

Age and Body Weight at Puberty and Service per Conception of Ongole Crossbred Heifer on Smallholder Farming System

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ABSTRACT: Age at puberty of a heifer is an important parameter to determine its reproductive longevity. This study was done to identify the age and body weight at puberty and service per conception of Ongole crossbred heifer on the smallholders farming system, in Tri Andhini Rejo cattle farmer group, Tegalrejo, Yogyakarta. The observation had been done on 37 heads of heifer from October 2012 to October 2013. When heifers showed first signs of estrus, the data of age, weight and body size were collected. The heifers were weighed and measured then be grouped based on its puberty age, which predicted according to the turn of cattles incisors (I_d , I_1 , and I_2). The data of puberty age were calculated and analyzed descriptively, while the body weight and the body size of the heifers were analysed using one-way ANOVA test. Result of this study showed that the age at puberty of Ongole crossbred heifers were achieved on the four different age levels: I_d (1.5 years), I_1 (2 years), I_2 (3 years) and I_3 (> 3 years), with the percentages were 32.4%, 40.5%, 24.3% and 2.7%, respectively. The average of body weights at puberty were 212.2 ± 35.2 kg (I_d), 232.5 ± 35.0 kg (I_1), 202.7 ± 20.3 kg (I_2), and 219 kg (I_3). Service per conception were 2.3, 1.9, 1.4 and 1.0 for I_d , I_1 , I_2 and I_3 , respectively. It can be concluded that age and body weight at puberty were varied, might be resulted from varied management of cattle keeping by smallholders farmers.

Keywords: Ongole Crossbred, Age at puberty, Body weight, Service per conception, Smallholder farming system

INTRODUCTION

Puberty may defined as the time which estrus first occurs, being accompanied by ovulation (Peters and Ball, 2004). The age of onset of puberty is clearly important since this could possibly prevent a cattle's availability for breeding at desired time. Some research results showed that Ongole crossbred heifers reached puberty varied at an age of 523 to 823 days hari (Anggraeny *et al.*, 2006; Beliana, 2008; Okasari, 2010; and Iskandar, 2011).

Beside age at puberty, service per conception (S/C) is important as well. Some results showed that S/C of Ongole crossbred varied from $1,89 \pm 0,2$ to $2,68 \pm 0,28$ times (Astuti, 2006; Winarti and Supriyadi, 2010; Aryanti, 2010). Ajie (2014) reported that age of cattle influenced S/C; 5-6 years of cows resulted significantly ($P < 0.05$) better S/ C ($1,40 \pm 0,52$) than 3-4 years of cows ($1,70 \pm 0,48$), or 7-8 years of cows ($2,40 \pm 0,52$). On average the S/C is $1,83 \pm 0,64$.

This study is aimed to explore the age at puberty, body weight, and S/C of Ongole heifers in smallholder farming systems.

MATERIALS AND METHODS

Study area

This study was conducted in Tri Andhini Rejo farmer's group, located in Bener Village, Tegalrejo Sub district, Yogyakarta Province, from October 2012 to October 2013.

Data collection

Thirty seven Ongole heifers belong to 19 farmers kept in a communal barn, which have not reached puberty, were selected. Recording sheets were used to record the identity of farmers and the cattle and reproduction activities such as onset of puberty, insemination, pregnancy palpation, and bull's information. Farmers observed, recorded on the recording sheets and reported to us the onset of puberty of their heifers. We determined the age of the heifers which showed the first puberty by inspecting its teeth. Heifers with only temporary teeth exist (I_0) were estimated as 1.5 y of age; one pair of incisors (I_1) were estimated as 2 y; two pairs of incisors (I_2) were estimated as 3 y; 3 pairs of incisors (I_3) were estimated as 4 y and; 4 pairs of incisors (I_4) were estimated as more than 4 y (Rianto and Purbowati, 2010). Heifers were weighed using weight scale (FHK Ogawa Seki Co.Ltd. Tokyo, Japan) with capacity of 800 kg, and body sizes were measured.

Farmers were interviewed about their general information, background and motivation, and technical aspects such as cattle management.

RESULTS AND DISCUSSION

General information of the farmers

The average of farmer's age is 51.1 ± 15.4 y, with 18.2 ± 23.8 y of average experience of cattle keeping. More than half (58%) of the farmers reached junior and senior high school and only 5% of the farmers finished undergraduate school. The main occupation of the interviewees was farming (84%) and the rest of 16% was businessmen. The purposes of keeping cattle, ranked from the most to less important are; producing calves, saving, hobby, producing manure and utilizing crop by-products.

Management of keeping cattle

All of the farmers keep the cattle in a communal barn, not close with their house. The farmers visited the barn once to five times in a day, with an average of 2.6 ± 1.0 times in a day, and spent 1.2 ± 0.4 hr to feed, give drink water, clean the barn and observe the estrus. Most of the farmers have good ability in detecting the estrus.

Feed offered to the cattle were forages and concentrates. Combination of native grasses and rice straw were mostly offered (52.6% of farmers); about twenty percent of farmers offered native grasses, rice straw and cultivated grasses; and 10% of farmers offered single native grasses in the ration. Few farmers offered cultivated grasses, maize straw and cassava leave. Less than half of the farmers (47.4%) offered concentrates which consisted of soy bean hull, rice bran and pollard. Forages were offered two (52.5%) until three (47.4%) times a day.

Age and body weight at puberty

Table 1 shows the age at puberty of Ongole crossbred heifers. Most of the heifers (73%) reach puberty at age of 1.5 – 2 y. It is in line with Anggraeny and Umiasih (2007), that found that about 67.1% of heifers reached its puberty at above 1.5 y. Longer time of puberty indicate low reproductive performance (Bishop and Pfeiffer, 2008). Timing of puberty is highly variable (Peters and Ball, 2004) and influenced by genetic, nutrition level and growth rate before puberty (Waters, 2012). Nutrition level is very important in relation with puberty, as breed factor can not be manipulated (Williams, 2013). When related to feeding management of smallholder farms, it is assumed that variability on feeds, in term of quality and quantity, result on different puberty.

Table 1. Puberty age of Ongole

Age at puberty	Number of heifers (heads)	Percentage (%)
I _d	12	32.43
I ₁	15	40.54
I ₂	9	24.32
I ₃	1	2.70
Total	37	100.00

Environmental factors such as climate, season and availability of bull around the female also stimulate the onset of puberty (Utomo, 2013). Tropical cattle reach puberty later (25 – 33 months) (Eduvie *et al.*, 1993; Kanuya *et al.*, 1993; Osei *et al.*, 1993) than cattle in sub tropic areas (less than 25 months) (Sargentini *et al.*, 2007; Saenz *et al.*, 2008). Cattle in the tropic often get less feed in longer period so that the heifer reach puberty later (> 2 y).

Body weight at puberty

Body weight of the Ongole crossbred heifers at puberty for each group of age is presented in Table 2.

Table 2. Body weight of Ongole crossbred at puberty for each group of age

Body Weight	Age group			
	I _d (n=12)	I ₁ (n=15)	I ₂ (n = 9)	I ₃ (n = 1)
Minimum (kg)	152.6	161.6	180.1	219
Maximum (kg)	288.0	285.0	234.0	219
Average (kg)	212.2±35.2	232.5±35.0	202.7±20.3	219

Age group of I₁ have the highest body weight at puberty (232.5±35.0 kg), followed by I₃, I_d and I₂ with the body weight are 219 kg, 212.2±35.2 kg and 202.7±20.3 kg, respectively. In general, a female cattle has to have an average body weight of approximately 200 kg to get an estrus. It indicates that the growth rate is a determination of puberty age, as stated by Boyle (2007) and Waters (2012), that cattle reach puberty when the body weight is 60% to 70% of mature body weight.

Service per conception (S/C)

Table 3 presents the S/C of Ongole crossbred for each group of age.

Table 3. Service per conception of Ongole crossbred for each group of age

S/C (time) (%)	Group of age			
	I _d (n=12)	I ₁ (n=15)	I ₂ (n = 9)	I ₃ (n = 1)
1	25	46.6	55.5	100
2	33.3	33.3	44.5	-
3	25	13.3	-	-
4	16.7	-	-	-
5	-	6.6	-	-
Average (time)	2.33	1.87	1.44	1

The results show that S/C tends to be better in older puberty age. It might be because the reproduction organs are more ready on older age. However, it needs deeper study on the factors which influence S/C.

CONCLUSIONS

It is concluded that management of heifer on smallholder farming systems are varied, results variation on pubert age. Heifers have to reach 200 kg to get first estrus (puberty) with S/C is relatively high.

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