Trop. Anim. Prod. Invest. 19 (1): 9-12 (2016)
ISSN: 1115-2540
http://animalsci.agric.ui.edu.ng/TAPI/index.php/tapijournal/index

ORIGINAL RESEARCH ARTICLE

Comparative evaluation of the reproductive performance of West African dwarf goats and sheep in a humid environment

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ABSTRACT
A study was conducted to compare and evaluate the reproductive performance of West African Dwarf (WAD) goats and sheep in terms of age at first kidding and lambing, kidding and lambing interval, gestation period, birth weight and weaning weight. Records of the total number of WAD goats and sheep were collected from the productive record of the herd kept over ten – year period (1997 – 2006) at the University Livestock farm. The data collected were subjected to Analysis of Variance (ANOVA). Results obtained showed that 271 WAD goats and 317 WAD sheep were kept over a period of ten years. Age at first kidding and lambing, kidding and lambing interval, gestation period and birth weight of kids/lambs were significantly different (P<0.05) with values of 17.72 months, 249.55 days, 5.11 months, 1.11kg and 19.37months, 303.80 days, 6.19 months, 1.52kg for WAD goats and sheep respectively while weaning weight was similar (P>0.05) in both WAD goats (8.63kg) and sheep (8.27kg). Age at first kidding and lambing was significant (P<0.05) in WAD sheep (19.37 months) and in WAD goats (17.72 months). Kidding/lambing interval was significant (P<0.05) in WAD sheep (303.80 days) and in WAD goats (249.55 days). Gestation period was significant (P<0.05) in WAD goats (5.11 months) than in WAD sheep (6.19 months). Birth weight of kids/lambs was higher in WAD sheep (1.52kg) than in WAD goats (1.11kg). Apart from the birth weight of kids, WAD goats performed better than WAD sheep in terms of kidding and lambing interval, age at first kidding and lambing and gestation period.

Keywords: Age at first kidding/lambing, gestation period, kidding/lambing interval.

INTRODUCTION
The West African Dwarf sheep and goats are trypano – tolerant meat breeds found mostly in the Southern part of Nigeria. They are raised extensively by rural households and enjoy no special attention from keepers (Payne and Wilson, 1999). West African Dwarf sheep and goats are the most prolific when compared with other domesticated ruminants under tropical conditions. They are also known to breed throughout the year (Chukwuka *et al*., 2010). However, over the years, the productivity of these breeds has remained low owing to poor reproductive performance (FAO, 1995). Their reproductive performance is influenced by such factors as nutrition, environment, disease and management. The criteria that determine the value of West African Dwarf sheep and goats include their adaptation, capacity to make socio – economic contribution, capacity to fill market opportunities and the potential for increasing productivity (Mamabolo and Webb, 2005).
This study was therefore designed to compare the reproductive performance of WAD sheep and goats managed intensively in a hot humid environment.

MATERIALS AND METHODS
Location of Study
This experiment was carried out in the Sheep / Goat Unit of the Teaching and Research Farm of Michael Okpara University of Agriculture,

Umudike, Abia State of Nigeria, latitude 05° 28′ North and longitude 07° 31′ East, and altitude of 122 meters above sea level. It lies within the tropical rainforest zone characterized by average annual rainfall of 2,177 mm in 148-155 rain days. Average ambient temperature is 25.5 °C with minimum and maximum temperatures of 22 °C and 29 °C, respectively. Relative humidity ranges from 76 to 87%

Data collection

Data at first kidding and lambing, kidding and lambing rate, gestation period, birth weight, weaning weight for the WAD sheep and goats breeds were collected from the productive records of the WAD sheep and goats herds kept over a ten year period (1997 – 2006) at the University Livestock farm. Records of the total number of does and ewes (≥12 months) in the flock as well as the total number of kids and lambs per year were also collected.

Analysis of data

The various data collected were subjected to the analysis of variance (Steel and Torrie, 1980), significant means were also separated (Duncan, 1955).

RESULTS AND DISCUSSION

Table 1 shows the total number of WAD goat in the herd from 1997 – 2006. There was a progressive increase from 19 in 1997 to 40 in 2006 making a total number of 271goats, indicating that an average of 1.0 goat reach sexual maturity yearly and can be subsequently served. The does in the herd but for occasional break in 1998 showed consistent rise from 11 in 1997 to 22 in 2006. The bucks also showed a consistent rise from 6 in 1997 to 11 in 2006. The kid also showed a consistent rise from 2 in 1997 to 7 in 2006. Table 2 shows the total number of WAD sheep within the period from 1997 – 2006. There was a progressive increase from 24 in 1997 to 39 in 2006 giving a total number of 317 sheep. Also indicating that an average of 1.0 sheep reach sexual maturity yearly and can be subsequently served. The rams increased consistently from 4 in 1997 to 9 in 2006 and the ewes also showed a consistent rise from 18 in 1997 to 24 in 2006. The lamb showed also a consistent rise from 2 in 1997 to 6 in 2007.

Table 3 shows the reproductive performance of West African Dwarf goats and sheep. Age at first kidding and lambing differed significantly ($P<0.05$) among the two animals. West African Dwarf goats had a lower age at first kidding (17.72 months) than the age at first lambing for the WAD sheep (19.37 months). The range of 17.72 – 19.37 months reported in this study as the age at first kidding /lambing is more than the range of 16 – 18 months reported by Chukwuka *et al* (2010). Age at first kidding/lambing marks the beginning of a doe and ewe productive life (Valesio, 1983). Kidding and lambing interval also differed significantly ($P<0.05$). WAD goat had lower kidding interval (249.55 days) than the lambing interval of WAD sheep (303.80 days).

Table 1. Total number of West African Dwarf goats from 1997 - 2006

Year	Buck	Doe	Kid	Total
1997	6	11	2	19
1998	7	11	2	20
1999	7	12	3	22
2000	8	13	3	24
2001	9	13	4	26
2002	9	14	4	27
2003	10	15	5	30
2004	10	15	6	31
2005	11	15	6	32
2006	11	22	7	40
Total	**88**	**141**	**42**	**271**

WAD = West African Dwarf

Table 2. Total number of West African Dwarf sheep from 1997 – 2006

Year	Ram	Ewe	Lamb	Total
1997	4	18	2	24
1998	5	19	2	26
1999	5	19	3	27
2000	6	20	4	30
2001	6	21	4	31
2002	7	21	4	32
2003	8	22	5	35
2004	8	22	5	35
2005	9	23	6	38
2006	9	24	6	39
Total	**67**	**209**	**41**	**317**

WAD = West African Dwarf

The kidding interval of 249.55 days reported for WAD goats in this study compares favourably with the kidding intervals of 258 days and 250 days reported by Mamabolo and Webb (2005) and Ikwuegbu *et al* (1995) respectively. However, the lambing interval of 303.80 days reported in this study is higher than the lambing interval of 242.93 $\pm$ 10.04 days and 268. 57 $\pm$ 6.22 days reported by Bratte (2015) and Guangul (2007) respectively, however, comparable with 199 – 313 days reported by Mengiste (2008). In this study WAD goats recorded lower kidding interval than the lambing interval recorded by WAD sheep. This tends to be in line with Haumesser (1985) who reported that sheep show longer lambing interval which is disadvantageous in breeding sheep. Gestation period also differed significantly ($P<0.05$) with WAD goats having lower (5.11 months) gestation period than WAD sheep (6.19 months). The gestation periods of 5.11 months (153.3 days) reported for WAD goats and 6.19 months (185.7 days) for WAD sheep in this study are higher than the gestation period of 145 – 148 days and 150 days reported by Chukwuka *et al* (2010) and Simmons and Carol (2001). The result obtained in this study was consistent with Wilson and Durkin (1983) who reported the gestation period of WAD goats lower than that of WAD sheep. Birth weight was significantly ($P<0.05$) different in both ruminants. WAD sheep had higher birth weight (1.52kg) than WAD goats (1.11kg). The birth weight of 1.11kg reported for WAD goats in this study is lower than 1.19kg, 1.42 $\pm$ 0.38kg and 1.43 $\pm$0.04kg reported by Ukanwoko *et al* (2012), Salako (2013) and Baiden (2007) respectively. The birth weight of 1.52kg for WAD sheep in this study compares favourably with 1.60 $\pm$ 0.1kg reported by Ososanya *et al* (2007) but lower than 1.90 $\pm$ 0.1kg reported by Bratte (2015) for WAD sheep.

CONCLUSION AND RECOMMENDATION

Judging from the analysis, the overall performance of the small ruminants suggest that the WAD goats performed comparatively better than the WAD sheep in terms of age at first kidding, kidding and lambing rate, and gestation period in the hot humid environment of Nigeria. WAD goats had shorter gestation period, shorter kidding interval and earlier age at first kidding and as such recommended to local farmer.

Table 3. Reproductive performance of West African Dwarf goats and sheep

Parameters	WAD Goat	WAD Sheep	SEM
Age at first kidding and lambing (Months)	17.72^{b}	19.37^{a}	1.50
Kidding and lambing interval (days)	249.55^{b}	303.80^{a}	24.84
Gestation period (Months)	5.11^{b}	6.19^{a}	1.01
Birth weight (kg)	1.11^{b}	1.52^{a}	0.20
Weaning weight (kg)	8.63	8.27	1.61

^{ab}Means on the same row with different superscript differ significantly ($P<0.05$).
WAD = West African Dwarf

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