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## Influence of season on herd size and birth rate of small-holder goats in the southern guinea savanna

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**Abstract**

The study aimed to evaluate the influence of season on herd size and the birth rate of goats in Southern Guinea Savanna, Nigeria. The study was carried out in Idah, Kogi State, Nigeria. A total of 54 households from 6 villages were used for the evaluation. Structured questionnaires on the socio-economic characteristics of the goat owners were administered. Data on the reproductive performance of goats were collected by visual appraisal. The data collected were on herd size, sex, number of pregnant goats, lactating goats and newly weaned kids. The result showed that more women (63.6%) were involved in goat rearing than males (36.4%), and about 91.6% of the respondents had a herd size of 1-20 goats, while only 8.4% had a herd size of 21-30. The goat herd distribution showed that the average herd size was 16.5 goats, within the range of 7 to 30 goats. The herd structure was 391 females and 184 males. Three breeds of goats were identified, the West African Dwarf (WAD) goats being the dominant (397), followed by Maradi (Red Sokoto) breed (113), and the least was Pygmy breed (75). Season significantly influenced pregnancy and the number of lactating goats. There were more lactating goats during the cold-wet period and more pregnant goats during the hot-dry season. It was concluded that goat production is still at the peasant level, and goats were kept as a supplementary source of income. The conception rate was high during the cold-dry season, which was manifested in the hot-dry season. More awareness is still needed to increase the production of goats in the area. We recommend a reproduction program should be targeted during the cold-dry season where the conception rate is high.

**Keywords:** Breeds, Goat, Herd-size, Pregnancy, Season

**Introduction**

Cattle and goats are the leading suppliers of meat in Nigeria (Adedeji *et al.*, 2006). Specifically, about 90 % of the country's cattle population and 70% of the sheep and goat populations are concentrated in the

northern region of the country (Adedeji *et al.*, 2006). A large number of rural households raise goats with a herd size varying from 3 to 20 heads. These herds represent more than 90% of the total goat population

in Nigeria (Adedeji *et al.*, 2006). Increasing productivity of goats will contribute significantly to the improvement of the living standard of the rural people. In Nigeria, goats are the most numerous of all the types of small ruminants and their production is increasingly becoming a major source of animal protein (Adebambo, 2002).

The people of Southern Savanna and the rain forest zones of Nigeria seem to be familiar with the rearing of goats than cattle, hence the need to advocate research on goat's production in these areas.

Nigeria pastoral systems are characterized by poor and fluctuating nutritional levels which can cause reproductive inefficiencies in goat flocks. Despite the ability of many local goat breeds such as the Small East African to be non-seasonal breeds, breeding females may exhibit prolonged periods of anoestrus, reduced ovulation rates, an ovulation, high embryonic and foetal losses as a result of poor nutrition and sometimes climatic conditions. (Oni 2002, Rojero *et al.*, 2005; Bushara *et al.*, 2016) Seasonal and climatic changes are a major factor that affects the distribution and production of ruminants in Nigeria. Traditional pastoral producers in the study area (Idah) exert very little control over reproductive activity in their goat herds. Farming accounts for 80% of the population of the area. The major crops grown

are yam, cassava, maize, rice and tree crops such as oil palm, citrus, and cashew. The livestock that are commonly kept are goats, sheep and poultry.

This study was designed to assess the influence of season on herd size and birth rate of small holder goat herd in Idah LGA, Kogi State Nigeria.

**Materials and Methods**

*Experimental site*

This study was conducted in Idah Local Government Area (LGA) of Kogi State Nigeria. Idah is a LGA on the eastern bank of the Niger River in the southern guinea savanna zone, north central region of Nigeria. The LGA has a typical savannah climate with distinct wet and dry seasons. The wet season stretches from April to October, while the dry season is from November to March. The annual rainfall ranges from 1100 mm to 1300 mm. Figure 1 shows the rainfall pattern and Figure 2 shows the temperature and relative humidity in the study area.

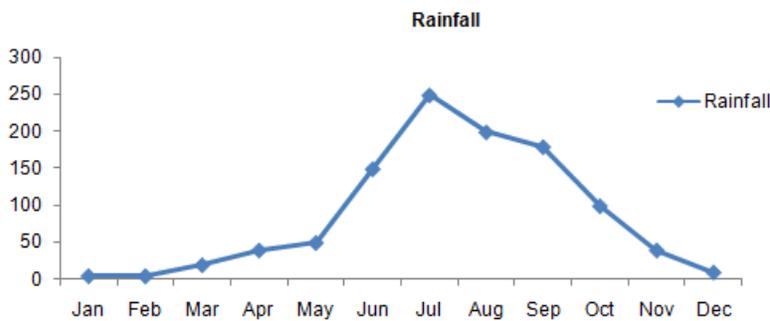
*Sampling technique*

A purposeful sampling technique was used in this study. The study commenced with a primary visit to identify smallholder goats. Fifty-four households from 6 villages namely Allah Okweje, Aloko-inah, Efulu, Ichekene Ekwokata and Ichala-Edeke (Table 1)

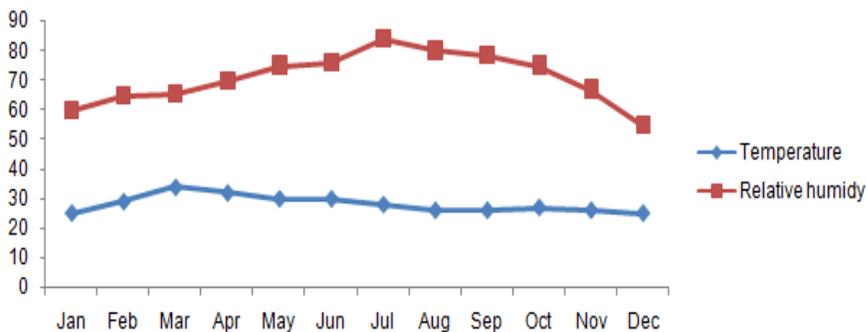
were used for data collection. Structured questionnaire on the socio-economic characteristics of the goat owners were administered to few literate farmers, and for the illiterate farmers, the questions were read to them. The villages were spread across the local government area and were selected based on the number of goats available and the receptivity of the goat keepers.

*Method of data collection*

The second visit was for the collection of data on the reproductive performance of the goats. The data was collected by visual appraisal of individual goat to examine the effect of season on the reproductive



1  
**Figure 1:** Rainfall pattern in Idah, Kogi State Nigeria (NIMET)



**Figure 2:** Temperature and relative humidity pattern in Idah, Kogi State, Nigeria (NIMET)

**Table 1:** Breakdown of Sample size amongst the villages in Idah LGA

S/No	Village	House holds
1	Allah Okweje	6
2	Aloko-inah	9
3	Efulu	5
4	Ichekene	8
5	Ekwokata	10
6	Ichala-Edeke	16
Total		54

efficiency of small holder goat herd. The data collected were on herd size, sex, number of pregnant goats, lactating goats (goats that were still breast feeding their young and newly weaned kids (goats that were no longer suckling). This was done during the cold-dry season (November – February), cold wet season (July – September) and during the hot-dry season (March – May).

*Statistical analyses*

Descriptive statistics was used to analyze the data on Socio-economic Characteristics of goat owners, herd and breed distributions of goats using SPSS software package, while data on the effect of season on the reproductive performance of goats were subjected to analysis of variance using the statistix 9.0 software and the differences in means were separated using Turkey in the software package.

**Results**

*Socio-economic characteristics of goat owners in the study area*

Table 2 shows the socio-economic characteristics of goat owners in the study area. About 62.6% of the sampled farmers were between the ages of 20 – 49 years. It was also found that 63.6% of the respondents were female while 36.4% were male. Majority of the respondents (78.6%) had one form of education or the other while 21.5% had no formal education. Only 15% of the sample goat owners had tertiary education. About 91.6% of the respondents had a herd size of 1 – 20 goats while only 8.4% were having a herd size of 21 – 30. Thirty-four holders representing 63.6% had a household size of between 6 - 10 persons.

*Descriptive statistics of goat herd distribution*

The goat herd distribution (Table 3) showed that the average herd size was 16.86 goats, within the range of 7 to 30 goats. The herd structure in this study was 391 does and 184 bucks. The average size of the ` from 1 to 4, but majority

**Table 2:** Socioeconomic characteristics of goat farmers

Characteristics	Frequency	Percentage
<b>Age (years)</b>		
20-29	2	3.7
30-39	19	35.5
40-49	13	23.4
50-59	12	22.4
> 60	8	15.0
Total	54	100
<b>Sex/Gender</b>		
Male	20	36.4
Female	34	63.6
Total	54	100
<b>Level of Education</b>		
No Formal Education	12	21.5
Primary Education	24	44.9
Secondary/ Grade II	10	18.7
Tertiary Education	8	15.0
Total	54	100
<b>Herd Size</b>		
1-10	30	56.1
11-20	19	35.5
21-30	5	8.4
Total	54	100
<b>House hold Size</b>		
1-5	9	15.9
6-10	34	63.6
11-20	11	20.6
Total	54	100

(90%) of the goats had litter size of 1 and 2, with rare cases of litter size of 4 (0.3 %). The average number of pregnant female and lactating goats were low (1.66 and 2.8) respectively.

*Descriptive statistics of the distribution of breeds of goats* Three breeds of goats were identified (Table 4) and were common among the small goat holders in the area. The West African Dwarf (WAD) goats were predominant [397 (68%)], followed by Maradi (Red Sokoto) breed [113 (19%)] and the least popular were Pygmy breed [(75, (13%)). In the three identified breeds, females were more than males.

*Effect of season on the performance of goat herd*

The cold-wet season significantly (P<0.01) increased the number of nanny does; the mean values of the nanny does was 7.71 compared to 3.14 what was recorded during the cold-dry and hot-dry seasons respectively. Goats were noticed to be pregnant by visual appraisal and they were significantly (P<0.01) higher in the hot-dry season than during the cold-dry and cold-wet seasons.

**Discussion**

Age classification shows that majority of the sampled goat owners were middle age and were still in their economic active age which could result in positive effect on production. Older farmers are assumed to have gained knowledge and experience over time and are better able to evaluate technology information than younger farmers (Kariyasa & Dewi 2011; Mignouna *et al.*, 2011). Age classification is relevant to this study because adoptability of new farming techniques and productivity is influenced by age (Hall and Khan, 2002). More females were interested and were involved in the rearing of goats in the study area (Gefu, 2002) than male probably because goats are docile and easy to manage compared to cattle. Education plays a major role in creating awareness among farmers and influences the adoption of innovations. (Mignouna *et al.*, 2011; Lavison 2013; Namara *et al.*, 2013). Most people in Nigeria with tertiary education qualifications prefer white collar jobs to farming. Majority of the farmers in the study area still keep goats as a supplementary source of income and to meet immediate household needs (Gefu, 2002). Household size is important because it influences the amount of care and attention (Mignouna *et al.*, 2011) that is given to the goats

especially when they are pregnant and during the dry season when green feeds are scarce for goats.

Herd distribution recorded in this study was lower than the average herd size of 19.2 in the range of 2 to 70 reported in Zaria (FAO, 2009). The herd structure in this study was comparable to the smallholder goats herd structure in Zaria which comprised of 79.3% females and 20.6% males with average buck to doe ratio of 1:19. The high number of females in the herd implied that farmers were conscious of keeping only that category of animals which are productive and can conceive for the sake of increasing their herd size. The number of kids and litter size are similar compared to those reported by Akpa *et al.* (2010). The average number of pregnant does and lactating goats were low (1.66 and 2.8) respectively. This implied that majority of the females had just weaned their kids and were yet to conceive again or some were in their early stages of pregnancy which was not noticed by visual appraisal.

The result on breeds of goats agrees with Ogah, (2016) who found that the WAD goats are predominant in Kogi and Benue states of Nigeria. The dominance of the WAD goats is likely as a result of the influx of the goats from the southern parts into the study location and also due to the socio- cultural and aptive value of the goat to the farmers. The about 19% brown goats identified in the study area confirms the inflow of the Red Sokoto (brown) from the Northern parts of the state towards the south. Kogi state (Idah) is situated along the commercial route linking the North and South of Nigeria. Lakpini (2002) observed that the central states of Nigeria have a mixture of Northern and Southern types of goats. In the three identified breeds, females were more than males. Most males are usually sold off while more females are kept for reproduction.

**Table 3:** Descriptive Statistics of Goat Herd distribution

Parameters	Sum	Mean/SD	C.V.	Min	Max
Herd size	585	16.86±2.34	19.77	7.00	30.00
Bucks	184	5.26±1.45	20.53	3.00	9.60
Does	391	11.17±4.52	21.02	6.00	20.40
Kids	202	5.77±2.43	24.11	2.00	10.00
Pregnant Does	58	1.66±1.42	51.82	1.00	6.00
Lactating Does	98	2.80±1.56	34.98	1.00	7.00

**Table 4:** Descriptive statistics of the distribution of Breeds of Goat in the study area

Parameters	Sum	Mean/SD	C.V	Min	Max
<b>West African Dwarf Goats</b>					
Herd size	397	25.63±5.42	9.63	14.00	29.00
Bucks	121	8.70±2.43	12.59	7.00	10.00
Does	276	17.25±2.43	18.40	8.00	20.00
<b>Maradi</b>					
Herd size	113	14.13±4.52	31.99	4.00	10.00
Bucks	39	2.44±1.27	25.47	1.00	4.00
Does	74	5.12±2.11	23.39	3.00	8.00
<b>Pygmy Goats</b>					
Herd size	75	9.38±3.34	25.68	3.00	7.00
Bucks	29	2.43±2.20	40.47	1.00	3.00
Does	46	3.55±1.6	21.65	2.00	4.00

During the cold-wet season, there was increase in availability of green fodder that supports production (Silva *et al.*, 1998; Madibela *et al.*, 2002; Dadi *et al.*, 2008) hence, more milk production by the nanny goats. Nanny goats could afford to comfortably breastfeed their young without stress. This is an indication that young goats can afford to continue to run with their mothers without being restricted by them. The reason for the increase number of pregnant goats during the hot-wet season may be attributed to early conception which might have occurred during the cold-dry season, probably because temperature was favorable (Marai *et al.*, 2008) and this was manifested in the preceding season which is the hot-dry season. Also, it could be because of the presence of the number of males in the flock running with the females (Silva *et al.*, 1998; Webb & Mamabolo, 2004). During the cold –dry season majority of the males and some old females are usually sold for slaughter during festivities like Christmas and Salah.

It was concluded that majority of the people that were involved in goat rearing in the study area are educated, within the productive age and were women with small goat herd sizes. The West African dwarf goat is predominant in the area and majority were female goats. Conception rate is high during the cold-dry season which was manifested in the hot-dry season. More awareness is still needed to increase production of goats in the area and reproductive program should be structured to target the cold-dry season for optimum conception (reproduction) and production.

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#### Conflict of Interest

The authors declare that there is no conflict of interest.

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