Characteristics of Size and Shape of Body Dimension of Madura and Rote (Indonesia) Fat-Tailed Sheep Using Principal Component Analysis

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ABSTRACT

Fat-tailed sheep is one of the important livestock resources for meat production especially in dry area of Indonesia such as Madura and Rote Islands. One of criteria for good performance as meat type is body measurement which can be useful to show their characteristics and general body dimension. This experiment was done to identify the size and shape of body dimension of fat-tailed sheep in Madura and Rote Islands. Data of 9 body measurements have been analysed from 136 fat-tailed sheep, 50 rams and 86 ewes. The data obtained were analyzed with Principle Component Analysis (PCA). The results showed that chest deep is a representaion of body size for fat-tailed Madura and Rote rams with correlation coefficient between body size and chest deep were 0.924 and 0.842, respectively. There is a different representation of body size for both ewes. The tail width is the representation of body size for fat-tailed Madura ewes with correlation coefficient is 0.799; in contrast, the wither height is the representation of body size for fat-tailed Rote ewes with the correlation coefficient is 0876. The representations of body shape for both fat-tailed sheep are the cranium width (for fat-tailed Madura rams and ewes and also for fat-tailed Rote ewes) and chest circumference (foe fat-tailed Rote rams). A positive correlation coefficient between cranium width and body shape representation is found (0.785; 0.785; 0.630), but the fat-tailed Rote rams have negative correlation coefficient which is -0.648. Sheep possessing greater tail length and width have smaller body shape, or vice versa. It is concluded that the body size and shape of the rams and ewes of fat-tailed Madura sheep do not differed from those of fat-tailed Rote sheep.

Key word: fat-tailed sheep, principal component analysis (PCA), body size, body shape

INTRODUCTION

Indonesian fat-tailed sheep is one of the largest population of sheep which produce meat in dry area. There are two regions having the largest population which are the Madura Island in the west part of Indonesia, and Rote Island in the east part of Indonesia. The production of meat animals is associated with the growth and development. The development pattern is useful in the assessment of confirmation. Usually the size is measured as body weight while the shape is described by several body measurement or visual appraisal. The problem of size and shape of animal is that the weight does not adequately distinguish the different in body composition. Furthermore, visual appraisal is affected by individual biases and perceptual differences among observers (Carpenter, 1979). Statistical technique with multivariate technique of principal component analysis has been used to combine weight and body measurements into indexes for defining the size and shape (Brown *et al*., 1973; Carpenter, 1979).

The concept of principal component analysis (PCA) has received limited attention, but it can be used to evaluate variation in body shape (Brown *et al*., 1973). MacFie (1979) used multivariate statistical techiques to quantify the differences in shape between breed. The use of PCA for analysing the size and shape in Indonesian sheep were rarely. Brown *et al*. (1973) has used the PCA of nine linier measurement and weight to elicit an objective description of different pre-yearling body shape. A similar PCA to that used by Brown *et al*. (1973) was also applied to measure the body size of Garut sheep (Erfan, 2004). The aim of the present paper is to quantify the difference in size and shape of fat-tailed sheep in Indonesia.