The Effect of Work on Reproductive Performance of Bali Cattle Under the Oil Palm Plantation in Bengkulu

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ABSTRACT

The integration of cattle rearing under the oil palm plantation would beneficially support both livestock and plantation sector. Farmer would benefit the integration of livestock-oil palm plantation through its better income, optimum land use, labor efficiency, and better environment. In Bengkulu, the use of Bali cattle as Draught Animal Power (DAP) for carrying fresh fruit bunch (FFB) has proven to benefit both to the plant and livestock. The objective of this study was to determine the effect of work on reproductive performance in Bali cow. A total of 40 Bali cows within the range of body condition scored (BCS) 6-7 are divided into two groups, namely *Working* animals and *No-Working.* The *Working* group was subjected to three kinds of day-to-day work; these were *Work-1* (pulling cart from home to oil plantation), *Work-2* (pulling cart with FFB from plantation to collection site) and *Work-3* (pulling cart from plantation to home). Parameters measured were working regime (distance, speed, duration, and load) and reproductive performance (S/C, length of gestation, days open, birth weight and calving interval). Results showed that the average of distance, speed and load of *Work-1* and *Work-3* were significantly lower ($P<0.05$) than those of *Work-2*. For the respective *Work-1*, *Work-2* and *Work-3*, it was known that the distance measured were 1.287, 0.407, and 1.287 km; the load were 138.75, 582.5 and 89.09 kg; and the speed were 2.082, 0.856, and 2.055 km/hr respectively. Result also showed that there was no significant difference on reproductive performance between *Working* and *No-Working* animals, as presented by S/C (1.50 vs. 1.41), gestation length (284.2 vs. 281.6 d), days open (82.5 vs. 80.53 d), calf birth weight (14.6 vs. 16.25 kg), and calving interval (375.9 vs. 370.9 d). In conclusion, there was no working effect on reproductive performance for Bali cows.

Key words: Bali cattle, working, oil palm plantation, integration, reproductive performance

INTRODUCTION

Population and production of cattle in Indonesia has decreased in the last two decades, the major constraint to increased livestock production is the difficulty in providing feed of sufficient quantity and with adequate nutrient composition throughout the year .and decreasing land for livestock production mainly due to increasing land used for plantation such as oil palm, rubber, etc. There is considerable chance to optimizing land use through integration between crops and livestock, palm oil plantation have a huge potential to increase livestock population through the use of its by products for feed.

The inter row areas of these crop are usually covered with vegetation comprising legume, grasses, broadleaf species and fern which usually considered as weeds that can be utilized as source of for ruminant feed (Dwatmadji, 2005; Wahab, 2002). According to Jalaludin (1996) the cost of weeding control is quite significant and can be easily eliminated if the vegetation in the inter-rows is utilized for animal nutrition. Integrating animals in the plantation can also reduce fertilizer application since the nutrients returned to the soil from the animals are quite substantial. Reducing chemical fertilizers in the long-run will not only reduce production costs but, more importantly, will also minimize further deterioration in soil fertility.

In Bengkulu, the importance of cattle and oil palm integration can play an important role for weeding control, providing manure compost, producing calves, as life-saving, and for draft purposes. As a draft animal in oil palm system, Bali cattle can be used for transporting Fresh Fruit Bunch (FFB) from the harvesting area to collection site (main road). It is generally accepted that working animal requirement for

energy-yielding substrates increases during working, therefore Zerbini et al. (1993) found that the incidence of ovulation without estrus was higher in working than in non-working cows. Reducing ovarian activity was also reported in working buffaloes (Teleni et al., 1989), it is unlikely that the cessation of cyclic activity in working animals was result of direct competition for nutrient between the ovary and other tissues. According to Zerbini et al. (1999), the primary need of the working animal is to increase feed and metabolic energy intakes to meet energy requirements for work and avoid deleterious body weight losses. This becomes more critical in working cows requiring extra energy for lactation and reproduction, and where the main feed source is roughage.

MATERIALS AND METHODS

The research was conducted in oil palm plantation PT. Agricinal located in Muko-Muko District, 140 km north of Bengkulu. Forty well trained Bali cows 5-7 year of age within the range of body condition scare (BCS) 6-7 on scale of 1-9 (1 = emaciated to 9 = obese) (see Teleni et al., 1993) were used in this research and then subjected into two groups, *Working* and *No-Working*. The working cows were assigned to three kinds of work: *Work-1* (pulling cart from home to oil plantation), *Work-2* (pulling cart with Fruit Fresh Bunch from plantation to collection site) and *Work-3* (pulling cart from plantation to home). The working cows were grazed on the available native pastures available between oil palm inter row and based on the prevailing system of 8 hour day-grazing (06.00 - 14.00). Parameters measured were working regime (distance, speed, duration and load), physiological (respiration rate, pulse rate and temperature), and reproductive performance (service per conception, length of gestation, birth weight, estrus post partum, calving interval, calf weight). Data were tabulated and analyzed using ANOVA (Daniels, 1991).

RESULTS AND DISCUSSION

Working Regime

Most parameters on working regime measured (distance, speed, and load), except duration load), indicated that *Work-1* (pulling cart from home to oil plantation) and *Work-3* (pulling cart from plantation to home) were significantly different with *Work-2* (pulling cart with Fruit Fresh Bunch from plantation to collection site) (see Table 1). Work-3 had the highest load among the other two.

Based on the parameters measured, the natural working regime employed for carrying FFB in this experiment can be categorized as light work. This due to that working regime of current experiment was below the reported working regime measured by other researchers (see Pearson et al., 1989; Goe and McDowell, 1980; Dwatmadji, 2000).

Table 1. Mean ± standard deviation of working regime (distance, duration, speed, and load) of Bali cows during *Work-1*, *Work-2*, and *Work-3*.

Parameters	Work-1	Work-2	Work-3
Distance (km/day)	1.29±0.155^{a}	0.41±0.028^{b}	1.29±0.155^{a}
Duration (hour/day)	0.65±0.084^{a}	0.52±0.045^{a}	0.67±0.085^{a}
Speed (km/hour)	2.09±0.118^{a}	0.86±0.085^{b}	2.05±0.214^{a}
Load (kg)	38.7±15,26^{a}	582.5±56.49^{b}	89.1±10.71^{a}

Note: $^{a, b}$ means within rows bearing different letters in superscripts differ significantly (P<0.05).

Table 2. Mean ± standard deviation of respiration rate, pulse rate and rectal temperature of *Working* during pre and post working periods during *Work-1*, *Work-2*, and *Work-3*

Parameter	Work-1		Work-2		Work-3	
	Pre	Post	Pre	Post	Pre	Post
Respiration (breaths/minute)	22.9±1.07^{a}	43.9±2.40^{k}	29.7±0.95^{b}	57.0±2.44^{l}	34.2±1.61^{b}	57.0±2.53^{l}
Pulse rate (beats/minute)	60.7±0.78^{a}	80.4±2.46^{k}	65.5±0.96^{b}	87.8±2.46^{k}	69.1±1.31^{b}	86.9±2.13^{k}
Temperature (^{o}C)	36.6±0.06^{a}	37.2±0.06^{k}	37.1±0.02^{b}	37.9±0.07^{l}	37.2±0.05^{b}	37.8+0.07^{l}

Note: ^{a,b} means within *Pre* rows bearing different letters in superscripts differ significantly (P<0.05);
^{k,l} means within *Post* rows bearing different letters in superscripts differ significantly (P<0.05).

Reproductive Performance

Result shows that average number of services per conception was 1.5 ± 0.16 ranging from 1 to 3 in *Working* cows and 1.41 ± 0.12 varying from 1 to 2 in *Non-Working* cows. Statistically, there was no difference between working and non working control (Table 3). While Zerbini and Larsen (1996) found that the average services per conception for *Working* and *Non-Working* cows were 2.1 and 1.9, respectively. Findings of the present study are supported by the results of Ahmad et al. (2007) that average number of services per first conception was 1.5 ± 0.152 ranging from 1 to 6. Some other workers like Murdia and Tripathi (1990) who reported 1.58 services per conception, while Singh and Mishra (1980) have also found almost similar results (2.0 ± 1.15). Sekerden (1996) reported comparatively large number of services per conception (3.3 ± 0.17). The average number of services required for each conception was 1.8 for supplemented Bali Cows and 2.0 for non-supplemented Bali cows was reported by Oka (2002). Successful service or insemination depends on many factors as quality of semen, skill of the inseminator, proper time of insemination and cows to be inseminated themselves; management, nutrition and climate conditions may also affect the success of service or insemination.

Average gestation length of *Working* and *Non-Working* control cows was presented in Table 3. It was found that average gestation length for *Working* group was 284.18± 2.520 days, for *Non-Working* cows was 281.65±1.930 days. Gestation length of Bali cows under farm and urban conditions were studied by Fordyce et al. (2002), and found that the mean gestations of Bali cows were between 280-290 days.

The time taken for first estrus *post partum* in *Working* cows was 82.50±1.98 days, and it was longer than estrus *post partum* in *Non-Working* of 80.53 ± 1.770 days, but the difference was not significant. Our findings are in fair confirmation with Sinha et al. (1998) who observed the postpartum fertile estrus interval in prostaglandin treated cows was shorter (86.43 ± 4.01 days) than that of untreated control (144.50 ± 5.23 days).

The average birth weight was 14.63 ± 1.026 kg (*Working* cows) and 16.25 ± 0.984 kg (*Non Working*). In general, birth weight was not affected working. Our result is in line with Billi et al. (2000) who found that Bali calves have birth weight varying from 11.4 to 21.5 kg with male calves were significantly (P<0.05) heavier than female calves.

In addition, Bamualim and Wirdahayati (2002) found that Bali calves birth weight varying from 11.9-14.9 kg, Bamualim and Wirhayati (2002) also reported that supplemented cow 3 months before calving had no effect on calves' birth weight.

Table 3. Mean ± standard deviation reproductive performance of *Working* and *Non-Working* cows

Parameter	Working	Non-Working	P
Service per conception	1.50±0.160	1.41±0.120	0.236
Length of gestation (day)	284.2±2.52	281.6±1.93	0.238
Birth weight (kg)	14.6±1.03	16.27±0.984	0.988
Estrus post partum (day)	82.5±1.98	80.5±1.77	0.753
Calving interval (day)	375.9±4.45	370.9±3.54	0.675

The mean values for calving interval found for *Working* cows was 375.94 ± 4.45 days and *Non-Working* cows 370.94 ± 3.54 days, our result in the present study are shorter than the results of Zerbini and Larsen (1996) in which calving intervals for working and non working cows were 525 and 495 days, respectively. Wirdahayati et al. (2000) found that calving interval for smallholder Bali cows in Nusa Tenggara region was 510 days (non-supplemented) and 481days (supplemented). Moreover, Bamualim and Wirhayati (2002) also reported that supplemented cow 3 months before calving had shorter the calving interval than those of un-supplemented cows. According to Martojo (2002) the lengths of calving interval of Bali cows depend on management and environment conditions. Martojo (2002) found that calving interval of Bali cows depend on the management of each region, *e.g.* calving interval of Bali cow was found 15.4 months (NTT), 16 (NTB) and 15.7 months (South Sulawesi). Our results indicate that there were no differences between *Working* and *Non-Working* on reproductive performance. Agyemang et al. (1991) reported that the reproductive and productive performances of draft and non-draft cows were similar when the work load was light.

CONCLUSION

There were no differences between *Working* and *Non-Working* on reproductive performance of Bali cattle under the oil palm plantation in Bengkulu.

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