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Effect of season of calving on performance of Bunaji calves

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Abstract

The study was conducted to determine the effect of season of calving on performance of Bunaji calves for 2014 and 2015 wet and dry seasons calving. Secondary data for 2014 and 2015 calving records were used. In 2014, a total of 100 calves were used for the study from which 30 were male and 30 were female in the wet season calving. In the dry season calving, 20 were male and 20 were female. In 2015, a total of 56 calves from which 16 were male and 16 were female calves in the wet season and 12 were male while 12 were female in the dry season. Records of data collected on birth, weaning and yearling weights were subjected to statistical analysis. The results for calves' birth and yearling weights for wet season calving were significantly (P<0.05) higher than those that were calved in the dry season. The result for weaning weight of dry season calving was significantly (P<0.05) higher than for calves that were weaned in wet season. The results of birth, weaning and yearling weights of male calves were significantly (P<0.05) higher than those of female calves. Interaction effect showed that the weaning weight of calves calved in 2015 were significantly (P<0.05) higher than calves calved in 2014. It was concluded that breeding of cows to calve during wet season is a substantive plan as there are availability of green forages and browse plants of higher quantity and quality. It can be concluded in this study that breeding of cows to calve in the dry season needed supplementation of feed with concentrate, improved hay and silage

Keywords: Wet and dry seasons, calving weight, sex, weaners, supplementation

Effet de la saison de vêlage sur les performances des veaux Bunaji

Résumé

L'étude a été menée pour déterminer l'effet de la saison de vêlage sur la performance des veaux Bunaji pour le vêlage des saisons humides et sèches 2014 et 2015. Les données secondaires des fiches de vêlage de 2014 et 2015 ont été utilisées. En 2014, un total de 100 veaux ont été utilisés pour l'étude dont 30 étaient des mâles et 30 étaient des femelles dans le vêlage de la saison des pluies. Lors des vêlages de saison sèche, 20 étaient des mâles et 20 des femelles. En 2015, un total de 56 veaux dont 16 mâles et 16 femelles en saison humide et 12 mâles et 12 femelles en saison sèche. Les enregistrements des données recueillies sur le poids à la naissance, au sevrage et à l'âge d'un an ont fait l'objet d'une analyse statistique. Les résultats pour le poids des veaux à la naissance et d'un an pour le vêlage en saison humide étaient significativement (P < 0,05) supérieurs à ceux qui ont été vêlés en saison sèche. Le résultat pour le poids au sevrage des vêlages en saison sèche était significativement (P<0,05) supérieur à celui des veaux sevrés en saison humide. Les résultats de poids à la naissance, au sevrage et à un an des veaux mâles étaient significativement (P<0,05) supérieurs à ceux des veaux femelles. L'effet d'interaction a montré que le poids au sevrage des veaux vêlés en 2015 était significativement (P<0,05) supérieur à celui des veaux vêlés en 2014. Il a été conclu que l'élevage de vaches pour vêler pendant la saison des pluies est un plan substantiel car il existe une disponibilité de fourrages verts et de plantes à brouter en plus grande quantité et qualité. Il peut être conclu

dans cette étude que l'élevage des vaches pour vêler en saison sèche nécessitait une supplémentation en aliments concentrés, en foin amélioré et en ensilage.

Mots-clés : Saisons sèches et humides, poids au vêlage, sexe, sevrage, supplémentation

Introduction

The efficiency of a beef cattle production system depends on the reproductive rate of the cow, the growth rate of the calf to weaning, and the overall efficiency of feed utilization (Nqeno *et al*., 2010). The high reproductive performance of the beef cattle industry is largely impacted by the rate of cows which can consistently maintain a 365 days calving interval (Asimwe and Kifaro, 2007). In order to keep the 12-month calving interval, the female beef cattle should be pregnant within 80-85 days (Morris *et al*., 2006). As the postpartum anestrus interval (PPI) gets longer, the calving interval gets longer. Therefore, the subsequent reproductive performance of the herds falls down and the profitability would become worse (Morris *et al*., 2006). The prolonged postpartum anestrus interval is correlated with a few factors, including the late involution of uterus (Short *et al*., 1990), postpartum nutrition condition (Wettemann *et al*., 2003). The short estrus cycle (Short *et al*., 1990), suckling (Wettemann *et al*., 2003), calving season (Ansari-Lari and Abbasi, 2008), careless heat detection (Melendez *et al*., 2008), high parity (Asimwe and Kifaro, 2007), and reproductive disorders (Short *et al.*, 1990). Pregnancy rates increased with the proportion of parity (Rae *et al*., 1993) and calving interval had a significant relation with the number of services per conception (Gebeyehu *et al*., 2007). Literature has shown that seasonal differences affect the availability of feed since the growth of plants occur, mainly during rainy season, and the animals must be supplemented with hay and/or concentrate during the dry seasons (Scogings *et al.,* 2015). To the best of our knowledge, little or none is documented on the interactive effect of dry and rainy season on the performance of weaned calves. Similarly, lack of efficient and skillful management results in shortage of nutrition through inadequate provision of feeds to animals. It is hypothesised that interaction of season and sex will positively alter the weaning weight of Bunaji calves. Hence the objective of the study was to determine the effect of season of calving on performance of Bunaji calves.

Materials and methods

Study site

The study was conducted at the feedlot of Beef Research Programme, National Animal Production Research Institute (NAPRI), Ahmadu Bello University, Shika-Zaria, Nigeria. Shika falls within latitudes 11° 8' 19.56" N and longitudes 7° 45' 51.22" E, with an altitude of 640m above sea level (Google Earth, 2017). Shika is located within the Northern Guinea Savannah Ecological Zone, with an average annual rainfall of 1,100mm which starts from late April/early-may and ends mid-October. Annual maximum temperature ranges from 27-35℃, depending on the season, while the mean relative humidity during harmattan and wet seasons are 21%-72%, respectively (IAR, 2017). The cold season or the early dry season falls within the months of November-February while the hot season or late dry season falls within the months of March to June, the wet season is within the months of July to October as reported by lyeghe-Erakpotobor *et al.* (2013).

The study animals and their management

A total of 100 calves were used for the study. Sixty (30 male and 30 female calves) in the wet season and 40 (20 male and 20 female calves) in the dry season of year 2014. Data was collected for birth weight, weaning

weight and yearling weight. Similarly, data was collected for birth weight, weaning weight and yearling weight from 32 (16-male and 16-female calves), in the wet season and 24 (12 male and 12 female calves) in the dry season of the year 2015. The cow groups corresponding to each season were subjected to the same nutritional and health management under semi-intensive grazing system. During the breeding seasons, the cows were supplemented three times in a week with mixed concentrate diet, fed at 2% of their body weight. Then con cent rate comprised maize bran (60.74%), wheat bran (12.94%), cottonseed cake (25.32%) and table salt (1%) until calving. During the lactation period, concentrate comprising maize bran (39.50%), Wheat bran (28.45%), Cotton Seed Cake (31.05%) and table salt (1%) was supplemented, fed 3 times a week at 2% of their body weight, until the calves were weaned. The cows were vaccinated against contagious bovine pleuro-pneumonia (CBPP), black quarter (BQ) and were dewormed with Sambezol® suspension, oral doses and two months after calving, the calves were dewormed.

Data collection

Data were collected for wet and dry season birth weight from mid-May to end of July 2014, and from October ending to mid of December, 2015. The data for weaning weight were collected on 22nd February, 2015 and July, 2016. The yearling weights were recorded in the month of July, 2015 and December, 2016.

Data analysis

Data collected on birth weight, weaning weight and yearling weight for both years were subjected to Statistical Analysis of Variance according to (SAS, 2002). Significance means were compared using Duncan's Multiple Range Test (DMRT) (Duncan, 1955)

Results

Effect of wet season calving and the dry season calving in the year 2014

Table 1 shows the effect of Wet Season calving and the Dry Season calving in the year 2014. The calves that were calved (born) in the wet season were significantly (21.09kg) higher than the calves that were calved in the dry season (19.75kg). For weaning weight, calves that were calved in the dry season were significantly (44.44kg) higher than the calves that were calved in the wet season (28.69kg). The Wet Season calves were weaned in the late February and the Dry Season calves were weaned in late August

Yearling weight shows that the calves that were calved (born) in the wet season were significantly (112.68kg) higher than those that were calved during the dry season (107.00kg).

Effect of sex on the performance of the calves that were calved in the same breeding/calving season in the year 2014

Table 2 show the effect of sex on the performance of the calves that were calved in the same breeding/calving season in the year 2014. The male calves at birth (21.52kg), at weaning (39.63kg), and at one year old (113.60kg) were significantly higher than their female counterparts at birth (19.92kg), at weaning (24.34kg) and at one year old (101.52kg), respectively.

Table 1: Main effect of season of calving on performance of Bunaji calves in 2014

Parameters (kg)	Wet season	Dry season	SEM
Birth weight	21.09 ^{a}	19.75^{b}	2.83
Weaning weight	28.69^{b}	44.44 ^{a}	13.90
Yearling weight	112.68 ^{a}	107.00 ^{b}	13.60

^{ab} : Means with the different superscripts in the same row are significantly (P<0.05) different. SEM: Standard error of mean, LOS**:** Level of significance, NS**:** Not significant. ***:** Significantly different.

Table 2: Main effect of sex on performance of Bunaji calves in 2014

Parameters (kg)	Male (50)	Female (50)	SEM	LOS
Birth weight	21.52 [a]	19.92[b]	2.83	*
Weaning weight	39.63 [a]	24.34[b]	13.90	*
Yearling weight	113.60 [a]	101.52 [b]	13.60	*

[ab] : Means with the different superscripts in the same row are significantly (P<0.05) different. SEM: Standard error of mean, LOS: Level of significance, NS: Not significant. ***:** Significantly different.

Effect of Wet Season calving and the Dry Season calving in the year 2015

Table 3 shows the effect of wet season calving and the dry season calving in the year 2015. Calves that were born in the wet season (21.38kg) were significantly (P<0.05) higher than the calves that were calved in the dry season (19.87kg). For weaning weight, calves born in the dry season (93.33kg) were significantly (P<0.05) higher than the calves that were calved in the wet season (84.26kg). Correspondingly, yearling weight shows that the calves that were calved (born) in the wet season (111.39kg) had significantly (P<0.05) higher weights than those calved during the dry season (105.63kg).

Effect of sex on the performance of the calves that were calved (born) in the same breeding/calving season in the year 2015

Table 4 shows the effect of sex on the performance of the calves that were calved (born) in the same breeding/calving season in the year 2015. The male calves at birth (21.68kg), at weaning (93.18kg), and at one-year-old, are significantly (119.00kg) higher than the female calves at birth (19.96kg), at weaning (82.83kg, and at one year old (100.53kg), respectively.

Table 3: Main effect of season of calving on performance of Bunaji calves in 2015

Parameters (kg)	Wet Season	Dry Season	SEM	LOS
Birth weight	21.38 [a]	19.87[b]	2.29	*
Weaning weight	84.26 [b]	93.33 [a]	12.95	*
Yearling weight	111.39 [a]	105.63 [b]	18.92	*

[ab] : Means with the different superscripts in the same row are significantly (P<0.05) different SEM: Standard error of mean, LOS**:** Level of significance, NS: Not significant. ***:** Significantly different.

Table 4: Main effect of sex on performance of Bunaji calves in 2015

Parameters (kg)	Male (28)	Female (28)	SEM	LOS
Birth weight	21.68 [a]	19.96[b]	2.29	*
Weaning weight	93.18 [a]	82.83[b]	12.95	*
Yearling weight	119.00 [a]	100.53 [b]	18.92	*

[ab] : Means with the different superscripts in the same row are significantly (P<0.05) different SEM: Standard error of mean, LOS: Level of significance, NS: Not significant. *: Significantly different.

Interaction of year, season and sex in the year 2014 and 2015

Table 5 shows interaction of year, season and sex in the year 2014 and 2015, respectively. It showed that there was no significant difference at birth weight, in 2014 (20.42kg), and in 2015 (20.62kg) and yearling weight in 2014 (109.84kg); and at yearling weight in 2015 (108.51kg) and there was significant difference in the weaning weight for the two years, 2014 (53.19kg) and 2015 (88.80kg), respectively. The table showed that there was significant difference in the wet and dry calving season at birth weight. Calves born in the wet season were higher (21.23kg) than calves born in the dry season (19.81kg). Weaning weight, calves born in dry season were

higher (83.03kg) than calves born in wet season (58.96kg). And the yearling weight, calves born in wet season were higher (112.04kg) than calves born in the dry season (106.32kg). The table also, showed that there is significant (P<0.05) difference in birth weight of males (21.60kg) and females (19.94kg). At weaning, the males had 66.41kg while the females had 53.59kg. Yearling weights were 116.30kg and 101.03kg for males and females, respectively. The interaction of year, season and sex also shows that there were no significant (P<0.05) difference for the year 2014 and 2015.

Table 5: Effect of year, season of calving and sex on performance of Bunaji calves in 2014/2015

Parameters (kg)	Birth weight (kg)	Weaning weight (kg)	Yearling weight (kg)
Year			
2014	20.42	53.19^{b}	109.84
2015	20.62	88.80^{a}	108.51
SEM	0.67	8.43	3.95
LOS	NS	*	NS
Season			
Wet	21.23^{a}	58.96^{b}	112.04^{a}
Dry	19.81^{b}	83.03^{a}	106.32^{b}
SEM	0.67	8.43	3.95
LOS	*	*	*
Sex			
Male	21.60^{a}	66.41	116.30^{a}
Female	19.94^{b}	53.59	101.03^{b}
SEM	0.67	8.43	3.95
LOS	*	NS	*
Interaction (P<0.05)			
Y*Sx*S	NS	NS	NS

^{ab} : Means with different superscripts in the same column differed significantly (P<0.05) different.
SEM: Standard error of mean, LOS: Level of significance, NS: Not significant. ***:** Significantly different.
Sx: sex. Y: year. S: season.

Discussion

Birth weight for the calves during the wet season calving were higher, compared to the dry season calving. This might be due to the fact that, during the onset of rainy season from the month of April and May, green forages and browse plants are available in enough quantity for the animals to graze and browse on. Bamigboye *et al.* (2013) reported that rangelands for animals to graze only blossom in the rainy season while in the dry season they become standing hay. Thus, the animals will have abundant feed in the wet season and a shortage of feed in the dry season. The problem of nutritional stress is more prominent in the northern states of Nigeria where the dry season feed supply for stock is poor forage that is low in protein and energy (Lamidi and Ologbose, 2014). This result is in agreement with that of Aynalem (2006); Ndofor-Foleng *et al*. (2011) who reported a higher birth weight for calves born during the rainy season and the calves were higher than those born in the dry season; and the reason for higher weight in rainy season-born calves is due to favorable feeding condition as there was green forages and browse plants in enough quantity and quality for the cows to graze on. However, this result disagrees to those of Giday (2001) and Melaku *et al.* (2011) who reported higher birth weights for Fogera calves born in dry season.

Availability of forage allowed the cows to consume feed sufficient quantity during rainy season. While on the dry season the number of forages was reduced resulting on insufficient feed intake. Performance production of body weight was influenced by cows' consumption and the environment (Kurniasari *et al*., 2016). The result presented in table 1 and 3 shows that the calves born in dry season were significantly (P<0.05) higher at weaning age than wet season-born calves. The dams calved in the dry season and the calves exposed to the rainy season in the months of May, June, July and weaned on the 22nd of August. Before weaning, there was availability of feed resources and the dams were able to judiciously feed on quality grasses and browses in quantity and the dams were able to produce high milk for calve consumptions. This result agrees with Ndofor-Foleng *et al*. (2011) who reported higher weaning weight for Gudali calves in Cameroon. However, this result disagrees with (Mekonnen *et al.*, 2011; Melaku *et al*., 2011) who reported higher weaning weight of calves born during the short rains. On the other hand, the result presented in the table 1 and 3 shows that the yearling weight for calves born during the wet season were significantly (P<0.05) higher than calves born during the dry season. The calves born in the wet season (May to July), were weaned at seven (7-month-old) in the month of February. The calves spent sixty (60) days under confinement with the supply of concentrate, hay and water. They were released for grazing in the onset of rainy season. The calves were one-year-old in the month of July, in the main rainy season; when there was fresh grass and browse plants in quantity and quality. This result agrees with (Ebangi *et al.,* 2002; Szabo *et al*., 2006; Ndofor-Foleng *et al.,* 2011) who reported higher live weight at yearling for calves born during the main rains. However, this result disagrees to Aynalem (2006) reported higher yearling weight for calves born during dry season than those born during the wet season. Sex had significant (P<0.05) effect on all of the traits studied. Males were consistently higher (P<0.05) than female calves in all significantly affected variables. Male calves at birth, at weaning and at yearling weight, were higher than female calves. The effect of sex on birth weight of calves has also been reported by several workers (Giday 2001; Amsalu 2003; Jiregna *et al*., 2006; Getinet *et al*., 2009; Ndofor-Foleng *et al.*, 2011; Mekonnen *et al.,* 2011). Similarly, male calves were significantly higher than females at weaning weight, (seven month) and at yearling (twelve month) weight. The effect of sex on growth performance traits obtained in this study is in complete agreement with results reported by Getinet *et al.* (2009) for Ogaden cattle breed of Ethiopia and Ndofor-Foleng *et al.* (2011) for Gudali and Wakwa cattle breed in Cameroon. Males grow more rapidly and reach a greater mature weight while females have slower rate of growth and reach maturity at smaller size due to the effect of hormonal differences in their endocrinological and physiological functions, longer gestation length of male and to selection pressure that was more intense on males than female calves (Koger and Knox, 2009). Also, in this study, the bull calf was higher than heifer calf. This was because genetically bull calves were more superior to heifer because bull calf had an androgen hormone that caused nitrogen retention more than on heifer (Purwantho, 2012). Toelihere (1997), stated that the size of the bull calf placenta was larger than heifer placenta. During growth, one factor that can affect birth weight was the size of placenta. Interaction among year, season and sex as influence by the performance of Bunaji calves are existed. The weaning weight in this study, of calves in the year 2015 is higher than that of the year 2014.

These results may be explained by the shortage of concentrate supplement to the calves as at the time the weaning took place during which the calves were extremely disturbed by the dry hay supplement. Probably, the feed restriction was a factor that the weaning weight of calves in 2014 were not higher compared to weaning weight of calves in year 2015.

Conclusion

The study has indicated that birth weight and yearling weight for the calves born during the wet season were higher compared to those born in the dry season. Weaning weight for calves born during dry season were higher compared to those born in the wet season. Similarly, birth weight, weaning weight and yearling weight for male calves were higher compared to that of female calves.

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