

Effects of once-daily suckling on the postpartum reproductive performance of the local beef and crossbred cattle in Malaysia

(Kesan penyusuan sekali sehari terhadap prestasi pembiakan selepas beranak bagi lembu pedaging tempatan dan kacukan di Malaysia)

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Key words: once-daily suckling, postpartum ovarian activity, conception rates, Kedah-Kelantan cattle, KK crossbred

Abstrak

Kesan penyusuan sekali sehari terhadap prestasi pembiakan selepas beranak 56 ekor lembu betina Kedah-Kelantan (KK) dan kacukannya (Brahman-KK, Hereford-KK dan Friesian-KK) telah dikaji secara pencerapan klinikal dan radioimmunocerakinan progesteron. Menghadkan tempoh menyusu kepada sekali sehari selama 30–45 minit nyata dapat memendekkan ($p < 0.01$) tempoh dari masa beranak hingga pengovulan pertama bagi KK dan kacukannya. Tempoh dari beranak hingga kebuntingan nyata lebih pendek ($p < 0.01$) bagi lembu yang menyusukan anak sekali sehari berbanding dengan lembu yang menyusukan anak secara biasa. Kadar kebuntingan nyata lebih tinggi ($p < 0.05$) pada lembu yang menyusukan anak sekali sehari berbanding dengan yang menyusukan anak secara biasa. Pertambahan berat badan harian dari lahir hingga cerai susu pada umur 6 bulan ialah 353.50 g bagi penyusuan biasa dan 333.50 g bagi penyusuan sekali sehari. Kajian ini menunjukkan bahawa menghadkan tempoh menyusu kepada sekali sehari nyata dapat meningkatkan prestasi pembiakan selepas beranak bagi lembu tempatan tanpa menjejaskan prestasi pertumbuhan anaknya.

Abstract

The effects of once-daily suckling on the postpartum reproductive performance of 56 Kedah-Kelantan (KK) cattle and its crossbred cows (Brahman-KK, Hereford-KK and Friesian-KK) were studied using clinical observation and progesterone radioimmunoassay. Restricting the suckling to once-daily for 30–45 min reduced significantly ($p < 0.01$) the interval from calving to first ovulation in KK and KK crossbred cows. The calving-to-conception interval was significantly ($p < 0.01$) shorter in once-daily suckled cows than in normal suckled cows, and the conception rate was significantly ($p < 0.05$) higher in the former than in the later group. The average daily gain of the calves from birth to weaning at 6 months old was 353.50 g in normal suckling group and 333.50 g in once-daily suckling group. The study showed that restricted suckling significantly improved the postpartum reproductive performance of the local beef cattle without affecting the growth performance of their calves.

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Introduction

For efficient beef production, it is desirable to maintain a regular calving interval of 12 months although calving intervals of 13–14 months are still considered satisfactory for cattle reared in a tropical environment. Under tropical conditions, the calving intervals of Zebu beef cattle ranged from 12.7 to 22.8 months (Galina and Arthur 1989). An important component of the calving interval is the “days open” period or the interval between calving and the subsequent conception. The “days open” period should not exceed 80–85 days if a calving interval of 12 months is to be achieved (Peters 1984). The length of this period is influenced by several physiological factors such as complete uterine involution, resumption of postpartum ovarian activity with apparent sign of oestrus and the conception rate after service.

The resumption of postpartum ovarian activity is influenced by various factors but suckling by calves appears to be the major contributing factor. Suckling delayed resumption of postpartum ovarian activity in cows (Baker 1969; Radford et al. 1978; Moore 1984). The suckling stimulus delayed return to oestrus and subsequent conception in postpartum cows (Laster et al. 1973; Bellows et al. 1974; Randel 1981). Restricting the suckling period to only once-daily for 30–60 min hastened the resumption of postpartum ovarian activity as well as shortened the interval from calving to oestrus and to conception (Randel and Welker 1976; Suzuki and Sato 1983).

In a search for an efficient beef cattle management system in Malaysia, a study was conducted to investigate the effects of once-daily suckling on the resumption of postpartum ovarian activity, and conception rate of Kedah-Kelantan cattle and its crossbreds. The growth performance of the calves suckling once daily was also evaluated.

Materials and methods

The study was conducted at MARDI Livestock Research Centre, Kluang, Johor. Fifty-six cows from four beef breedtypes, namely the local Kedah-Kelantan (KK), Brahman-KK (BK), Hereford-KK (HK) and Friesian-KK (FK) were used. The cows were 5–8 years old.

The cattle were grazed on improved pastures of *Brachiaria decumbens* at a stocking rate of 4–5 animals/ha. High cobalt mineral lick-blocks were made available to the animals. Shade was provided in open pasture by shade trees. Water was made available freely from natural streams.

The cows were randomly assigned to one of two groups: normal suckling and once-daily suckling. Fourteen cows from each breedtype were assigned to each treatment group. Cows in the normal suckling group were allowed to nurse their calves until the calves were weaned at 6 months of age. Once-daily suckling began at 20 days postpartum and continued until 90 days postpartum. The calves were separated from their dams and kept in calf pens. They were allowed to suckle their dams for 30–45 min daily. Cut grass, concentrate supplement and water were supplied to the calves daily ad libitum.

Blood samples from the cows were collected twice weekly from calving up to 3 weeks after breeding to monitor ovarian activity. The samples were collected from the jugular vein in heparinized vacutainer tubes and chilled immediately in ice. The samples were centrifuged and the plasma stored at –20 °C until analysis for progesterone.

Rectal palpations of the ovaries were done twice weekly beginning at 7 or 8 days postpartum to monitor growth of follicles and ovulation. All the dams and calves were weighed weekly. The cows were joined with entire bulls fitted with chin-ball marking device at 20 days postpartum. The ratio of bull to cows was 1:20. Pregnancy diagnosis per rectum was done once at 45–60 days after breeding.

Progesterone assay

The plasma progesterone concentration was determined by solid-phase radioimmunoassay. The assay was performed using a Coat-a-Count[®] progesterone kit (Diagnostic Product Corporation, LA, USA). The progesterone concentration in the plasma sample was calculated using a logit-log programme on a computer. The inter-assay and intra-assay variation was 8.3% and 5.7% respectively.

Data analysis

The records from rectal palpation and heat detection as well as plasma progesterone profile were chronologically compiled for each cow. Based on these records, the interval from calving to follicular development, ovulation, first breeding and conception were estimated. In true postpartum anoestrus cow, the postpartum interval was taken as 120 days for analysis. Two cows were diagnosed to have endometritis and one cow died one week after calving. The data from these cows were not included in the analysis.

The data were analysed by a statistical analysis system using general linear model procedure with Duncan's Multiple Range Test for the comparisons of means (SAS 1984). The data on the conception rate were analysed by chi-square.

Results and discussion

The effects of restricted suckling on the subsequent postpartum ovarian activity and fertility in KK and KK crossbred cows are shown in *Table 1*. The effect of breedtypes on the interval from calving to first ovulation, first service and conception was not significant. Previous study (Johari et al. 1992), however, reported that KK cows had significantly ($p < 0.05$) longer calving-to-first-service and calving-to-conception intervals compared with the crossbred cows. The non-significant differences obtained in this study were perhaps due to better management and nutrition received during the experimental period, as indicated by the good body condition of most of the cows throughout the study period.

Table 1. Effects of suckling and breedtypes on interval between calving and subsequent reproduction events in KK and KK crossbred cows

Parameter	Treatment	N	Breedtype			
			KK	BK	HK	FK
No. of animals			13	14	13	13
Mean calving to 1st palpable follicle (days)	NS	27	20.00	20.29	17.00	21.29
	OS	26	18.96	17.71	17.43	23.57
Mean calving-to-1st-ovulation interval (days)	NS	27	59.86a	50.14a	65.00a	56.29a
	OS	26	43.14b	33.57b	35.00b	36.00b
Mean calving-to-1st-service interval (days)	NS	27	62.29a	52.17a	70.86a	62.14a
	OS	26	47.00b	42.14b	40.26b	39.00b
Mean calving-to-conception interval (days)	NS	27	89.29a	89.14a	85.57a	72.00a
	OS	26	61.43b	62.86b	70.42b	39.00b
No. of services per conception	NS	27	1.71	2.29	2.14	1.86
	OS	26	1.57	2.14	1.86	1.86
Conception rate (%)*	NS	27	71.4c	51.1c	71.4c	71.4c
	OS	26	100.0d	100.0d	100.0d	85.7d

NS = normal suckling daily

OS = once-daily suckling for 30–45 min

* no. of cows conceived/no. of cows treated x 100

ab = mean values within treatment groups in columns with different letters differ significantly ($p < 0.01$)

cd = mean values within breedtype groups in rows with different letters differ significantly ($p < 0.05$)

Restricting the suckling to once-daily did not affect the interval from calving to first palpable follicle, but reduced significantly ($p < 0.05$) the calving-to-first-ovulation interval in all breedtypes. The calving to first service interval in once-daily suckled cows was significantly ($p < 0.05$) shorter than in normal suckled cows for all breedtypes. Suckling activity delayed postpartum follicular development to ovulation, hence prolonged the postpartum-to-oestrus interval (Eduvie 1985) while restricted suckling hastened the postpartum ovarian activity, thus decreased the postpartum to oestrus interval (Randel 1981; Suzuki and Sato 1983). Suckling stimulus suppressed the release of pituitary luteinising hormone (LH) which may be necessary to stimulate the final maturation of the follicle and subsequent oestradiol secretion (Kesler et al. 1980). Without an increase in oestradiol secretion, the positive feedback effect of oestradiol on LH surge does not occur, and consequently the early postpartum follicle fails to ovulate and become atretic. In this study, 11% of the normal suckled cows failed to ovulate and did not show any sign of oestrus by 120 days postpartum.

Suckling stimulus also delayed the subsequent conception (Bellows et al. 1974; Randel 1981) while restricted suckling hastened the conception in postpartum cows (Randel and Welker 1976; Suzuki and Sato

1983). Results of this study indicated similar effects of restricted suckling on KK and KK crossbred cows. Cows on once-daily suckling had shorter ($p < 0.01$) interval from calving to conception and higher ($p < 0.05$) conception rate than in normal suckled cows in all breedtypes. Similarly, restricted suckling reduces the suckling stress, and without the stress, tonic LH is released from the pituitary gland. This results in an increase in LH concentration, and coupled with sustained follicle stimulating hormone (FSH) concentration, promotes the final maturation of the Graffian follicles. The Graffian follicles produced oestradiol-17 β in large quantities sufficient to initiate the preovulatory surge of LH, and this resulted in first ovulation, thus shortening the postpartum-to-oestrus interval and postpartum-to-conception interval (Stevenson and Britt 1980).

The KK calves had significantly lower ($p < 0.05$) average daily gain (ADG) at 3 and 6 months than the crossbred calves (Table 2). The once-daily suckling calves of HK and FK breedtypes had a significantly lower ($p < 0.05$) ADG at 3 months than normal suckling calves of the same age and breedtypes. However, the difference in the ADG from birth to weaning at 6 months between the once-daily suckling and the normal suckling calves of the same breedtypes was not significant. These results indicated that the practice of suckling the

Table 2. Effects of suckling and breedtypes on average daily gain of calves

Parameter	Treatment	N	Breedtype			
			KK	BK	HK	FK
No. of animals			13	14	13	13
Av. daily gain at 3 months (g)	NS	27	292.00c	400.00d	428.00ad	466.00ad
	OS	26	248.00c	422.00d	230.00bc	316.00bd
Av. daily gain at 6 months (g)	NS	27	318.00c	344.02d	392.00d	360.00d
	OS	26	228.00c	428.00d	306.00d	392.00d

NS = normal suckling

OS = once-daily suckling

ab = mean values within treatment groups in columns with different letters differ significantly ($p < 0.05$)

cd = mean values within breedtype groups in rows with different letters differ significantly ($p < 0.05$)

calves once-daily for 30–45 min would not affect the growth performance of the calves at weaning.

As shown in this study, once a day suckling for 30–45 min improved the reproductive performance of postpartum KK and crossbred cows. This practice could provide an effective management procedure to increase reproductive efficiency in beef cattle in this country. However, this practice is limited to situation in which intensive control of the herd population is feasible. Further studies could be carried out to evaluate the feasibility of implementing the practice of restricted suckling under smallholders' condition.

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References

- Baker, A. A. (1969). Postpartum anoestrus in cattle. *Aust. Vet. J.* **45**: 180–3
- Bellows, R. A., Short, R. E., Ulrich, J. J. and Pahnish, O. F. (1974). Effects of early weaning on postpartum reproduction of the dam and growth of calves born as multiplier or singles. *J. Anim. Sci.* **31**: 589–600
- Eduvie, L. O. (1985). Factors affecting postpartum ovarian activity and uterine involution in Zebu cattle indigenous to Nigeria. *Anim. Reprod. Sci.* **8**: 123–8
- Galina, C. S. and Arthur, G. H. (1989). Review of cattle reproduction in the tropics. Part 2. Parturition and calving intervals. *Anim. Breed. Abstr.* **57(8)**: 679–86
- Johari, J. A., Ariff, M. O., Tan, H. S., Adnan, S. and Daud, E. (1992). Postpartum fertility of Kedah-Kelantan and crossbred cattle. *Proc. XV MSAP Ann. Conf.* (Theme: Towards more efficient and effective animal production strategies) 26–27 May 1992, Kuala Terengganu, Malaysia, p., 160–2. Serdang: Malay. Soc. Animal Prod.
- Kesler, D. J., Trovel, T. R. and Hixon, D. C. (1980). Effects of days postpartum and exogenous GnRH on reproductive hormone and ovarian changes in postpartum suckled beef cows. *Theirogenology* **15**: 287–96
- Laster, D. B., Glimp, H. A. and Gregory, K. E. (1973). Effects of early weaning on postpartum reproduction of cows. *J. Anim. Sci.* **36**: 734–40
- Moore, C. P. (1984). Early weaning for increasing reproduction rates in tropical beef cattle. *World Anim. Review* **49**: 39–50
- Peters, A. R. (1984). Reproductive activity of the cow in the postpartum period. I. Factors affecting the length of the postpartum cyclic period. *British Vet. J.* **140**: 76–83
- Radford, H. M., Nancarrow, C. D. and Mottner, P. E. (1978). Ovarian function in suckling and non-suckling beef cows postpartum. *J. Reprod. Fert.* **54**: 48–56
- Randel, R. D. (1981). Effect of once-daily suckling on postpartum interval and cow-calf performance of first calf Brahman x Hereford heifers. *J. Anim. Sci.* **53**: 755–7
- Randel, R. D. and Welker, A. (1976). Once-daily suckling effect on cow-calf performance. *J. Anim. Sci.* **43**: 301 (Abstr. 345)
- SAS (1984). *SAS User's Guide: Statistics* Cary, NC: SAS Inst., Inc.
- Stevenson, J. S. and Britt, J. H. (1980). Models for prediction of days to first ovulation based on changes in endocrine and non-endocrine traits during the first two weeks post-partum in Holstein cows. *J. Anim. Sci.* **50**: 103–12
- Suzuki, O. and Sato, M. (1983). Effect of restricted suckling on postpartum reproductive performance of beef cows and growth of their calves. *Proc. 5th world conf. on anim. prod.* **2**: 247–8. Tokyo: Japan Soc. of Zoo. Sci.