

COMPARATIVE STUDY OF BODY WEIGHTS AT BIRTH, WEANING AND POST-WEANING IN KALAHARI RED AND WEST AFRICAN DWARF GOATS

Bamisile¹, K.K., Bemji^{1*}, M.N., Wheto¹, M., Sowande², O.S., Omotosho¹, B.O., James³, I.J., Umejiesi¹, S.I., Lawal¹, A.M., Oluwatosin⁴, B. O. and Okwuelum⁴, N.

¹Department of Animal Breeding and Genetics, ²Department of Animal Production and Health, ³Department of Animal Physiology, ⁴Institute of Food Security, Environmental Resources and Agricultural Research, Federal University of Agriculture, Abeokuta, Nigeria

*Corresponding author: bemjimn@funaab.edu.ng

Abstract

This study investigated birth weight, weaning weight and 6-month post-weaning weight of Kalahari Red (KR) and West African Dwarf (WAD) goats semi-intensively managed at the Federal University of Agriculture, Abeokuta in South West of Nigeria. Body weight records for 61 KR and 63 WAD kids were subjected to least squares analysis of variance using the General Linear Model procedure of Statistical Analysis Software Program (SAS) to evaluate the effects of breed, sex, season, birth type and parity. The results showed significant ($P < 0.05$) effect of breed with indication that KR kids exceeded WAD kids in body weights at birth (2.74 ± 0.06 kg vs 1.61 ± 0.05 kg), weaning (11.87 ± 0.19 kg vs 4.36 ± 0.15 kg) and post-weaning (17.10 ± 0.34 kg for KR and 6.39 ± 0.33 kg). Male kids were heavier ($P < 0.05$) than female kids with corresponding weights of 2.45 ± 0.06 kg and 1.90 ± 0.05 kg at birth, 8.97 ± 0.21 kg and 7.26 ± 0.14 kg at weaning and 12.42 ± 0.43 kg and 11.07 ± 0.26 kg at 6-month post-weaning. Wet season born kids were better ($P < 0.05$) than dry season born kids for all the three traits measured. Single born kids weighed heavier ($P < 0.05$) than twin-born kids at weaning (8.08 ± 0.49 kg vs 7.24 ± 0.61 kg) and post-weaning (8.08 ± 0.49 kg vs 7.24 ± 0.61 kg), while litter size did not affect birth weight significantly. Parity was insignificant for birth weight, weaning and post weaning weights. These results clearly indicate the superiority of Kalahari over Dwarf goats in terms of body weights at all stages. Information from this study can be utilized to carry out further study on genetic improvement of body weights of WAD goats.

Key words: Birth/weaning weights, Kalahari Red, Dwarf goats

Introduction

The KR goat is native to South Africa. It was developed mainly for meat production (Kotze *et al.*, 2004). Age at first breeding is 6 months, average birth weight is 2.5 kg and kids grow fast with mature buck weighing 115 kg while doe reach 75 kg (www.indigenousebreeds.co.za/indigenousebreeds/goat/kalahari). The WAD goats are found in large numbers in the southern parts of Nigeria. They are hardy, small, early maturing, prolific and are non-seasonal breeders weighing between 20-25kg. Birth weight and weaning weights are of economic benefit to farmers and breeders because the productivity of the herd depends on them. They affect the reproductive ability in goat (Al-Shorepy *et al.*, 2002; Rashidi *et al.*, 2011). In addition, rapid pre-weaning growth rate can lead to heavier kids at weaning because pre-weaning performance of kids provides stage upon which post-weaning performance is built and consequently, higher profits will accrue to the farmer via an increased amount of meat produced per day (Al-Shorepy *et al.*, 2002). Birth weight and early growth rate of animals are determined

not only by genetic potential but also by maternal and environmental factors (Mandal *et al.*, 2006). These traits are controlled by polygenes and are also affected by feeding and management under farm conditions (Supakorn and Pralomkarn, 2009). Birth weight and growth of kids are mostly under the influence of breed (Mourad, 1993), feeding (Haddad, 2005), type of birth (Zhang *et al.*, 2009), sex (Kuchtik and Sedlackova, 2005) and season (Jimenez-Badillo *et al.*, 2009). The potential for genetic improvement depends largely on the genetic and phenotypic parameters upon which selection may be applied (Das *et al.*, 1996).

Materials and Methods

This research was conducted in the Institute of Food Security, Environmental Resources and Agricultural Research (IFSERAR) farm, Federal University of Agriculture, Abeokuta (FUNAAB) located within latitude $7^{\circ} 10' 30''$ and longitude $3^{\circ} 25' 41''$ in the humid zone of south-west Nigeria. It receives a mean precipitation of 1,112.7mm with a seasonal distribution approximated at 110.9mm in the late dry season (January-March) 462.1mm in the early wet season (April-June), 376.6mm in the

late wet season (July-September) and 163.1mm in the early dry season (October-December). Relative humidity averages 82 percent throughout the year. This location is 76m above sea level (Google earth, 2013). A total of 124 kidding records comprising of 61 KR and 63 WAD were utilized for this study. The kids and their dams were raised on cross ventilated pens with slated floor. Nutrition was based on concentrate feed supplement of 15% crude protein which was fed to the animals at 200 to 700 g per day depending on breed and zero grazing or grazing on natural pastures. Water was offered *ad libitum*. Natural mating of does was carried out and non-return of does to oestrus was a confirmation that the does were pregnant. Following kidding, birth weight, weaning weight and post weaning weight of kids were taken using Avery weighing scale calibrated in kilogram (kg). Type of birth was recorded as single or twins and sex of kid recorded as male or female. Two distinct seasons were considered, namely dry season (October to March) and wet season (April to September). The dams considered were either in their first or second parity. Data generated were subjected to least squares analysis of variance using the General Linear Model procedure of Statistical Analysis Software Program (SAS, 2003) to evaluate the effects of breed, sex, season, birth type and parity on body weights at birth, weaning and 6-month post-weaning. The statistical model used was $Y_{ijklmn} = \mu + B_i + P_j + S_k + T_l + S_m + \epsilon_{ijklmn}$, where: Y_{ijklmn} = trait of interest (kg), μ = population mean, B_i = effect of the i^{th} breed (i = KR or WAD), P_j = effect of j^{th} parity (j = 1 or 2), S_k = effect of k^{th} sex (k = male or female), T_l = effect of the l^{th} type of birth (l = single or twin), S_m = effect of the m^{th} season of kidding (m = wet or dry) and ϵ_{ijklmn} = random residual error.

Results and Discussion

The results as presented in Table 1 showed significant ($P < 0.05$) effect of breed with indication that KR kids exceeded WAD kids in body weights at birth (2.74 ± 0.06 kg vs 1.61 ± 0.05 kg), weaning (11.87 ± 0.19 kg vs 4.36 ± 0.15 kg) and post-weaning (17.10 ± 0.34 kg for KR and 6.39 ± 0.33 kg). KR goat breed is a new breed introduced in FUNAAB from South Africa in 2011. It has been classified as a large goat breed (www.indigenousebreds.co.za/indigenousebreds/goat/kalahari) with inherent potential for high birth weight and faster growth rate. Generally, the progeny of large breeds grow faster than the progeny of small breeds, hence the superiority of KR over WAD goats in terms of birth, weaning and 6-month post-weaning weights. Heavier weights

of Kalahari Red kids at weaning and 6-month post-weaning may be attributed to good milking ability of the dams which was available to the kids in sufficient quantity. Male kids were heavier ($P < 0.05$) than female kids with corresponding values of 2.45 ± 0.06 kg and 1.90 ± 0.05 kg at birth, 8.97 ± 0.21 kg and 7.26 ± 0.14 kg at weaning and 12.42 ± 0.43 kg and 11.07 ± 0.26 kg at 6-month post-weaning. The superiority of the males in terms of body weights has been attributed to androgenic effect male sex hormones. Other findings by Oderinwa (2014) have shown that males obtained relatively higher supply of nutrients during feeding than females and hence their superiority in body weights as similarly reported by other authors (Ikwuegbu *et al.*, 1995; Amoah *et al.*, 1996; Hagan *et al.*, 2014) that male kids were generally heavier than female kids. Wet season born kids were better ($P < 0.05$) than dry season born kids in terms of all the three traits measured. Wet season in South West Nigeria is characterized by high rainfall that encourages lush vegetation with good quality feed. Goats had access to good quality pasture during the rainy season which encourages milk production and hence the amount of milk available to the kids. Significant seasonal effects on body weights of kids have also been reported by Das *et al.* (1996), Moore (2000) and Baiden (2007).

Single born kids weighed heavier ($P < 0.05$) than twin-born kids at weaning (8.08 ± 0.49 kg vs 7.24 ± 0.61 kg) and post-weaning (8.08 ± 0.49 kg vs 7.24 ± 0.61 kg), while litter size did not affect birth weight significantly. Significantly lower body weights of twin-born kids at weaning and 6-month post-weaning could be attributed to competition by litter mates for available milk from their dams compared to single-born kid. The current observation corroborated the findings of Oderinwale (2014) working with KR goat and Bushara *et al.* (2013) reports that birth weight was significantly influenced by type of birth. The effect of parity on body weights was insignificant. The does utilized for this study were of first and second parities. Their offspring could be similar in body weights given that both groups constitute young does.

Conclusion

It can be concluded from this study that Kalahari Red had better performance compared to West African Dwarf goat in terms of body weights from birth to 6-month post-weaning. Non-genetic factors such as sex, season of birth and birth type also have significant influence on body weights. Information from this study can be utilized to carry out further study on genetic improvement of the body weights of WAD goats.

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Table 1: Least squares means for effects of breed, sex, season, birth type and parity on body weights at birth, weaning and 6-month post-weaning of Kalahari Red and West African Dwarf goats

Source of Variation	N	Birth weight (Kg)	N	Weaning weight (Kg)	N	6-Month weight (Kg)
Breed						
Kalahari Red	40	2.74±0.06 ^a	50	11.87±0.19 ^a	52	17.10±0.34 ^a
WAD	63	1.61±0.05 ^b	57	4.36±0.19 ^b	48	6.39±0.33 ^b
Sex						
Male	54	2.45±0.06 ^a	46	8.97±0.21 ^a	43	12.42±0.43 ^a
Female	69	1.90±0.05 ^b	61	7.26±0.14 ^b	57	11.07±0.26 ^b
Season						
Wet	76	2.19±0.04 ^a	68	8.36±0.13 ^a	68	12.14±0.24 ^a
Dry	47	2.15±0.07 ^b	39	7.87±0.21 ^b	32	11.35±0.44 ^b
Birth Type						
Single	48	2.13±0.08	44	8.08±0.49 ^a	41	12.40±0.70 ^a
Twin	75	2.06±0.11	63	7.24±0.61 ^b	59	11.30±0.96 ^b
Parity						
1 st Parity	53	2.12±0.07	47	8.10±0.21	45	11.82±0.39
2 nd Parity	70	2.23±0.07	60	8.13±0.22	55	11.67±0.40

^{a,b} Means in the same column with different superscripts are significantly different (P<0.05)