

Use of body linear measurements to estimate the reproductive performance of cattle in smallholder farms by a participative breeding system in South Sulawesi, Indonesia

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Abstract. Study aimed to identify the correlation of body sizes of Bali cattle with the pregnancy ability trait. Many studies gave attention to the body characters of beef cattle as the object being observed. Several types of research reported a strong correlation between some linear body sizes with some production traits. The pregnancy trait in beef cattle is very important, especially for smallholder farmers. A total of 100 cattle were measured body sizes, includes 50 pregnancy cattle and 50 non-pregnancy cattle. Three morphometric traits were measured on each animal. The parts measured were body length (BL), withers height (WH), heart girth (HG) and body condition scoring (BCS). The morphological traits were analysed using descriptive statistics using IBM SPSS Statistic 20 and Microsoft Excel. Relationship between HG and BCS on pregnant cow followed a regression equation $Y = 0.0721X - 4.447$ ($R^2 = 68.3\%$) and on an-pregnant cow followed $Y = 0.0953X - 7.3978$ ($R^2 = 68.3\%$). The relationship between heart girth and body condition scoring is very close and can be used to predict pregnancy ability in cows. The regression equation will greatly help smallholder farmers in the participatory breeding system.

1. Introduction

Beef cattle in Indonesia spread across 95% of smallholder farmers. It is an advantage in efforts to develop community-based beef cattle. The farmers have become the main actors in efforts to develop beef cattle, even in breeding activities. So that all beef cattle breeding activities are carried out in smallholder farmers. Activities involving farmers and other stakeholders called participatory breeding system. Morphological evaluation of different breeds of beef cattle is still considered important from a selection point of view. For proper use of morphological traits in beef cattle selection programs, the knowledge of their descriptive statistics and genetic parameters are necessary [1].

There are certain body characters of Bali cattle that distinguish it from other breeds. The study of these characters helps in further breeding and improvement programs of breeds. The characters are included the height and length of the animal, head shape and neck conformation, tail length and thickness at the base, ear length and width and rump length and horn [1]. Many studies gave attention to the body characters of beef cattle as the object being observed. Several types of research reported a strong correlation between some linear body sizes with some production traits [2]. The body condition



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scoring (BCS) system has used for the assessment of body condition. The BCS is one of the most imperative factors correlating reproductive performance. The study aimed to identify the correlation of body sizes of Bali cattle with the pregnancy ability trait. The pregnancy trait in beef cattle is very important, especially for smallholder farmers. Results obtained in the present study would also be useful and helpful to farmers and animal scientists who are involved in cattle research.

2. Materials and methods

2.1. Materials

A total of 100 cattle were measured body sizes, includes 50 pregnancy cattle and 50 non-pregnancy cattle. The animals were more than 2.5 – 3 years old as determined by dentition. They were reared through the semi-intensive management system in Barru Region in South Sulawesi, Indonesia.

2.2. Collecting and Analysis Data of Morphological Traits

Three morphometric traits were measured on each animal. The parameters measured were body length (BL), measured from the distance from the point of the shoulder joint to the point of the pin bone; withers height (WH), the distance from the highest point of withers to the ground; and heart girth (HG), measured as body circumference just behind the forelegs [3]. The BCS was measured with the British system (scale point of 1 to 5). The morphological traits were analysed using descriptive statistics using IBM SPSS Statistic 20 and Microsoft Excel.

3. Result and discussion

The genetic correlations between BCS and fertility suggest that BCS is moderate to the strong indicator of fertility [4]. BCS has a close relationship with cow pregnancy. The results showed that most of the pregnant cows had BCS in the range 5-6, while the non-pregnant cows were mostly in the range 4-5. In measuring withers height (WH), body length (BL) and heart girth (HG), it was found that BCS had a close relationship with heart girth. During fifth and sixth parity, WH peaked at an additional 2 to 3 cm [5]. Changing the size of the HG associated with pregnancy is often considered the cow. Relationship between HG and BCS on pregnant cow followed a regression equation $Y = 0.0721X - 4.447$ ($R^2 = 68,3\%$) (Figure 1). The analysis of variance showed that the regression equation could be used to predict fertility in cow ($p < 0.01$). The relationship between WH and BL to BCS is very low. The genetic relationship of BCS with the health and fertility of cows was confirmed [6]. The heart girth not only has a strong relationship with the BCS, but also with body weight. The heart girth was the most reliable body measurement in the prediction of body weight for different types of animal [7].

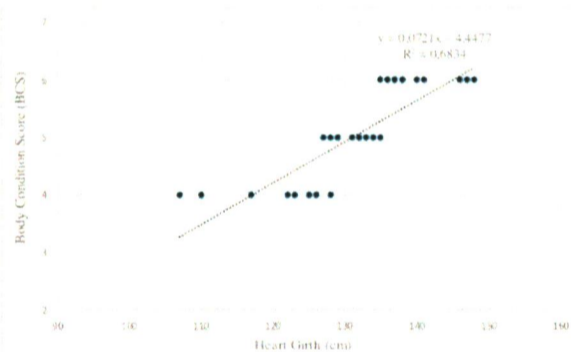


Figure 1. Relationship between HG and BCS on the pregnant cow.

Whereas the relationship between HG and BCS on an-pregnant cow followed a regression $Y = 0.0953X - 7.3978$ ($R^2 = 68,3\%$) (figure 2). The relationship between HG and BCS in both pregnant and non-pregnant cows was very strong. The results of HG and BCS measurements and their relationship can be used to predict the potential for pregnancy in cow. The heart girth can be selected

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