( $P > 0.05$ )

The results showed that ALT activity is much lower than the standard value. Based on the one sample t test, ALT activity was significantly lower ( $P < 0.01$ ) compared to the standard value. According to Miles *et al.* [14] the decrease in ALT activity may be associated with decreased liver expression and protein function responsible for intermediate metabolism, but the physiological mechanisms responsible for this associated effect are not understood. This condition can be compromised in older cows [16] [17]. The main function of mammalian liver is to coordinate the body energy and run various metabolism. Alanine transaminase (glutamic-pyruvic

transaminase) is expressed by periportal hepatocytes which supports the production of ammonia by transitioning alanine into pyruvate [18], producing Glu (Glutamate) from  $\alpha$ -KG (ketoglutamate). Glutamate, through deamination with glutamate dehydrogenase to produce ammonia and  $\alpha$ -KG. Ammonia from Glu and peripheral Ala can now be incorporated into carbamoyl phosphate for ureagenesis, while the remaining Glu is available for conversion into  $\alpha$ -KG (as an anaplerotic reactions to fill the citric acid cycle), used for gluconeogenesis, protein synthesis, or transported to the sinusoid. Berata *et al* [19] found lead (Pb) in blood plasma of Bali cattle that are reared in Denpasar garbage dump. Lead causing toxicity in living cells that can lead to oxidative stress. Many researchers have shown that oxidative stress in living cells is caused by an imbalance between the production of free radicals and antioxidants (glutathione) to detoxify the intermediate reactive substance or to repair the resulting damage. Under the influence of lead, free radicals increased and antioxidants decreased [20]. At a very high concentration, free radicals can cause damage to cell structure, protein, nucleic acid, membrane and lipid, resulting in stress situations at the cellular level [21]. Finally disrupts the cell's biological metabolism. The ionic mechanisms of lead toxicity cause significant changes in various biological processes such as cell adhesion, intra and inter-cellular signals, protein folding, maturation, apoptosis, ionic transport, enzyme regulation, and neurotransmitter release. Lead can replace calcium even in picomolar concentrations affecting protein kinase C, which regulates neural excitation and memory storage [6].

Values that are outside of this standard value can give a sense of the disfunction of ALT. This alanine transferase enzyme is an enzyme that plays a very important role in protein metabolism. The largest and most active metabolism of proteins occurs in the liver cells (hepatocytes). The low ALT activity can be interpreted as decreasing of the ALT function, which means disfunction of protein metabolism. Suyanto *et al.* [5] revealed that the meat of cattle kept in landfill contained heavy metals (Cd and Pb). The presence of heavy metals in the meat indicates the inability of the liver to detoxify toxins which enter the body. Protein is a component of the body used to bind

the toxin to neutralize and eventually remove it from the body. So in accordance to the decreased or disrupted metabolism due to the reduced function of ALT in protein metabolism. Aspartate transferase apart from present in hepatocytes (liver cells) is also found in heart and muscle cells. Thus, examination of AST is said to be less sensitive in detecting the disruption of liver function. In contrast, examination of ALT can detect liver dysfunction specifically. The results of AST activity in this study is within the standard limits, so it cannot be used to detect liver function disorders.

#### IV. CONCLUSIONS

The alanine aminotransferase (ALT) enzyme activity of Bali cattle that were reared in Suwung Pedungan, South Denpasar, Bali garbage dump was significantly lower than the standard ( $P < 0.01$ ), while the aspartate aminotransferase (AST) activity was in accordance with the standard.

#### ACKNOWLEDGMENT

The authors would like to express their appreciation to The Ministry of Research & Technology and Higher Education through Udayana University Institute for Research and Community Service and Faculty of Veterinary Medicine for supporting this project under Study Program University Superior Grant and all who support the research and writing this manuscript.

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