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MPPA (Most Probable Producing Ability) Estimation of Kebumen Ongole Crossbred Cattle based on Offsprings Weaning Weight

Estimasi Nilai MPPA (*Most Probable Producing Ability*) pada Sapi PO Kebumen Berdasarkan Berat Sapih Keturunan

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Abstrak

Tujuan dari penelitian ini yaitu untuk menghitung nilai MPPA induk pada sapi PO Kebumen. Penelitian ini telah dilakukan pada bulan Juli sampai dengan Oktober 2015 di wilayah Urut Sewu, Kebumen. Materi penelitian yang digunakan adalah data *recording* tiga tahun terakhir (2013-2015) terdiri dari 41 ekor pejantan, 51 induk dan 244 pedet. Data berat sapih anak sebelumnya telah dikoreksi berdasarkan umur induk, jenis kelamin dan umur penyapihan 120 hari. Ripitabilitas dihitung menggunakan metode korelasi antarkelas. Nilai MPPA induk dihitung berdasarkan nilai ripitabilitas berat sapih keturunan. Hasil penelitian menunjukkan bahwa nilai ripitabilitas berat sapih anak termasuk dalam kategori tinggi (0.32 ± 0.15). Nilai MPPA induk sapi PO Kebumen kemudian dihitung menggunakan nilai tersebut dan juga rata-rata performan populasi (83.45 kg). Dihasilkan 10 besar induk sapi PO Kebumen dengan nilai MPPA tertinggi. Nilai MPPA kemudian diurutkan dari nilai tertinggi ke terendah. Nilai MPPA tertinggi dimiliki oleh SAJ0315078 (110.69) dan terendah dimiliki oleh TA1112020 (97.20). Hasil dari penelitian ini kemudian dapat digunakan sebagai dasar dalam seleksi induk sapi PO Kebumen di dalam populasinya.

Kata kunci: Sapi PO Kebumen, MPPA, berat sapih, keturunan

Abstract

The object of this research was to determine the value of MPPA (Most Probable Producing Ability) of Kebumen Ongole crossbred cattle. This research was conducted in June until October 2015 in the Urut Sewu area, Kebumen. The materials which used in this study were data record during the last three years (2013-2015) consists of 41 sires, 51 dams and 244 calf. Weaning weight data has previously been corrected based on age of dams, sex and weaning age of 120 days. Repeatability was calculated using interclass correlations method. MPPA was calculated based on the value of repeatability of offsprings weaning weight. The results showed that the repeatability value of weaning weight were included in high category (0.32 ± 0.15). The MPPA value of Kebumen Ongole crossbred cattle then calculated by it and also by the performans of population (83.45 kg). There were top 10 of dams with the highest MPPA values. The result was sorted by the highest value to the lowest. The highest score of MPPA was SAJ0315078 (110.69) and the lowest TA1112020 (97.20). The results of this research can be used as the basis for the dam selection of Kebumen Ongole crossbred cattle in its population.

Keywords: Kebumen Ongole crossbred cattle, MPPA, weaning weight, offsprings

Introduction

The Ongole crossbred cattle was formed as a result of grading up of Java and Sumba Ongole cattle that comes from Madras, India in 1930. Ongole cattle was the one of a good meat producer animal. Hafid (2013) reported that the carcass of males and females cattle each can reach 67.23% and 66,89%.

Carvalho (2010) also reported that the percentage of the carcass reach 49,40 ± 1.27%. The characteristics of Ongole crossbred cattle are white-gray color on body, with a large head, neck and knees were dark. The body size of this cattle is relatively short, large humped and has a wattle at the neck to stomach. Kebumen Ongole crossbred has larger body size than Indonesian National Standard of Ongole cattle. One of the associations of Ongole crossbred cattle breeder in Central Java was called ASPOKEB (Association of Ongole crossbred cattle breeder in Kebumen). This organization was work in the development of Kebumen ongole crossbred cattle, so they have the data record and information about Kebumen Ongole crossbred cattle. The history of Kebumen Ongole crossbred cattle originated in 1976, Suharto's Government bring 4 sire of Ongole and Brahman in Mirit from India and its to be developed as known as Madras cattle (Ras Madjapahit) that the result of Java cattle x Ongole Cattle x Brahman cattle (Nugroho, 2014). Kebumen Ongole Crossbred cattle also has been established as a new cattle strains in Indonesia through Decision Letter of Minister of agriculture no. 358/Kpts/PK. 040/6/2015 on 8 June 2015.

The potential of Kebumen Ongole crossbred cattle as one of the genetic resources of livestock and protein sources should be increased, including through the selection. A growth trait such as weaning weight is an economic trait which became one of the considerations as selection criteria. Selection can be done by calculating the genetic parameters, especially repeatability. Any observations on production was a combination of genetic and environmental factors. Observations done repeatedly will generate differences, such as the first observations will differ from the results of the second observation. Repeatability is used to find out the extent of relationship between the first production with the next on a single individual. Repeatability was a part of the total variance of a population caused by differences between individuals that is permanent (Hardjosubroto, 1994). Several study showed that the repeatability of weaning weight of Ongole local cattle reached 0.55 and 0.42 ± 0.11 respectively (Duma and Tanari, 2008; Rastosari, 2015). Selection was done when the repeatability of its trait were moderate to high (Hardjsubroto, 1994). The repeatability of weaning weight can be used to calculate the MPPA (Most Probable Producing Ability) of dams in the population. MPPA is a prediction of the animal production ability that accounted by the basis of performance data for each individual. These value was used to select the dams individually based on the most excellent value.The object of the study is to determine MPPA value of Kebumen Ongole crossbred cattle based on offsprings weaning weight. The results of this research are expected to help ASPOKEB in selecting the dams.

Materials and Methods

Data Collection and Correction.

This research has been conducted from July until October 2015. The materials used in the study was the growth record data of last 3 years i.e. 2013 to 2015. This data include the pedigree informations, cattle performances, weaning age and the age of the dams. Pedigree data consists of 41 Sires, 51 dams and 244 offsprings The weaning weight data was corrected by the age of dams, type of birth and sex with the following model:

Corection factor of sex

$$CF_{sex} = \frac{WW_{male}}{WW_{female}}$$

Where :

CF_{sex} = Correction factor of sex
WW_{male} = Weaning weight of male cattle
WW_{female} = Weaning weight of female cattle.

Corection factor of dams age

$$CF_{dams\ age} = \frac{WW_{highest\ age}}{WW_{actual\ age}}$$

Where :
$CF_{dams\ age}$ = Correction factor of dams age
$WW_{highest\ age}$ = The highest weaning weight at the age of a specific parent
$WW_{actual\ age}$ = Weaning weight at the actual age

Corected weaning weight

$$WW_{120}=\left[\frac{WW-BW}{WA}\ x\ 120+BW\right]\ x\ CF_{sex}\ x\ CF_{dams\ age}$$

Where,
WW_{120} = Corrected weaning weight at 120 days of age
WW = Actual weaning weight, BW as Birth weight
WA = Actual weaning age.

Repeatability. Repeatability of weaning weight was calculated used interclass correlation method with the following model :

$$r = \frac{\sum X1X2 - \frac{\sum X1 \sum X2}{N}}{\sqrt{\left((X1^2 - \frac{(\sum X1^2)}{N}\right)\left(X2^2 - \frac{(\sum X2^2)}{N}\right)}}$$

Where :
r = Repeatability
X_1 = The first record of a trait
X_1 = The second record
N = The number of dams.

MPPA The estimation of MPPA used data of 51rams and 609 lambs. MPPA was calculated base on weaning weight of offspring according to the formula:

$$MPPA = \frac{n\ r}{1+(n-1)r}(\bar{P}-\bar{\bar{P}})+\bar{\bar{P}}$$

Where :
MPPA = Most Probable Producing Ability
n = The number of offspring per rams
r = Repeatability
$\bar{P}$ = The average of offsprings weaning weight
$\bar{\bar{P}}$ = The average of weaning weight of offsprings population.

Results and Discussion

Weaning weight

The average of WW_{120} in Kebumen Ongole crossbred cattle in this study was 119.40±36.61 kg. This result was lower than the weaning weight of several Indonesian native cattle are Sumba Ongole 113.67±25.24 kg, Bali 88.59+16.15 kg, Brahman cross 107.13+19.25 kg, PO 109.10+18.35 kg and 44.68+11.00 kg for Aceh (Kaswati et al., 2013; Duma and Tanari, 2008; Prihandini et al., 2011; Putra, 2014). The difference in the weaning weight was caused by the difference of the weaning ages. Kebumen Ongole crossbred cattles have lower weaning weight than the others because they are weaned at the age of 120 days, while the other at the age of 205 days. In addition, the difference between weaning weight on cattle caused by the difference of their breeds. These result are similar with Szabó et al., (2012) who report that 20-30 % of the Hungarian Grey calves are heavier than the average of Hereford, Angus and Limousin and 10-20 % of them are heavier than the bottom 10-20 % of the top Blonde d' Aquitaine breed's calves. It is also reinforced by the statement of Sullivan et al., (1999) who found that substantial breed overlap exists in many regions of North America. For example 1 % of Angus, 3 % of Limousin and 6 % of Hereford were above the Simmental mean as for the weight gain between birth and weaning in their stud.

Repeatability

The result of repeatability was 0.32 ± 0.15 in the high category. It was coresponding to Hardjosubroto (1994) and Warwick et al., (1990) with the range 0,30 to 0,50, but it was lower than the results of Duma (1997) of 0.55 and Rastosari (2015) of 0.42 ± 0.11 on Brahman cattle. The high value of repeatabiity in this research allows to do selection based on weaning weight offsprings, besides that the low value of standard error can be indicated as the accuracy of it values (Hardjosubroto, 1994). These results also can be explained by the situation that herds of the evaluated breeds were kept in the same environmental conditions. The dams which have a calf that has high weaning weight in the early of its life will has a higher value of weaning weight in the future (Hardjosubroto, 1994). These difference

of the value of repeatability could cause by genetic variance, permanent or temporary environment (Kurnianto, 2009). Genetic variance differences associated with their breeds, for example Szabó et al., (2012) and Dodenhoff et al., (1999) have reported values of standard error 0.1-0.5 for the genetic parameter values of weaning weight of different beef cattle breeds. Some environments can cause the differences expression of the genetic. Different farms gave different nutrition, management, conditions that resulted high phenotypic variation (Szabó et al., 2012). The calculation time and the different populations could change the animals composition and the genetic diversity. The repeatability of a trait was useful for estimate the next productivity of animals that have more than one productivity records. The repeatability value also could be used for calculate the MPPA values then it could be sorted based on the value (Warwick et al., 1990).

MPPA

The MPPA value of the dams was calculated based on the offsprings weaning weight with the repeatability value of 0.32, the average of population performance 83.45 kg and then sorted by the largest value to the smallest. The result of the dams that have 10 top-ranked of the MPPA were in Table.

Most probable producing ability (MPPA) could use to estimate the dams production. The results showed that the dams SAJ0315078 have the highest value of MPPA 110.69 with the ratio of 139.71%, its mean that the dams have MPPA value 39.71% more than the average of population. The top 10 of the dams have ratio value more than 100% so their MPPA value still above the population. The results showed that the top 10 of dams has a superior productivity, so it can be recommended as a basis of evaluation and selection for the dams of Kebumen Ongole crossbred cattle. In the previous study, Suhada et al., (2009) has reported 150 dams in Padang Mengatas have MPPA above average weaning weights and the remaining 210 dams or 58.33% are under their average. The dam which has the higher value of MPPA will be more superior than the dam that has low MPPA value.

Table. The estimation of MPPA based on the offspring weaning weight

No	Dams	x	MPPA	Ratio (%)
1.	SAJ0315078	101,80	110,69	139,71
2.	TA1201009	100,68	109,04	137,62
3.	SAJ4 14 010	100,67	109,02	137,60
4.	TA1303055	100,60	108,92	137,47
5.	TA1306135	97,56	104,41	131,78
6.	TA1206067	96,29	102,51	129,39
7.	TA1207100	94,86	100,39	126,71
8.	TA1306125	94,19	99,39	125,45
9.	TA1404040	93,09	97,77	123,40
10.	TA1112020	92,71	97,20	122,68

*x = the average of offspring weaning weight, MPPA = Most Probable Producing Ability

Conclusion

The MPPA values that obtained from this study are SAJ0315078 (110.69), TA1201009 (109.04), SAJ4 14 010 (109.02), TA1303055 (108.92), TA1306135 (104.41), TA1206067 (102.51), TA1207100 (100.39), TA1306125 (99.39), TA1404040 (113.79) and TA1112020 (97.20). The results of this research can be used as the basis for the dam selection and selection of Kebumen Ongole crossbred cattle in its population.

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