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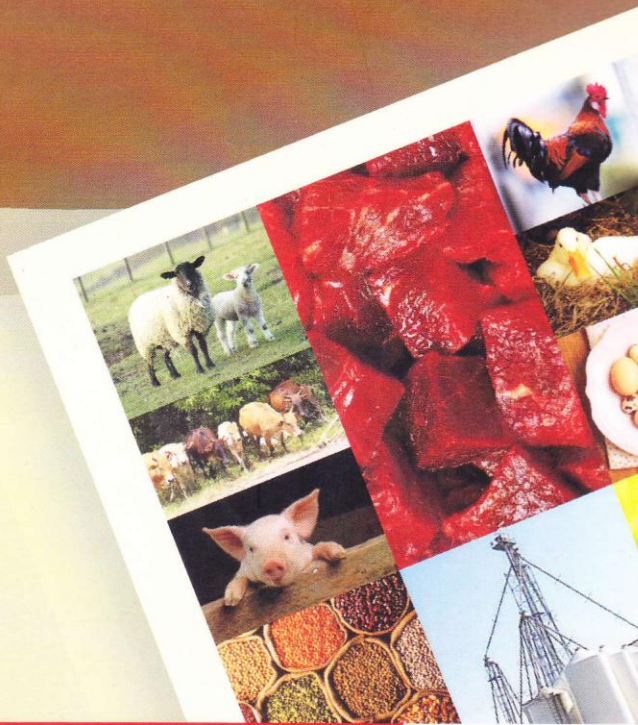

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Time	Room C	Room D
	Genetics, Breeding and Reproduction **Moderator: Prof. Dr. Ir. Sri Supraptini Mansjoer, M.S.**	**Feed and Nutrition** **Moderator: Prof. Dr. Ir. Wiranda G. Piliang, M.Sc.**
16.00-16.15	**Tatik Suteky and Dwatmadji:** Effects of Work on Reproductive Performance of Bali Cattle under the Oil Palm Plantation in Bengkulu	**Dewi Apri Astuti:** Physiological Status, Blood Profile and Body Composition of Sheep Fed with Ca-Saponified Lemuru Oil Coated by Herbs
16.15-16.30	**Idalina Haris:** Performance of Grade-1 Kids as a Result of Grading-up Between Local Goat and Boer Goat	**Despal:** Comparison of Indirect and Direct Determination of Microbial Growth in the Rumen Simulation Technique (Rusitec)
16.30-16.45	**M. Aman and Dasrul:** Growth Selection by Evaluation of Exterior Parameter and Nutritional Approach on Local Meat Chicken	**Ahmad Salihin Baba:** Availability of Browse Plants to Goats Fed with Napier Grass and Concentrate: I. Effects on Voluntary Feed Intake and Body Weight Gain
16.45-17.00	**Restu Misrianti** Identification of Pituitary-Specific Positive Transcription Factor 1 (Pit1) Gene Polymorphism in Indonesian Swamp Buffalo (*Bubalus bubalis*) and Holstein-Friesian Cows	**Muhammad Daud** Potential Oligosaccharide of Extract Rumbia Fruit (*Metroxylon sago Rottb.*) as Prebiotic
19.00-21.00	Dinner Party (Dinner Symposia)	

Tuesday, November 24, 2009

Time	Ballroom 3	
	Event	**Speaker**
08.00-08.30	Plenary 5: Herbs and Herbals in Animal Nutrition	Prof. Abdul Razak Alimon
08.30-09.00	Plenary 6: BROILER Chicken Welfare: WHAT DO THEY WANT AND WHAT DO WE WANT?	Prof. Dr. Zulkifli Idrus
09.00-09.30	Plenary 7: The global market of organic animal products – chances and risks	Prof. Dr. Gerold Rahmann
09.30-10.00	Coffee Break and Poster Session	
10.00-10.30	Plenary 8: Future of Domestic Ducks in Rice Field	Dr. Lertrak Srikitjakarn
10.30-11.00	Plenary 9: Development of Indonesian policy in contributing sustainable production	Dr. Tjeppy D. Soedjana, M.Sc.

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 under the oil palm plantation would beneficially support both livestock and plantation sector 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 are divided into two groups, *Working* 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, EPP, birth weight and calving interval). Results showed that the average of working regime of *Work-1* and *Work-3* were significantly lower ($P<0.05$) than those of *Work-2*. In addition, 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), EPP (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. Therefore this integration between cattle in oil palm plantation play an important role in sustainable agriculture.

Key word:

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.

MATERIAL AND METHOD

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).

RESULT AND DISCUSSIONS

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-2 had the highest load among the other two.

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)	138.7±15,26[a]	582.5±56.49[b]	89.1±10.71[a]

[a, b] means within rows bearing different letters in superscripts differ significantly (P<0.05)

Based on the parameters measured, the nature 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).

In response to the working regime, physiological changes were measured before cows started working (*Pre*) and just finished working (*Post*) (see Table 2). *Pre* and *Post* parameters were measured to crosscheck the fatigue condition (see Upadhyay and Madan 1985). Based on these workers the physiological responses measured were not under fatigue condition, which was adjacent to the working regime employed in the current experiment. During work contracting muscle produces heat as a by-product of metabolism. Some of this energy is used by contractile proteins while the rest is liberated as heat energy which needs to be eliminated by various thermoregulatory processes in order to maintain normal body temperature, thereby sustaining work (Moran 1973; Nangia *et al.* 1980; Mathers *et al* 1984; Pieterson and Ffoulkes 1988). An increase in body temperature, measured as an increase in rectal temperature (RT), of 2.5^{O}C above normal resting value is regarded as intolerable to ruminant animals (Upadhyay and Madan 1985). These research workers found that cattle were unable to work when RT increased by more than 2.5^{O}C above resting value.

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]

[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.

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

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 11.7-14.9 kg, Bamualim and Wirhayati (2002) also reported that supplemented cow 3 months before calving had no effect on calves' birth weight.

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

Our results indicate that there were no differences between *Working* and *Non-Working* on reproductive performance, partly due to the light work regime employed. Integrated cattle

and oil palm plantation farming is one successful way of optimizing the use of resources for maximizing income and therefore this system play an important role in sustainable agriculture.

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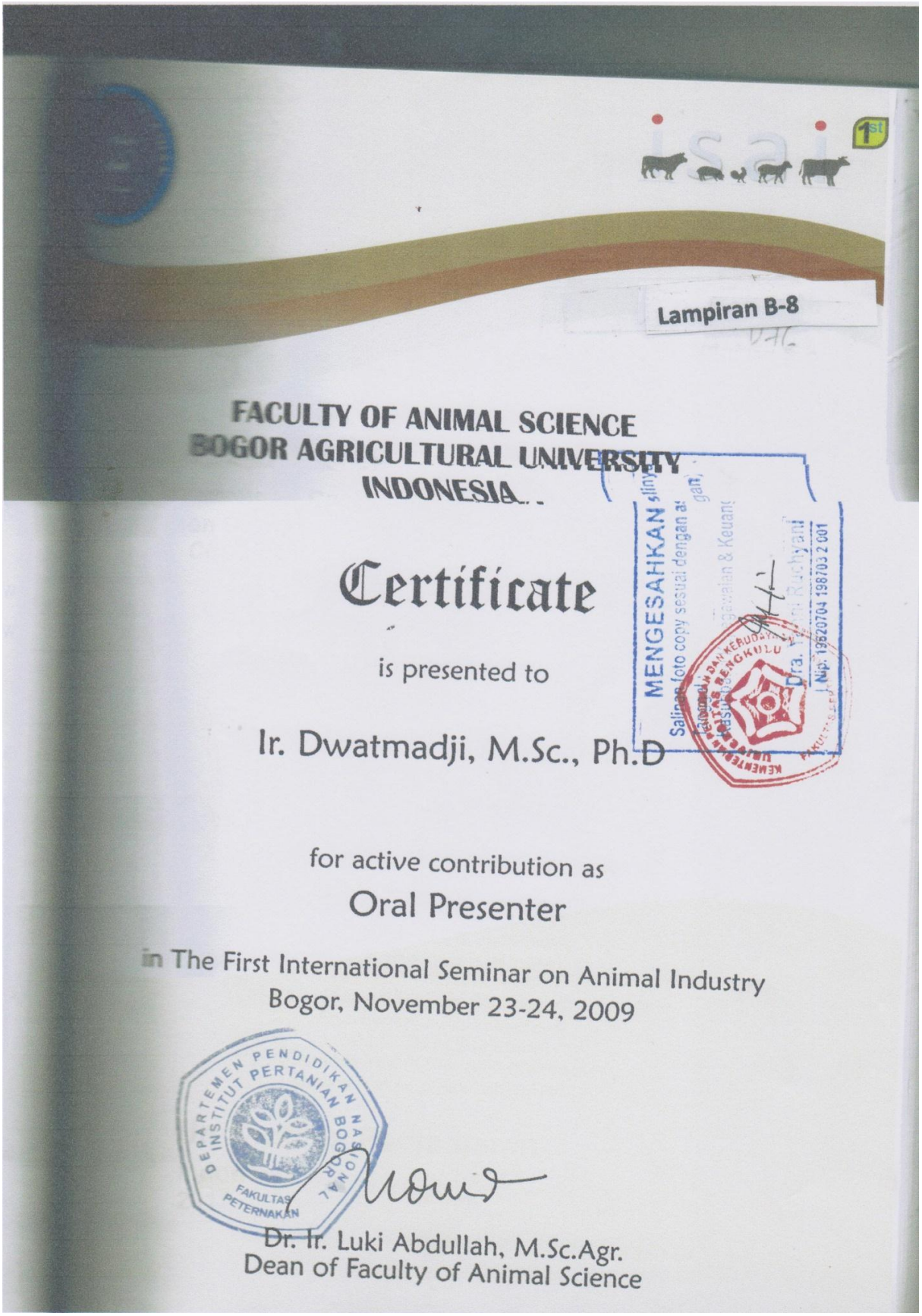

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Dean of Faculty of Animal Science