Reproductive performance and superovulatory response of endangered Cameroonian Namshi breed (*Bos taurus*)

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Abstract

This study was undertaken to determine the reproductive performance of the endangered *Bos-taurus* Namshi breed of Cameroon. Ovarian response to superovulatory treatment was also evaluated. The following observations were recorded. The average calf mortality rate was 25.71% while the average birth weight was 12.22 ± 0.82 kg, the percentage of animals in oestrus during the wet and the dry season was respectively 60% and 33.4%, the oestrus cycle length and oestrus duration were respectively 20.80 ± 1.20 d and 7.00 ± 0.80 h; corresponding dry season figures for those parameters were 19.00 ± 0.94 d and 6.00 ± 0.7 h, respectively. In the dry season the manifestation of oestrus was 80% during the day and 20% at night while in the wet season it was 55.55% and 44.5%, respectively. Postpartum oestrus was 18 months. The ovarian response to superovulatory treatment was about 6.40 ± 2.50 ovulations per cow. Results indicate that the scarcity of *Bos taurus* Namshi breed in Cameroon could be attributed to high calf mortality rate, low calving rate and long postpartum periods. Embryo transfer could be a way to rapidly multiply this breed

Key word: Oestrus; anoestrus postpartum; superovulation

Introduction

Cameroonian *Bos taurus* breed is found chiefly in the northern region of Poli. Before the 20th century, *Bos taurus* cattle were the only breeds bred in Cameroon. Today *Bos indicus* cattle breeds account for the majority of cattle bred in the northern Cameroon. Trypanosomiasis which is endemic in the south has limited the spread of *Bos indicus* breeds to the south.

Compared to the other breeds, Namshi breed represents less than 1% of the Cameroonian bovine livestock (Seignobos *et al.*, 1996). Farmers on the average have above 5 animals in

the herd. African *Bos taurus* have the advantage to be less demanding in nutrition, to resist trypanosomiasis better and can withstand bad climatic conditions and other diseases (Starkey, 1984). The spread of *Bos taurus* breeds to the south of the Cameroon will be advantageous to the population in that region since most of the beef consumed there come from the north.

There is a dearth of information on the reproductive performance of Namshi cattle and superovulatory treatment has not yet been done on the breed to assess their reaction to exogenous

gonadotrophin (Blondin *et al.*, 1996). The present investigation was undertaken:

- to study the reproductive performance of Namshi as a prelude to the introduction of AI in the breed
- To study the response of Namshi breed to superovulatory treatment using FSH-p
- To know whether there is a correlation between the decrease in the population of the breed and its productivity.

Material and methods

This study was carried out in the Poly region and at the regional research centre of the Cameroon agricultural research institute in Wakwa. This centre was only used for superovulatory treatment. The experiment was conducted from August 1996 to February 1999. Thirty five cows were available for the study. The cows were 5-12 years old. In the Poly region, as the study was conducted to know better this breed in their natural area (extensive husbandry), animals grazed *ad libitum* natural non selected pastures from 6 o'clock in the morning to 6 o'clock in the evening. No supplementary feeding was given excepted salt. Water was available to the animals throughout. Their average of monthly body weight during the study was 228kg. The meteorological conditions comprised means of 38-40°C and less than 1300 mm annual rainfall.

The following parameters were evaluated:

- Mortality rate: this was calculated as the ratio of the number of dead calves after birth and abortions to the total number of cows in the trial.
- Calving rate calculated as the ratio of total number of calves obtained during the trial to the number of cows in the trial.
- Birth weight of calves: taken within 24h after birth.
- Age at first calving: calculated as the interval in days between the date of

birth of a cow and the date of its first calving. Concerning this parameter questions were asked to 15 experimented herdsmen since the time of trial was limited.

- Postpartum oestrus of cows was calculated as the interval between the day of its first calving and the expression of new oestrus.

Concerning the oestrus activity, the trial was done during the dry and wet seasons and the following parameters were recorded:

- The oestrus cycle length
- The duration of oestrus
- The moment of the onset of oestrus (day or night)
- The number of cows in oestrus

The detection of oestrus was done during the morning, afternoon, evening and all the night. Two bulls were used to aid in oestrus detection and insemination. Cows were said to be in oestrus when they accepted without resistance to be mounted by bulls. Onset of oestrus was characterised by standing-to-be mounted (standing oestrus) and cervical mucus discharge associated with the sniffing and linking of genitalia by both cow and bull.

The above-mentioned activity parameters were recorded by well trained assistants

Superovulatory treatment

Fifteen cows were randomly selected to the trial. All animals were synchronised with synchro-mate-B implants placed on the external face of the ear and injection of 2ml of oestradiol valerate (Intervet-Netherlands). Ten days after, implants were removed, each animal received an injection of PMSG (i.m) 2500 IU. After synchronization, cows (n=9) that exhibited oestrus were assigned to superovulatory treatment.

Superovulation was initiated on the morning of day 9 after the beginning of oestrus (oestrus=0) and consisted of injection of FSH-p in decreasing dose over 4 days as follow:

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Day of the cycle (d)	Dose of FSH-p administrated
d=0 (onset of oestrus)	
d=9 (post oestrus)	Morning: 1.9ml Evening: 1.9ml
d=10 (post oestrus)	Morning: 1.6ml Evening: 1.6ml
d=11 (post oestrus)	Morning: 0.9ml + cloprostenol 2ml Evening: 0.9ml
d=12 (post oestrus)	Morning: 0.6ml Evening: 0.6ml
d=13 (onset of the following oestrus)	Insemination (3 times at 8h intervals)
d=20 (post oestrus)	Corpora lutea palpation

Cows that exhibited oestrus in the fifth day (day 13) were inseminated. Ovaries were rectally palpated (Zemjanis, 1970) and the number of corpora lutea were recorded.

Statistical analysis

The mean of all the above obtained data was analysed by standard least-squares analysis of variance. Student's *t*-test was used to compare means of oestrus activities parameters (Claudes, 1987)

During the trial 19 calves(54.29%) were born. Nine(25.71%) of the new born calves were born before the end of pregnancy and died after because they were too fair. None of the cows calved twice. The Namshi cows calves for the first time at 46 month.

Results

Mean value for basic reproductive parameters of Namshi breed are shown in Table 1.

Table 1: Zootechnical parameters of Namshi breed

Breed	Number of animals	Mortality rate (%)	Calving rate (%)	Weight of new born calves (kg)	Age at first calving (month)	Post-partum interval (month)
Namshi	35	25.71	54.29	12.22±0.82	46	18

The length of oestrus cycle and duration of oestrus in the experimental animals during the different seasons of the year are shown in Table 2. The average duration of oestrus was 6.65±0.72h (ranging from 1 to 15h), mean duration of oestrus was longer ($p<0.05$) in the wet season (7±0.87h vs 6±0.78h) than in the dry season. The average length of the oestrus cycle

was 19.20±0.6d (ranging from 17 to 25d), cycles were significantly shorter in the dry season (18±0.94 vs 20±1.2d) than in the rainy season ($p<0.05$). although the onset of oestrus occurred at any time, more mounts occurred in the morning. This was specially evident during the dry season (80% vs 20%) rather than wet season (55.55 vs 44.45%) ($P<0.05$).

Table 2 : *Oestrus activity parameters of Namshi breed*

Breed	Seasons	Number of animals (n)	Oestrus cycle length (d)	Oestrus duration (h)	Oestrus onset (%)		Number of animals in oestrus (%)
					day	night	
Namshi	Wet	35	20.80±1.20*	7.00±0.87*	55.55*	44.45*	60*
	Dry	35	18.00±0.94*	6.00±0.78*	80*	20*	33.34*

* $P < 0.05$

Comparing the data of the number of the animals in oestrus during the two seasons, it was observed that more cows (60% vs 33.34%) were

in oestrus in the wet season ($p < 0.05$). After calving most of the cows resumed cycling and showed oestrus after 18 months (Fig 1).

Figure 1: Distribution of postpartum interval of Namshi breed

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After the removal of synchromate-B implants, 20% of cows exhibited oestrus after 48h while 40% of cows exhibited oestrus after 72h. 40% did not exhibit oestrus. No response to superovulation was observed in three cows (only

one ovulation per cow). Six cows showed a response to treatment with 6.4 ± 0.3 ovulation (4 to 16). Table 3.

Table 3 : Superovulatory response after FSH-p response

Parameters	Animals without oestrus	Animals in oestrus (after 48h)	Animals in oestrus (after 72h)
Number of treated animals (n=15)	6	3	6
Number of corpora lutea (n=9)	-		6.4 ± 0.30

Discussion

The reproductive indices (mortality rate, calving rate, birth weight, age at first calving) evaluated in this study are lower than those reported by other researchers (Mpeck, 1996). This could be attributed the problem of feeding level. Important observations are being made on the role of feeding level and specific dietary nutrients that enable animals to maintain adequate body weight (Mandibaya *et al.*, 1999). The mal nutrition decreases the amount of FSH needed to support gonadotrophin-dependent follicles (Dowing, 1991) and consequently reduces the fecundity of female (Tierney *et al.*, 1992) resulting in the low birth weight and calving rate. The incomplete feed prolongs anoestrus and causes early abortions (Lhoste *et al.*, 1993). It is why the number of dead calves was high.

The percentage of cows detected in standing oestrus during the wet season (60%) was significantly ($P < 0.05$) higher than the percentage in the dry season (33.34%) indicating the seasonal influence in the oestrus behaviour of Namshi bred. This finding was also supported by previous studies (Jaster *et al.*, 1982). Although cows exhibited oestrus both in the dry and in the wet season, results indicate that AI in future should be concentrated in the wet season.

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The observation that more oestrus often begins in the day (Baker, 1967) was also confirmed in our study. The oestrus was more detected in the morning and the afternoon than in the evening and the night. So when AI program will be established, the oestrus detection should be done twice daily: early in the morning and late in the evening.

The oestrus cycle length of Namshi breed during the dry and wet seasons was similar to that reported by (Thys *et al.*, 1998). Most of the longer cycle ranged from 17 to 25d. This could be related to the exhibition of silent oestruses. Since the number of cows used for the experiment (n=35) was not high, further research is required. The duration of oestrus in this study is in agreement with that reported by (Shilling *et al.*, 1982) but longer than those reported by (Baker, 1967). The effect of season on the duration of standing oestrus recorded to this study is similar to earlier reports (Zakari, 1981). The seasonal effect has been attributed to poor nutrition and harsh climatic factors.

Most of the cows came into oestrus after 18 months (fig1). These results are significantly higher ($p < 0.01$) than those reported by (Mpeck, 1996) where cows came into oestrus 90d after calving. This could be related with suckling since calves were never separated from

their mother. The effect of suckling on the reproductive performance have been previously reported (Bell *et al.*, 1998). Sensory endings in the breast, activated by the stimulus of suckling, relay impulses to the hypothalamus and inhibit the secretion of GnRH, decrease of which inhibit the secretion of gonadotropins and also the positive feedback of the oestradiol on the release of LH (Humblot.1982) and thus inhibit ovulation. The lack of weaning of Namshi calves could delay resumption of ovarian activity and may cause the lowered reproductive activity of the breed. Besides suckling the scarcity of pasture during the dry season gives rise to cysts which have negative effect in the ovarian activity (Kamawata.1999).

The superovulatory treatment resulted in 6.4 ± 0.3 ovulations. The value was lower than other reports (9.3 ± 5) (Kamawata.1999) and similar to those reported by (Sergueev *et al.*, 1994). This difference could be related to breed and husbandry management (Ibrahimov.1991) The positive reaction of Namshi to FSH-p treatment proves that they can be used as future potential donors necessary to multiply the breed that is endangered

Conclusion

From the present results the low population of the Namshi breed can be related to the high calf mortality rate, the low calving rate and long post-partum period. Calves should be weaned early. Embryo transfer can provide an alternative.

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