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ORIGINAL ARTICLE

Survey for Productive Performance of West African Dwarf (WAD) Does and Savanna Brown Goat (SBG) Does Reared under Traditional Husbandry System

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SUMMARY

A study was conducted to evaluate the productive performance of West African Dwarf (WAD) does and Savanna Brown Goat (SBG) does reared under the traditional management system in Makurdi Benue State Nigeria, between March and June, 2015. Data on some productive indices such as age at first kidding, kid mortality rate, fecundity and kidding rate were collected by use of a questionnaire interview. Other parameters studied were types of feed supplement, medication and management system. A total of 60 WAD and 60 SBG farms were surveyed. Proximate analysis of feed supplement was carried out. Data were analyzed using descriptive statistics which include numerical means, standard error of the means (SEM) and percentages. Kidding rates, mortality at birth and at weaning, age at first kidding and fecundity were analyzed using the Chi-square test. The result showed that kidding rate of WAD does (97.2%) was higher than that of Savanna Brown Goat (SBG) does (68.9%; $p > 0.05$). Similarly, age at first kidding for WAD (363 days) and SBG (360 days) were not significantly different ($P > 0.05$) whereas kid mortality at birth and weaning were (4.4% and 3.4%) and (7.3% and 3.7%) for WAD and SBG does, respectively. These mortality rates at birth were significantly different ($P < 0.05$). Furthermore, the fecundity of WAD does for singles (1.75 ± 0.10), twins (5.45 ± 0.32), triplets (8.46 ± 0.70) and quadruplets (6.80 ± 1.34) was higher than that of SBG does single (1.49 ± 0.09), twins (4.77 ± 0.33), triplets (5.28 ± 0.47) and quadruplets (4.00 ± 0.00). These differences were statistically not significant ($P > 0.05$) except for triplet ($P < 0.05$). In conclusion, the current study has shown that WAD goats under the traditional management system has higher fecundity ($P < 0.05$) than SBG in Makurdi Benue State Nigeria and that SBG is gradually getting adapted to Middle belt zone.

Key words: West African Dwarf (WAD) does, Savanna Brown Goat (SBG) does, traditional management system, Benue state, Productive performance.

INTRODUCTION

Nigeria is one of the 16 countries in West Africa where West African Dwarf (WAD) goats and Savanna Brown Goats (SBG)

goats are predominantly raised under traditional management system where animals are allowed to roam and scavenge

for food (Fasanya *et al.*, 1992; Ngere *et al.* 1984; Gall, 1996; Savanna Brown Goats is probably the most widespread and well known in Nigeria (Haumesser, 1975) it is usually village goat in the northern two-thirds of the country (Ngere *et al.*, 1984). Diagnostic Animal Genetic Resource Information System report (DAGRIS), 2008). It has been reported that this type of traditional management system induced stress on the animals and the herbage they grazed has little crude protein content of between 2-5 % (Oppong, 1965; Uza *et al.*, 2005). This crude protein content is far less than the recommended content of 16-18 % in feed for goats (Steel, 1996). In Nigeria, WAD goats are raised principally under the traditional system where they graze natural pasture during the dry season. They are therefore, able to choose what to eat and what to reject and not being forced to eat what is being offered to them. However, during the cropping season (rainy season) they are tethered and therefore restricted within their grazing perimeters forcing them to eat only what is available within their grazing perimeter. This type of traditional system tends to provide inadequate nutrient that fail to meet their nutrient requirement both during the dry and rainy seasons and hence may affect their reproductive performance (Amoah *et al.*, 1996). WAD goats and SBG are raised principally as a source of meat among the inhabitants, other uses include; cultural, traditional as well as ceremonial purposes. Despite the large number of small ruminants about 22.1million (Afolayan *et al.*, 2001), the FAO recommended protein intake of 35 g/head/day in individual human beings is yet to be achieved in Nigeria (Akusu and Ajala, 2000). This is partly due to the type of traditional management system that is deeply established among the goat famers. Small ruminants play an important role in the nutrition and income of people worldwide (Mbilu, 2007). This is because goats are highly prolific and require low inputs for a moderate level of production

and reaching puberty early i.e. 12-24 months old (Zahraddeen *et al.*, 2008 a&b; Butswat, 1994). Therefore, they are highly profitable to keep (Oseni *et al.*, 2006).

The decreasing meat production despite the rising human population has led to insufficient meat needed for human consumption. One of the quickest solutions to this alarming situation is to improve the reproductive performance of goats in particular and other animals for quick multiplication leading to a geometric increase in meat and milk production. This geometric multiplication in goats can be expressed in many ways such as high ovulation rates, high conception rates, high kidding rates, high fecundity, shorter inter-kidding interval and early puberty. Therefore, the objectives of this study were to compare (1) the age at first kidding (2) mortality at birth and at weaning and (3) kidding rate between WAD and Savanna brown Goats under traditional management system in Makurdi Benue State Nigeria and the adaptation of Savanna Brown Goat to the region.

MATERIAL AND METHODS

Location of study area

The study was carried out within the 16 km radius of Makurdi Local Government area which lies approximately on latitude 7^o.44' N and longitude 8^o.54' E. The climate of the area is tropical and the vegetation characteristic is predominantly guinea savannah with average annual rain fall of 1,290 mm. There are two distinct seasons, the rainy season and the dry season; the former last from May to October, while the latter from November to April. The temperature ranges between 22.5^oC to 40^oC (Temi and Tor, 2006).

Research animals

The breeds of goat used for this study were the West African Dwarf (WAD) does and Savanna Brown Goat (SBG) does. A total of 120 farms with 1,062 does (60 WAD with 730 does and 60 SBG with 332 does) were

used. These animals were reared under traditional management system where they were allowed on range to graze with some level of supplementation.

Management system

The two management systems practiced by the farmers are: Semi- intensive system where animal are graze and return to the pens and free range under the traditional husbandry system where animals were allowed to graze around the houses and fine a place to lie at night without pens.

Data collection

Data were collected from March – June, 2015 by administering a structured questionnaire interview. The following data were collected: age of doe, parity, rate of twinning, litter size, kid mortality rate (%), number of kids in a year, weaning age (months), number of kids weaned, puberty (age at first service), vaccination against PPR and other medication within the past five years.

Feed analysis

Various samples of some feed materials being supplemented for the goats were collected, air dried, graded into powder and analyzed. These feed materials included maize offal, yam peels, cassava peels, moringa leaves, mango peels, gmelina leaves, palm leaves, cashew leaves (Table I). The chemical method was used in this study to determine the proximate analysis value of each feed. This is because it is a quantitative method in terms of finding out how much quantity of a given nutrient or compound is in a feed (Aduku, 2004).

Different types of feed materials and the value of their proximate analysis that were used to supplement the feed of WAD and SBG does are presented in TABLE I.

Data analysis

Determination of kidding rates

Kidding rate is expressed as the number of nanny goats that kid divided by the number mated, as pertaining to the flock and not to the number of mating's for an individual.

TABLE I. Types of feed supplements

S/No	Feed materials	WAD does		SBG does	
		No of farms sampled	No of farms & %	No of farms sampled	No of farms & %
1	Mango leaves	60	52 (86.7%)	60	57 (95%)
2	Cashew leaves	60	23(38.3%)	60	2 (0.03%)
3	Gmelina leaves	60	14 (23.3%)	60	11 (0.2%)
4	<i>Moringa oleifera</i> leaves	60	25 (41.7%)	60	7 (0.12%)
5	Palm leaves	60	58 (96.7%)	60	5 (0.08%)
6	Cassava leaves	60	4 (0.067%)	60	Nil
7	Maize leaves	60	2 (0,033.7%)	60	1 (0.02%)
8	Guinea corn leaves	60	8(0.13%)	60	5 (0.08%)
9	Maize offal (dusa)	60	10 (0.17%)	60	28 (46.7%)
10	Yam peels	60	40 (66.7%)	60	5 (0.08%)
11	Cassava peels	60	12 (0.2%)	60	Nil
12	Dry grass & leaves	60	11 (0.18%)	60	15 (25%)
13	Fresh grass & leaves	60	34 (56.7%)	60	26 (43.3%)

This is presented in the formula below:-

$$\text{Kidding Rate} = \frac{\text{No. of nanny goats that kidded}}{\text{No. of nanny goats mated}}$$

Statistical analysis

Data were analyzed using descriptive statistics which include numerical means, standard error of the means (SEM) and percentages. Kidding rates, mortality at birth and at weaning, age at first kidding and fecundity were analyzed using the Chi-square test.

RESULTS

Various feed materials fed to these goats were subjected to the proximate analysis and the results presented on TABLE II. These results are within the normal nutrient content in terms of crude protein, carbohydrate, fat, ash and dry matter content as established by (Devendra and Burns, 1970; Devendra and

Mcleroy, 1992; Peacock, 1996). The percentages of farms that received medication in WAD and SBG were 28 % and 29 %, respectively. There was no significant difference ($p > 0.05$). Similarly, the percentages of farms that receive vaccination against PPR virus in WAD and SBG farms were 57 % and 55 %, respectively. There was no significant difference ($p > 0.05$). Ages at first kidding in WAD and SBG in days were 363 and 360, respectively as shown in TABLE III. There was no significant difference ($p > 0.05$). Average farm kidding rates of WAD and SBG were 95.2 % and 68.9 %, respectively as shown in TABLE III. There was no significant difference ($p > 0.05$). Neonatal mortality rates (at birth) in WAD and SBG were 4.4 % and 7.3 %, respectively as shown in TABLE III. There was significant difference ($p < 0.05$).

TABLE II: Proximate analysis of the feeds materials

S/No	Sample/ Feeds materials	Dry matter (%)	Moisture (%)	Ash (%)	Lipids (%)	Crude fibre (%)	Crude protein (%)	Carbohydrate (%)
1	Maize offal	88.5	11.5	6.0	2.1	3.0	7.6	69.8
2	Yam peels	81.4	18.6	4.5	1.5	2.1	5.3	68.0
3	Cassava peels	89.9	10.1	6.5	1.7	4.5	2.3	74.9
4	Moringa leaves	87.7	12.3	7.6	3.0	3.0	3.0	71.1
5	Mango leaves	91.1	8.9	9.0	2.6	6.3	6.7	66.5
6	Gmelina leaves	90.3	9.7	7.5	4.0	2.5	12.8	63.5
7	Palm leaves	92.1	7.9	7.1	3.7	2.6	10.5	68.2
8	Cashew leaves	90.5	9.5	4.0	2.0	2.1	6.4	76.0

TABLE III: Productive performance of West African Dwarf (WAD) does and SBG does

Breed	Total No. of farm	Total No. of does kept	Total No of does mated	Total No of does kidded	Age at 1 st kidding (day)	Total No. of kids	Mortality rate at birth and weaning (%)	Kidding rate (%)
WAD does	60	730	725	705	365	1,168	4.4 , 3.4	97.2
SBG does	60	332	312	215	360	478	7.3, 3.7	68.9

TABLE IV: Total number of kids for single, twins, triplets and quadruplets for West African Dwarf (WAD) does and Savanna Brown Goat (SBG) does ($X \pm SEM$)

Parameters	WAD Does	SBG Does	p-value
Single	1.75 \pm 0.095 ^a	1.49 \pm 0.092 ^a	0.556
Twins	5.45 \pm 0.320 ^a	4.77 \pm 0.330 ^a	0.145
Triplets	8.46 \pm 0.695 ^a	5.28 \pm 0.467 ^b	0.000
Quadruplets	6.80 \pm 1.340 ^a	4.00 \pm 0.000 ^a	0.179

Values with different superscripts on the same row, differ significantly ($p < 0.05$)

Kid mortality rates at weaning for WAD and SBG does were 3.4 % and 3.7 %, respectively. There was no significant difference ($p > 0.05$). The total number of kids for single, twins, triplets and quadruplets for WAD and SBG does are presented in TABLE IV. There were no significant differences ($p > 0.05$) between

DISCUSSION

The percentage of farms feeding various feed materials was similar in both WAD and Savanna Brown farms (TABLE I). However, the productive performance differed markedly between the two breeds as shown on TABLES III and IV. This difference may be due to the genetic composition of the WAD goats that may promote higher fecundity than SBG. Another possible reason is that the WAD breed may be more adapted to the environmental conditions in Makurdi than the SBG breed. Considering these factors altogether, it is most likely that there was a synergistic effect between feed utilization efficiency by WAD does and their genetic traits to produce higher fecundity than the SBG does. This assumption will require further research to establish its validity in WAD does. The proximate analysis of the various feed materials (TABLE I) showed that crude protein, carbohydrate, dry matter, ash, crude fibre and moisture contents of these feed materials were similar to the reported standard content by Aduku (1993). This showed that the two breeds got quality feed supplementation although adequate quantities were not guaranteed all the time.

WAD and SBG does for single (1.75 ± 0.10 and 1.49 ± 0.09), twins (5.45 ± 0.32 and 4.77 ± 0.33) and quadruplets (6.80 ± 1.34 and 4.00 ± 0.00). However, there was a significant difference between WAD and SBG does for triplets (8.46 ± 0.70 and 5.28 ± 0.47) ($p < 0.05$).

Although many farms in both WAD and SBG were not vaccinated against PPR which is endemic in Makurdi (Majiyagbe *et al.*, 1980); these goats might have developed passive immunity to the disease virus through frequent exposure to infective PPR pathogens. This assumption is in agreement with (Obi *et al.*, 1983) who reported that goats may be conferred with passive immunity through exposure to infected or vaccinated animals against PPR virus. The most probable reason for this process of passive immunity is that the PPR virus is endemic in the environment in which these goats are kept; therefore, the goats were most likely to develop resistance and immunity against the viral infection. This could be the cost of low mortality of kids at birth and at weaning despite very minimal vaccination and medication. (Opasina *et al.*, 1985) had earlier reported a similar finding in WAD and SBG.

The farm kidding rate of WAD and SBG does (62.5 % and 59.5 %) showed a non-significant difference ($P > 0.05$). The age at first kidding is averaged 363 days for WAD does and 360 days for SBG does. The current findings agreed with earlier reports for WAD and SBG (Fasanya *et al.*, 1992; Bertaudiere, 1979; Osuagwuh and Akpokodje, 1981; 1984) who reported that

age at first kidding is between 384 – 795 days for WAD and SBG. The most probable explanation in the current study may be because the goats are on traditional free ranging management system where supplemented with feed materials that is high in protein content and they mixed very freely with bucks. These bucks are most likely to mate the does at the first oestrus manifestation hence the lower age at kidding as reported in the current study.

Neonatal mortality rate and kid mortality rate at weaning for WAD goats was 4.4 and 3.4% as compared to SBG 7.3 and 3.7 %. This showed a similarity in neonatal mortality between the two breeds, however, kid mortality at weaning was significantly higher in SBG does than in WAD does which has disagreed with the earlier report by Opasina *et al.* (1985) that WAD goats having a higher mortality rate at weaning than the SBG. It is worth mentioning here that weaning rate in goats is a combination of many factors such as genetic, quality and quantity of feeds availability, mothering ability and also medication and hygiene. In the current study the most likely combination of factors that made WAD goats to have lower kid mortality rate than the SBG at weaning were genetic trait and mothering ability since the two breeds were kept within almost the same management conditions in terms of quality/quantity of feed supplement and vaccination against PPR virus and other medications. Another possible reason that can affect both breeds similarly is that in Makurdi, most kidding takes place during the harsh dry season (November – March) when there is scarcity of fodder during the hot dry season. This situation is most likely to affect both neonatal and kid survival rates at weaning. The way forward towards reducing the neonatal mortality and kid mortality at weaning is to concentrate kidding rate between April – October (rainy season) when pasture is in abundance. The Survival rate of kids was also markedly affected by fecundity in the current study. For example,

a higher survival rate was seen in kids in single births compared to triplets and quadruplets. A similar trend was earlier reported by Odubate *et al.* (1993) and Oseni and Ajayi (2014a & b).

Proximate analysis results of feeds materials fed to these two breeds of goats agreed with the recommended standard values as reported by various scientists (Bunmi *et al.*, 2012; Mubi *et al.*, 2013; Afolabi *et al.*, 2012; Aja *et al.*, 2013; Lamidi and Ogunkunle, 2015; Dika, 2010). This proximate analysis results from the current study has shown that the nutritive value of these feeds materials being fed to these goats by the traditional husbandry management method is adequate, nutritionally. However, the drawback of these feed materials is that the traditional farmer does not know the exact quantity to feed each goat per day. Also these feed materials are mostly very scarce and availability differed at different times of the year. Therefore, there is a need for a concerted research effort in order to come up with a recommended daily quantity of these numerous and useful feed materials either as individuals or in combination of two or more, that meets the daily nutritional requirement of these two breeds of goats under the traditional management system. There is a need to also make these feed materials available all year round especially during the dry season (November – April) when fodder is scarce.

CONCLUSION

In conclusion the current study has shown that the reproductive performance of the WAD goats in terms of fecundity under the traditional management system is much better ($P < 0.05$) than that of SBG and that SBG is gradually getting adapted to Makurdi Climate. Therefore, goat farmers in Makurdi LGA, Benue State, Nigeria should be encouraged to keep WAD goats rather than SBG in order to maximise their return on investment (ROI) for improved disposable income.

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