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Genetic Parameters and Breeding Values Livestock Breeding Center for Excellence in Bali cattle.

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Abstract

Potential Bali cattle in BPTU Pulukan Bali as breeding centers should be evaluated productivity every year. A number of offsprings produced from the male elected and based on the breeding value (BV) will be set as seeds. Bali cattle birth data years 2006-2011 as the base for the analysis of genetic parameters and Breeding Value.

Heritability of body weight one year of beef Bali 34 ± 0.05. Ripitability properties of body weight one year of Bali cattle 0.41 ± 0.09. Genetic correlations of weaning weight with a body weight of 0.31 ± 0.19 years. Bali cattle breeding value for the highest male body weight at one year of age 17.60.

Heritability, and repeatability Bali cattle male in BPTU on the weight of the year in the category of moderate to high, and 8 head from males elected candidate is capable of producing 20 head seeds candidate.

Keywords: Genetic parameters, Bali cattle, Breeding value.

1. Introduction

A breeding program which among others include marriage and selection aimed at increasing the productivity and genetic quality. Selection in breeding programs which lead to the breeding stock is based on the NP to improve the genetic quality of livestock candidate seeds. Bali cattle have advantages such as high fertility rates, can utilize forages that are less nutritious, high carcass percentage, positive heterosis value and high adaptability to the environment as well as lambing percentages can reach 80 percent (Pane. 1990). Availability cows of reproductive age who have a good reproductive achievement plays an important role in determining population growth for the benefit of lowering the rejuvenation in the group.

Estimate heritability of weaning age and weight growth of one-year-old Bali cattle in the range of 0.3-0.4 (Praharani, 2009). Heritability of weaning weight and yearling regarded as moderate to high, which means that the program selection will be more effective and efficient in increasing genetic benefit in Bali cattle. Wilson (1996) estimated the heritability of traits live weight growth of adult cattle and hip height is 0.47 to 0.51 and from 0.62 to 0.88, respectively, and there is a genetic correlation (r = 0.80) between the two characteristics

2. Materials and Method

The method used in this research case study method in Bali Cattle BPTU Pulukan. The material consists of primary data weight and size of the vital statistics birth year 2006-2011.

2.1.Estimates of heritability

Components of variance to estimate the heritability of quantitative traits by using Restricted Maximum Likelihood (REML) with the pattern of Linear Mixed Model using program GENSTAT 14. The effect remains is the year of birth, sex and parity while the random effects is a stud. And Statistical Linear Mixed Model is as follows: $Y = X_t + Z_u + e$ (Knight, 2008). Estimation of heritability paternal half-sib correlation method using a completely randomized design. Heritability values calculated by the formula

$$h^2 = 4t = \frac{4\sigma_S^2}{\sigma_S^2 + \sigma_E^2}$$

2.1.Estimates repeatability (r)

To calculate repeatability production traits and body size cows used simple correlation formula (Interclass correlation) with the formula:

$$r = \frac{\Sigma xy}{\sqrt{\Sigma x^2 \Sigma y^2}}$$ (Hardjosubroto,1994)

Genetic correlation (r_g)

Covariance component is estimated using analysis of variance direction of the unbalanced pattern design (Becker, 1975).

Genetic correlation value calculated by the formula:

$$r_g = \frac{cov_g(xy)}{\sqrt{(\sigma_g^2(x)\sigma_g^2(y))}}$$

Breeding Value Estimation (EBV)

NP estimate conducted on the parameters body weight and body size Bali cattle at the age of 205 days and 365 days. EBV each parameter estimation is done by using the formula $BV = h^2 (P - \overline{P}) + \overline{P}$ (Absolute Breeding Value) and the value of a bull is based on the number of offsprings:

$$BV(HS) = \frac{nh^2}{4+(n-1)h^2}(P - \overline{P}) + \overline{P}$$

3. Results and Discussion

Genetic improvement of which can be evaluated through the growth of beef Bali (Table 1) as an additional factor of selection, because the size of the body can describe the kind of Bali cattle as beef-type cattle. Body size on growth in cattle inherited medium to relatively high and has a strong positive relationship.

Table 1. Average growth performance Bali cattle.

Variabel	Number of sample (head)	Average (kg)	Coefisien Varians (%)
Birth weight(BW)	475	17,82 ± 1,47	8,25
weaning weight (WW)	441	88,94±14,83	16,67
Weight one years (W1year)	390	121,50±20,27	16,68

Bali cattle birth weight in BPTU of 17.82 ± 1.47 kg, or ranges between 16-19 kg. Weaning weight by using 441 cows on average gained 88.94 ± 14.83 kg or ranges between 70-104 kg. Martojo (1988) Bali cattle birth weight ranged from 9.0 to 20 kg and weaning weight of cattle Bali, including small range between 50-100 kg. Results of this study for the weight of the year amounted to 138.3 ± 28.57 kg, or around 109 -176 kg, mean the Bali cow has a daily weight gain ranges from 360-475 grams per day. Value of genetic parameters such as growth performance Bali cattle in Table 2

Table 2. Value of genetic parameters growth performance Bali cattle:

Heritability				**Repeatability**			**Genetic correlation**			
Variable	**N**	**h²**	**Se**	**N**	**r**	**Se**	**Variable**	**N**	**Rg**	**Se**
BW	451	0,22	0,02	246	0,23	0,10	**BW-WW**	280	0,27	0,18
							BW-W1year	280	0,22	0,20
WW	440	0,25	0,03	176	0,33	0,09	**WW-W1year**	280	0,31	0,19
W1years	388	0,34	0,04	190	0,41	0,09				

Note. N: Animal Numbers; h²: heritability; Se: St.error; r: ripitability ; R_g : correlation genetic

Heritability of birth weight, weaning weight (205 days) and the body weight of Bali cattle aged 1 year in BPTU sequentially by 0.22 ± 0.02; 0.25 ± 0.03 and 0.34 ± 0.04. The third parameter is the nature of growth has a positive value and in the category of medium to high, conform with the limit values genetic parameters on the general nature of the production. Supriyantono research results (2006) heritability of weight one year of Bali cattle gained 0.27 ± 17.32. Heritability values for production traits such as weaning weight and weight one year generally have moderate to high category. From the results of several studies on the heritability of beef Bali obtained varying results, possible because of the differences in the method and time of observation.

Repeatability birth weight, weaning weight and body weight one year of age in the Bali cattle sequentially BPTU of 0.33 ± 0.07; 06 ± 0.28 and 0.36 ± 0.08. Guided by the provisions of that same nature and carried out on time and the same environment, the value repeatability results of this study are higher than the value heritability. So compared with Falconer and Mackay (1997) repeatability is part of the total population variance caused by differences between individuals who are permanent. In this study repeatability for different birth weight above 0.01 heritability value, while repeatability weaning weight and weight one year respectively 0.08 and 0.07 greater heritability value. Pirchner (1969) repeatability not fixed but depends on the magnitude of genetic and environmental diversity. Repeatability value will be smaller when temporarily high environmental diversity and even greater if the variance of a trait is controlled by genetic and environmental factors permanent. Ripitability weaning weight and weight one year the results of this study are much greater than the results Supriyantono

(2006) resulted in 0.006 and 0.022. It is possible differences in analytical methods or the number of repetitions, although carried on ox same nation and the same environment as well.

Genetic correlation between weaning weight and weight one year of 0.31 ± 0.19 was obtained. This result is larger and positive than the genetic correlation between birth weight by weaning weight (0.27 ± 0.18), and between birth weight with the weight of the year (0.22 ± 0.200). Genetic correlation between weaning weight and weight one year to indicate that the correlation is positive but less close. That is the change that occurs as a result of the selection weaning weight does not give much weight one year changes in the offspring due to environmental factors in the population. The basic concept is supposed to know the great and the sign of the correlation of genetic traits will be selected, can be used to estimate changes in the next generation. Warwick et al (1983) Genetic correlations can change in the same population for several generations if there is an intensive selection for one trait or several properties. Supriyantono (2006) genetic correlations of weaning weight with the weight of the year in Bali cattle also gained by 0.314. Two traits that have a genetic correlation can be used if the animals are selected on the first properties will be no response to the second trait in the next generation. Genetic correlation between the positive nature of the responses to be received by the second trait is also positive (Hardjosubroto, 2004).

The results can be predicted from the number of offspring produced 20 head can already be used as a substitute for the superior male.

Five best male generated based weaning weight breeding value of this study (Figure 1 and 2), only 20% were selected as superior male. The highest occupied male breeding value of 5.28 ear tag 0506.05. The breeding value 56.6% lower than the results Supriyantono (2006) with the highest breeding value amounted to 12.163 (from male ear tag 73 996). Differences result is possible because the breeding value of bulls used and the different testing time.

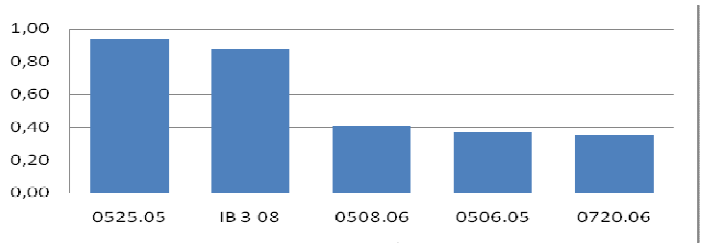

Figure 1. Estimated Breeding Value of birth weight highest in five males selected

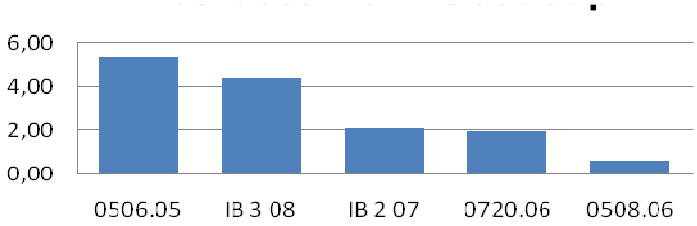

Figure 2. The highest weaning weight Estimated Breeding Value of five males selected

From the data NP birth weight and weaning weight in five male selected above, indicate that the birth weight of each male BV is always followed by an increase in weaning weight BV with varying values. Similarly BV weaning weight of each male followed by an increase in BV weight of one year.

4. Conclusion

Heritability and repeatability Bali cattle males in BPTU on the weight of the year in the category of moderate to high. Eight individuals males that have the highest NP capable of producing 54 head candidate seeds, consisting of 20 head seed candidates and 34 male candidates head females seeds.

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