Breeding *Bos Javanicus* d'Alton cattle in eastern Indonesia: Monitoring village cattle [1]

Dennis Poppi,* Tanda Panjaitan,† Dahlanuddin,‡ and Geoffry Fordyce§

*University of Queensland, St Lucia, Queensland 4072, Australia; †Balai Pengkajian Teknologi Pertanian Nusa Tenggara Barat, Indonesia; ‡University of Mataram, Nusa Tenggara Barat, Indonesia; and §Queensland Government, Charters Towers, Queensland 4820, Australia

ABSTRACT: A monitoring system of Bali cattle performance was established on Lombok (Kelebuh and Tandek: primarily cut-and-carry feeding) and Sumbawa (Boak and Simu: primarily grazing) islands. On each island, one village adopted new management and the second village retained prevailing management. The primary components of new management were: controlled seasonal natural mating using a selected bull, calf weaning at 5-6 months of age and managing weaner diets. Data collected included: diary, pedigree, growth, mating management, mating outcome, ownership, health management, diet, commodity use and weather. All data was linked to a unique animal number and was replicated in village and office books. Computer spreadsheets were created in the same format. A technical officer on each island supported all aspects of the village beef business at both villages, and the officers were in turn supported by a scientist. The monitoring system was very effective in providing a full data set for village cattle production. The success of the system was highly dependent on the dedication and skills of the technical officers.

INTRODUCTION

Bos javanicus d'Alton (Bali cattle) and their crosses are predominate cattle genotype in eastern Indonesia. Reviews by McCool (1991) and Wirdahayati (1994) indicate that have very similar reproductive physiology to *Bos taurus* and *Bos indicus* cattle, though are smaller with cow mature size in the vicinity of 270 kg. Holmes (1987) (quoted by McCool 1992) previously identified the major constraint to development of a productive and efficient beef sector in eastern Indonesia as poor nutrition and that low reproduction rates were due to poor timing of calving with seasonal growth of feed. Survey data by Wirdahayati (1994) show a long inter-calving interval, high calf mortality (3-30%) and low growth rates across the region. Copland (1974) considered management the key to lowering mortality of Bali calves. Calving is year round and peaks in August-October, the worst period, as it is the peak of the dry season.

Other observations of the eastern Indonesia beef breeding sector include:

- *Bos javanicus* appear well-suited to the environment and their low mature weight enables easier feeding to maintenance. There was no evidence of mature size changes due to almost random mating practices.
- There is almost no breeding bull production based on breeding objectives. As well, regulations in same areas requiring artificial insemination (usually with *Bos taurus* semen) over natural mating delays pregnancies.
- Weaning is rarely practised.
- Cattle husbandry is secondary to cropping.
- Unsanitary penning of animals in the rainy season often occurs.
- Crossing Bali cattle with exotic breeds that are typically 50% larger, appears counterproductive (McCool, 1992) if the feed provided does not increase to match increased requirements, available dietary energy is shifted from production to maintenance. As well, exotic breeds have lower tolerance of diseases, parasites, nutrition, and environmental conditions (Hodge, 1978).

We established a management system to match animal reproductive pattern growth with the supply

[1] The Australian Centre for International Agricultural Research funded this study as project AS2/2000/103 (Poppi *et al*. 2004).

of feed from pasture growth, crop residues and other feeds available to farmers. Application was tested in the wet tropics where plant growth extends for at least 6-8 months, which has a 3-4 month wet season and the dry tropics. Irrigation may prolong crop and pasture growth in the wet tropics. There is a wider range and more reliable access to crop residues in the wet tropics. This paper is the first in a series of fourth and reports on monitoring demonstration of the management system.

MATERIALS AND METHODS

Sites. In 2001, two village sites were established on Lombok (Kelebuh and Tandek: primarily cut-and-carry feeding) and two in Sumbawa (Boak and Simu: primarily grazing) islands. The villages were selected on the basis of having representative climate, a predominance of Bali cattle, 50-100 breeding cattle, accessibility by project staff, willingness of villagers to participate in a 3-year monitoring program, and being prepared to adopt different cattle management practices. On each island, one village was used to evaluate alternative Bali cattle management and the second village retained prevailing management.

Cattle Management. In villages where only monitoring occurred, it was requested that no change in management occur. The primary strategies within the new management (Figure 1) were:

- bull selection to meet breeding objectives. A bull was purchased in each village.
- controlled seasonal natural mating timed to meet animal performance (including draught power), business and social objectives. Maiden mating was at 2 years of age. Mating was for 7 months from early July in Kelebuh. In Boak where cattle grazed local teak forests over the rainy season, mating was for 7 months commencing in early November. Natural mating in the village required a yard for the untethered animals. Maiden heifers and lactating cows detected in oestrus were introduced to the yard generally twice during each oestrus that occurred during the designated mating season.
- strategic weaning to enhance animal performance and market performance. Calves were weaned at 5 months of age in the dry season, and at 6 months in the wet season. Cows were allowed near the pen for up to 3 days after separation from the calf. Calves were penned for 2 weeks on full hand feeding, after which they were managed separately from their dams.
- managing weaned calf diets to meet animal performance needs.
- composting of cattle waste to produce a fertiliser, assist in control of parasites, and improve housing sanitation, particularly during the rainy season. Composting took 60-90 days in sheltered pits ~1m^3.

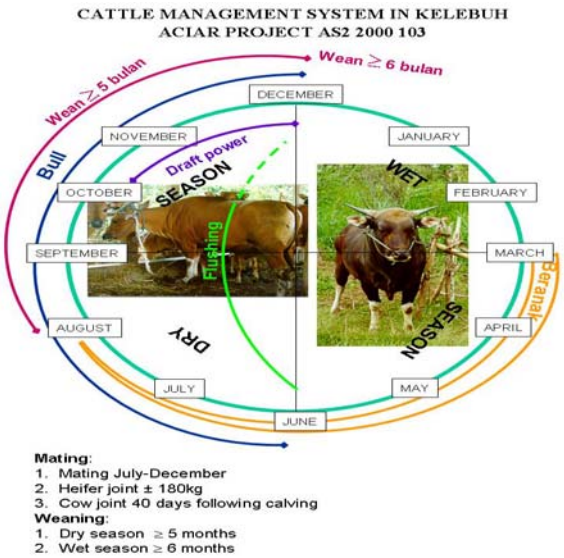

Figure 1. Poster prepared for farmers summarising new management at Kelebuh village

Monitoring

Each animal was allocated a unique identification number, the first one digit of which denoted village, the second and third digit denoted year of birth, and the final two digits were order of identification within year of birth and village. These numbers were printed on the cow bell that each animal wore. All data recorded was linked to the animal number. All data (Table 1) was recorded in books that remained at the village. The technical officer regularly updated a copy of the village book. Computer files (Microsoft Excel™) were created in the same format. On each island a technical officer was appointed to support all aspects of the village beef business.

Table 1. Data recorded

Data type	Data description
Diary	
Pedigree	Once-in-a-lifetime data such as dam, gender, birth date and weaning date
Growth	Monthly weights, condition scores (9-point scale as described by Teleni *et al*. 1993) and hip heights. Standard feed and water curfews were established within each site for weighing.
Mating	Mating details for each female at each oestrus.
Mating outcome	For each calf birth year, dates of conception (known or estimated), calving dates, calf number, weaning dates, and mating outcome code. The latter included: E = Not pregnant; A = Pre-natal loss; C = Peri-natal loss; L = Post-natal loss; W = Weaned a calf.
Ownership	The carer for each animal and whether the animal was leased or owned.
Management	
Health	
Diet	Each month, the daily diet of animals.
Commodity use	Costs associated with each animal.
Valuations	Each transaction was recorded.
Weather	A rain gauge and a maximum and minimum thermometer was placed in each village.

RESULTS AND DISCUSSION

The selected villages were recognised not represented the concept and the problem as option village given had fewer basic problems and village management was also improved during the monitoring period. However, the key element of alternative management along with the financial and social impact was successfully demonstrated. Monitoring was very effective. A lot of emphasis had been placed on ensuring the data base was complete and data was accurate. The efficacy of the system depends very much on the dedication and skills of the locally-based technical support officer. Complete data sets were developed at the Lombok villages which were supervised by a very conscientious technical officer. Data sets were quite incomplete for the villages monitored on Sumbawa Island due to the lack of diligence of the appointed technical officers, the village has not collaborated as initially agreed and difficulties on bull control because of many wild bulls in forest grazing areas. Therefore more emphasis was placed on weaning as one of key element of new management at Boak.

The monitoring system underpinned the entire project as it provided a full objective data set for a full range of cattle production parameters. The database imparted general information on performance of Bali cattle in both Lombok and Sumbawa islands to understand the production system and the gap between current production system and the possible improvement. The implementation new management was not significantly increase costs or time input. Inputs were focused into more appropriate times to synchronise with other business (eg, rice) and social activities. The system achieved control of Bali cattle production, some increased in sales, and thus accelerated cash flow and increased profit (Poppi *et al.*, 2004).

Bull selection was conducted in accord to local breeding objective of which the criteria to select the bull was based on local knowledge of bull soundness. The young mature selected bull was used only for one mating season. The implementation facilitated an opportunities on genetic improvement. Bull was penned in individual pen with joining area to accommodate 3-4 cows in one time. The natural mating using selected bull indicated that a penned bull was successfully mate with at least 4-5 introduced oestrus females daily and one selected bull achieved 52-69 pregnancies each mating season (Fordyce *et. al.*, 2010).

Seasonal control mating on restricted time was to achieve condensed timely calving at favourable condition to ensure calves drop matched with the supply of feed from pasture growth, crop residues and other feeds available to farmers to meet cow-calf requirement during early lactation and enable cow to produce sufficient milk and calves get access to good green pasture. The implementation of seasonal control mating resulted in concentrated calving time between April and June at Kelebuh village in Lombok (Fordyce *et. al.*, 2010). New management increased cattle growth rate in comparison to prevailing management. Growth rate of yearling bulls at Kelebuh village increased from 0.25 at the start of new management to 0.3 kg/day once better management was implemented (Julianto *et al.*, 2010). The calving to conception interval was improved with an average of 70 days or ranged between 1–3 months at Kelebuh and was longer with an average of 100 days or ranged between 1-6 months at Tandek (Fordyce *et. al.*, 2010). The early return to oestrus indicated that cow-calf received sufficient feed supply. During the wet season, 80% of cattle diets was green grass in Kelebuh village and adult cattle offered an averaged of 30-35 kg green feed per day during the wet season (Panjaitan *et al.*, 2010).

The implementation of weaning despite to conserve cow body condition and earlier rebreeding after calving it reduced cow-calf unit of feed requirement. The effective diet management was placed where the low quality offered to cow and limited good quality offered to weaned calves. Weaning rate was 85% and 94% in two consecutive years at Kelebuh village and remaining at 76% at Tandek village (Fordyce *et. al.*, 2010). Both villages on Sumbawa essentially remained control villages, and weaning rate was about 75%. The implementation of seasonal control mating and weaning increased the average progeny weight (Fordyce *et. al.*, 2010). A better calving and weaning times improved average progeny weight and bull reached slaughter condition of 300 kg and cows reached mature size approximately 6 months earlier than previously achieved (Fordyce *et. al.*, 2010; Julianto *et al.*, 2010).

CONCLUSIONS

This study provides a full objective data set for a full range of cattle production parameters. The new management system demonstrated high reproductive capacity of Bali cattle, selected bull was successfully mate with at least 4-5 introduced oestrus females daily and achieved 52-69 pregnancies each mating season, increase growth rate to achieve bull sale weight and cow mature size at earlier time.

LITERATURE CITED

Copland, R.S.(1974). Observations on banteng cattle in Sabah. Tropical Animal Health and Production 6,89-94.

Fordyce, G. Panjaitan, T., Julianto, T., Kurtz, E., and Poppi, D. (2010). Breeding Bos sondaicus cattle in eastern Indonesia. 4. Cattle reproduction. In: The 5th International Seminar on Tropical Animal Production, Yogyakarta, 19-22 October 2010.

Hodge, P.B. 1978. Beef cattle management in the tropics. In: Beef cattle production in the tropics. Department of tropical veterinary science. James Cook University of North Queensland.

Julianto, T., Panjaitan, T., Fordyce, G. and Poppi, D. (2010). Breeding Bos sondaicus cattle in eastern Indonesia. 3. Cattle growth. In: The 5th International Seminar on Tropical Animal Production, Yogyakarta, 19-22 October 2010.

McCool, C. (1992) Buffalo and Bali cattle – exploiting their reproductive behaviour and physiology. Tropical Animal Health and Production 24, 165-172.

Panjaitan, T., Fordyce, G. and Poppi, D. (2010). Breeding Bos sondaicus cattle in eastern Indonesia. 2. Cattle control, diets, draught use and feeding labour. In: The 5th International Seminar on Tropical Animal Production, Yogyakarta, 19-22 October 2010.

Poppi, D, Fordyce, G., Panjaitan, T., Dahlanuddin, Rutherford, A., Mashur, and Kurtz, E. (2004). Developing and integrated production system for Bali cattle in the eastern islands of Indonesia. Final report, Project ACIAR.AS2.2000.103, Australian Centre for International Agricultural Research, Canberra.

Teleni, E, Campbell, RSF, and Hoffmann, D (1993). Draught animal systems and management: An Indonesian study. ACIAR, GPO Box 1571, Canberra 2601, Australia.

Wirdahayati, R.B. (1994). Reproductive characteristics and productivity of bali and ongole cattle in Nusa Tengarra, Indonesia. PhD Thesis, University of Queensland, Australia.