

The effects of restricted suckling and early weaning on cow reproduction and weaner production performance in Gudali cattle

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Abstract

The effects of weaning calves at 180 days (early weaning – EW) or at 240 (control – CW) days following restricted suckling (RS) or unrestricted suckling (US) on the post-partum reproductive performance of cows and calf growth rates were investigated using 40 cow-calf pairs of Ngaoundere Gudali zebu cattle in Cameroon. Uterine involution, oestrous activity and the reproductive tract score (RTS) of postpartum (PP) cows and the pre- and post-weaning calf growth rates were compared. RS significantly accelerated uterine involution and reduced the calving to conception interval by 40 days. EW resulted in slightly lower weaning weights, but had no effect on the PP reproductive performance of the dams. RS and EW calves experienced slower growth and lower weaning weights. At weaning, the US-CW calves were 34.9, 28.7 and 71.1 kg heavier compared to the RS-CW, US-EW and RS-EW groups, respectively. However, RS was highly detrimental to post-weaning ADG up to a yearling age, while the EW calves showed compensatory growth during this period. Early weaning seems to be a management practice holding advantages in Ngaoundere Gudali cattle under local conditions and warrants further investigation.

Keywords: Calf growth, conception, oestrus, management, rebreeding, reproductive tract score

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Introduction

The Ngaoundere Gudali cattle, one of the most popular indigenous zebu breeds of the Adamawa Highlands of Cameroon, have a poor reproductive performance characterised by a late age at first calving, prolonged postpartum and calving intervals, a low calving rate (45-55%) and poor milk production (Mbah *et al.*, 1987). Shortening the interval from parturition to conception increases the reproductive efficiency of cattle. Limited uterine involution, short oestrous cycles and anoestrus are indicated as the main causes of postpartum (PP) infertility (Short *et al.*, 1990). Delayed resumption of ovarian activity after parturition seems to be the most important factor determining the long inter-calving period (ICP) in zebu cattle (Galina & Arthur, 1989). Suckling has been shown to be a major cause of long ICP's in beef cattle in general, and zebu cows in particular (Dawuda *et al.*; 1988, Short *et al.*, 1990). Time of the day when suckling takes place has a major effect on the resumption of ovarian activity in beef cattle (Stewart *et al.*, 1995; Gazal *et al.*, 1999). The manipulation of the suckling and lactation stimulus has been indicated as a viable management option to decrease the PP interval in certain cattle breeds (Williams, 1990, Short *et al.*, 1990). These are relatively easy and inexpensive management practices within the reach of resource-poor cattle farmers in developing countries. However, very little is known about the efficiency of such practices in zebu cattle farmed under extensive tropical conditions in Cameroon. The objectives of this study were to investigate the effects of restricted suckling and early weaning of calves on (i) the resumption of ovarian activity and reproductive efficiency of Ngaoundere Gudali cows, and on (ii) the pre- and post-weaning growth rates of Ngaoundere Gudali calves.

Materials and Methods

This study was carried out at the Wakwa Regional Centre of Agricultural Research for Development in the Adamawa highlands of Cameroon. The environmental and management conditions at the Centre, and the Ngaoundere Gudali cattle have been previously described (Tawah *et al.*, 1993). Forty PP Ngaoundere Gudali cows were visually monitored for mating twice a day (30 min periods from 7:00 to 7:30, 17:00 to 17:30) between 20 days and 180 days PP, with the aid of a fertile bull during a six month mating season. The reproductive tract score (RTS) of each cow was determined based on the position, symmetry of the uterine horns and the presence or absence of palpable ovarian structures (Schwalbach *et al.*, 2000) on days 15, 30, 45, 60 and 75 PP to monitor uterine involution and the resumption of ovarian activity. Uterine

involution was considered complete when the uterus had returned to non-pregnant tone and position in the pelvic cavity (Schwalbach *et al.*, 2000). All calves born to these cows were weighed within 72 hours of birth and monthly thereafter until 12 months of age. At 30 days PP, cow-calf combinations were randomly assigned to two groups of 20 each, namely restricted suckling (RS, calves isolated from the dams at night from 16:00 to 6:00) and unrestricted suckling (US, calves allowed to suckle their dams *ad libitum* until weaning). Subsequently, half the calves of each group were randomly allocated to one of two weaning regimens: early weaning (EW) at 180 days, or control (CW) at 240 days. The pre- and post-weaning average daily gains (ADG) of the calves were determined. The pregnancy status of the dams was determined by rectal palpation at 150 days post-mating, and correlated with the RTS at 60 and 75 days PP. The interval from calving to conception and ICP's were calculated. The calf weaning weights (WWT) were adjusted to 205 days (AWWT) and the treatments compared. A cow weaner production index (WPI) was determined as follows: WPI (kg) = Calf WWT (kg) x 365 days/ ICP (days). Factors considered when comparing the different suckling and weaning regimens included weight of the calf at birth, as well as pre- and post-weaning calf ADG. Data were analysed using the general linear model procedures of SAS (1991).

Results and Discussion

Complete results could only be obtained from 38 out of the initial 40 cow-calf pairs. The most important secondary traits recorded in these cows during the PP period are summarised in Table 1. From day 45 PP, cows that suckled their calves continuously recorded a lower ($P < 0.05$) RTS, compared to those that suckled their calves only during the day. These differences were accentuated at 60 and 75 days PP. The conception rates in both groups following fertile mating were positively correlated to the RTS at 60 days ($r = 0.56$) and 75 days ($r = 0.55$) PP. Uterine involution was completed earlier in a larger proportion of cows under the RS regimen. At 45 days PP, uterine involution was completed in 57.9% of the cows in the RS compared to only 5.8% in the US group. The gap between the two groups narrowed from 60 days PP. No cow was observed in oestrus within the first 60 days PP. By day 75 PP none of the cows in the US group showed oestrus and/or was mated, compared to five cows (26.3%) in the RS group. By day 90 PP 84.2% and 15.8% of the cows in the RS and US groups, respectively were observed in oestrus and mated. The mean interval from calving to conception and the mean ICP period were shorter ($P < 0.01$) in the RS (83.4 ± 5.1 d and 376.4 ± 3.2 d respectively) compared to the US group (126.6 ± 3.5 d and 419.4 ± 6.5 d respectively). Randel (1981) correspondingly showed that suckling once a day shortened the interval from calving to conception from 168.2 to 68.9 days in beef cattle.

Table 1 Mean RTS (\pm s.e.) and cumulative percentage of Ngaoundere Gudali cows at different postpartum stages under two suckling regimens, involving 19 cows each

Cow Variables	Suckling Regimen	Postpartum stage (days)						
		15	30	45	60	75	90	180
RTS	US	1.9 ± 0.1^a	2.4 ± 0.1^a	3.1 ± 0.1^a	3.5 ± 0.1^a	4.1 ± 0.1^a	-	-
	RS	1.8 ± 0.1^a	2.6 ± 0.1^a	3.6 ± 0.1^b	4.2 ± 0.1^b	4.6 ± 0.1^b	-	-
Completed involution	US	0	0	15.8	52.6	94.7	100	-
	RS	0	10.5	57.9	84.2	100	100	-
Detected in oestrus	US	0	0	0	0	0	15.8	100
	RS	0	0	0	0	26.3	84.2	100

^{a,b} Column means with different superscripts for the same variable differ significantly ($P < 0.05$)

On the other hand, WWT and pre-weaning ADG of calves were higher (121.0 g/day, $P < 0.01$) in the US than the RS groups (Table 2). These results indicate that RS slowed calf growth rate and consequently decreased weaning weight. In addition, CW calves were in general heavier ($P < 0.01$) than those weaned earlier. Calves under the US + CW regimen were 34.9, 28.7 and 71.1 kg heavier than the RS + CW, the US + EW and RS + EW calves, respectively. The mean AWWT differed ($P < 0.01$) between the US (131.6 ± 3.0 kg) and RS (92.7 ± 3.0 kg) groups, but no significant difference was recorded in AWWT between EW and CW calves. The combination of the two treatments, however, indicates the best AWWT in absolute terms is to be obtained when calves are weaned early under an US regimen. The EW-RS combination fared the worst in absolute terms. However, when the reproductive performance of the cows and those of their calves was combined into the WPI, this was higher ($P < 0.01$) for the cows nursing their calves continuously.

In descending order of mean WPI, the different suckling and weaning regimens could be ranked as follows: US-CW, RS-CW, US-EW and RS-EW (Table 2). Post-weaning growth rate until 12 months of age differed ($P < 0.01$) between the weaning regimens as the EW calves gained more weight (52.2 g/day, $P < 0.01$) than the CW group. Calves under US-EW grew 290, 272 and 86.4 g/day faster than RS-CW, RS-EW and US-CW calves, respectively. These results clearly indicate an advantage of US, and that compensatory growth occurred in the EW calves between weaning and 12 months of age. The combination RS-EW is not advisable under the local husbandry conditions of the Adamawa highlands.

Table 2 Mean (\pm s.e.) weaning weight, calving to conception interval, weaner production index, and pre- and post-weaning average daily gains for Gudali cattle under two suckling and two weaning regimens

Weaning regimen Suckling regimen	Early		Control	
	Unrestricted	Restricted	Unrestricted	Restricted
Weaning weight (kg)	119.7 \pm 4.1 ^a	77.1 \pm 4.4 ^c	148.4 \pm 4.4 ^b	113.5 \pm 4.0 ^a
Adjusted weaning weight (kg)	136.3 \pm 4.1 ^a	87.8 \pm 4.3 ^b	126.8 \pm 4.3 ^a	96.9 \pm 4.1 ^b
Pre-weaning ADG (g)	525 \pm 19 ^a	295 \pm 20 ^b	512 \pm 20 ^a	369 \pm 19 ^b
Post-weaning ADG (g)	312.0 \pm 17.0 ^a	40.0 \pm 17.9 ^c	225.6 \pm 17.9 ^b	22.0 \pm 17.0 ^c
Cow weaner production index (kg)	105.1 \pm 3.2 ^a	74.8 \pm 3.4 ^b	128.1 \pm 3.4 ^c	109.7 \pm 3.3 ^a

^{a,b} Row means with different superscripts differ significantly ($P < 0.01$)

Conclusion

Restricted suckling improved PP reproductive performance and, although it reduced calf growth rates during both the pre- and the post-weaning periods, it can still be considered to improve cow productivity. Early weaning had no effect on the reproductive performance of cows and slightly reduced the growth rate of pre-weaned calves. This was, however, compensated by a higher post-weaning ADG. Reducing the weaning age in Ngaoundere Gudali cattle under the Adamawa research centre's farming conditions seems to be a viable option to decrease the postpartum interval. Further research is needed to evaluate the long-term effects of these practices on overall Ngaoundere Gudali herd productivity under traditional livestock farming conditions.

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