Chapter

Assessment of Management and Breeding Practices among Indigenous Goat Farmers in a Tropical Humid Forest Zone

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Abstract

The study was undertaken to assess indigenous breeding practices and structure of back-yard goat farming in humid tropical forest zone. Pretested questionnaires and interview schedules were used to collect information from farmers in Ekiti, South-west Nigeria. Profile assessed were purpose, management, breeding and reproductive performances, disease prevalence, healthcare and challenges. Data were analyzed by descriptive statistics of SPSS, Version 20.0. Bucks run with does on free-scavenging system, mature sexually at 6–10 months, while mature does settle for bucks from about 7 months (52, 44, %). Main goals of farmers were flock multiplication, meatiness and coat color (24, 11, 6, %). Breeding was by natural random mating. Prolificacy was 1–4 kids but resistance to diseases was low. Selection practices were lowly engaged (7.5%), although based on health status and fecundity (19 and 13, %) for bucks and does respectively. Vaccination knowledge was high (77%), but mortality was also high. Drenching, castration and dehorning were performed (47, 24 and 5, %). Official intervention on breeding and improvement was nil. Challenges of farmers were stealing and accidents (46%), diseases and poisons (14%), lack of organized backyard sector, and the poor management system. Intensification of ethnoveterinary practices could promote improved healthcare in backyard goat farming.

Keywords: backyard farmers, breeding targets, selection criteria, management, reproductive capacity, West African dwarf goats

1. Introduction

The livestock sector is highly dynamic globally. In developing countries, it is evolving in response to rapidly increasing demand for livestock products. Historical changes in the demand for livestock products have been largely driven by human population growth, income level, urbanization and the production response in different livestock systems has been associated with science, technology and increases in animal population. In the future, production will increasingly be affected by

competition for natural resources, particularly land, water, competition between food and feed; and by the need to operate in a carbon-constrained economy [1]. Developments in breeding, nutrition and animal health will continue to contribute to increasing potential production, higher efficiency and genetic gains. Livestock production is likely to be increasingly affected by carbon constraints, environmental and animal welfare legislation. Demand for livestock products in the future could be heavily moderated by socio-economic factors such as human health concerns and changing socio-cultural values. There is considerable uncertainty as to how these factors will play out in different regions of the world in the coming decades [1]. Small ruminants such as goats and sheep are important sources of meat and cash bank for farmers. Although goats are traditionally raised as back-yard livestock for subsistence among Sub-Saharan African farmers, it is increasingly being marketed. Many rural small ruminant farmers own small ruminants, which are kept for home consumption, sale, and source of manure. Small ruminants are increasingly becoming a major source of animal protein in Nigeria, contributing over 30 percent to total meat consumption. The West African Dwarf goats are commonly kept by farmers in the Rain forest zone. Backyard goat breeding is popular among small-scale farmers for several reasons. It plays significant socio-economic roles in the life of the people: meets the immediate needs of households for meat and milk, useful for ceremonies and festivals, serve as banks of ready cash. Goats survive well in marginal lands and are efficient in converting high quality forage into milk [2] and flesh. The generally accepted problem is said to be lack of feed; either farmers lack an alternative source that provides sufficient feed (by-products, scrubland, etc.), or they are unable to satisfy the nutritional requirements for meat and milk production. An additional problem is selecting goat breed or individuals for each management system, although when farmers have alternative sources of food, they can select local genotypes or high-yielding goat breeds [3]. The humid zone has varying levels of tsetse fly challenge, therefore small ruminant production is limited to breeds that tolerate tsetse fly-transmitted trypanosomiasis. The zone therefore supports trypano-tolerant West African dwarf breeds of goats [4]. Reproductive potential of female animals is measured by the number of young ones produced per year, which depends on age of the animal at first kidding, litter size, kidding interval and kidding rate [5]. Reproductive performance of 2.2 kids/doe/year has been reported among village West African dwarf goats in Southwest Nigeria, while survival index of kids to 90-days was reported as 0.75. Overall mortality of 23.7% has been reported for goats [6]. This survey sought to characterize goat breeding in Ekiti humid forest zone to provide base-line information to proffer adaptable policy recommendations to relevant agencies for goat breeding. The objectives of the study were to:

i. examine flock breeding practices

ii. assess healthcare practices

iii. elucidate problems facing backyard goat breeding in the area

2. Materials and method

2.1 Study area

Ekiti State is in South-west Nigeria. The state was carved out from old Ondo State in 1996 which consists of the former 12 local government areas. It is located

between longitude 405.10 and 50 4.51 East of the Greenwich meridian and latitudes 701.51 and 805.10 North of the equator. It covers an area of 6,353 km^2. Vegetation pattern varies with climate and rainfall. There are two ecological zones namely tropical rainforest in the southern, and derived savannah in the northern periphery.

2.2 Data collection

Multi-stage sampling procedures were used to collect the data. First stage involved selection of six communities noted for high concentration of WAD farmers namely; Omuo (7.7573 N and 5.7228E), Isan (7.917 N and 5.317E), Emure (7.4317 N and 5.4621E), Oke-Imesi (7.8167 N and 4.9167E), Ikole (7.7897 N and 5.5106E) and Ayedun (7.6656 N and 5.3103E); all in Ekiti state. Second stage involved selection of 20 goat farmers from each community making total of 120 respondents. Structured questionnaires and interview schedules were adopted. Eighty-Eight (88) questionnaires were returned, with return rate of 73.33%. Data collected included breeding practices, reproductive performance, healthcare and challenging problems.

2.3 Data analysis

Data obtained were analyzed with SPSS v20.0 [7], using simple descriptive statistics of means, percentages, and charts.

3. Results and discussion

3.1 Purpose of farming and breeding objectives of farmers

Table 1 shows the reasons of farmers for engaging in goat farming. These included income generation, hobby, household protein supply, sacrifices and ceremonies (46, 23, 18, 2 and 2%) respectively. Economic reasons predominate the minds of farmers engaged in WAD goat farming. Next was hobby, revealing that many farmers also started out in order to engage their spare time for backyard goat production. About 18% raised goats to supply household animal protein. Thus, the need to nourish the family with adequate animal protein seemed to be gaining ground among Ekiti Farmers. Use of goats for sacrifices and ceremonies were not strong reasons for engaging in goat production among Ekiti farmers. Results shows that the principal reasons for raising WAD goats in Ekiti were to generate profit, get busy and supply household protein need.

Purpose of farming	Farmers' Response	%
Income generation	49	45.8
Hobby	25	23.4
Household protein	19	17.8
Sacrifice	2	1.9
Ceremonies	2	1.9
Others	10	9.3
Total	107	100.0

Note: Total responses exceeded 88 due to multiple responses. Source: Field survey, Own results.

Table 1.
Purpose for engaging in goat farming in Ekiti state.

Table 2 reveals different breeding objectives or goals among Ekiti goat farmers. About 24% breed for flock multiplication to ensure regular income through sales for family needs and welfare. Eleven percent breed for meatiness, while 6% breed for color. Thus, the main targets of backyard goat farmers in Ekiti were to breed for income and profit maximization through flock multiplication, high meatiness and coat color. The common coat colors observed were black, brown, white and mixtures of these colors with white.

3.2 Breeding flock management

About 69% of farmers (**Table 3**) allowed their bucks (males) to run with the does (females) throughout the year on free-range scavenging system, while 9% of farmers allowed their bucks to run with does at specific periods or during the two known seasons of the year. These few farmers thus engaged in controlled breeding.

3.3 Time of breeding

The few Ekiti farmers who practiced controlled breeding (**Table 4**) vary widely in period of practice. About 2% allowed their bucks to breed with Does during the rainy season between April to June, while 5% practiced controlled breeding

Goal	Observed no. of farmers	Percent frequency
Multiplication	21	23.8
Coat color	5	5.7
Meatiness	10	11.4
Body weight	3	3.4
None response	49	55.7
Total	88	100.0

Source: Field survey, Own results.

Table 2.
Breeding goals among WAD goat farmers in Ekiti state.

Method of Running Males with females	Yes	No	None-Response	Total
Buck run with Does all-year round	61 (69.3)	3 (3.4)	0 (0.0)	64 (72.7)
Buck run with Does at periods of the year	8 (9.1)	12 (13.6)	4 (4.5)	24 (27.3)
Total	69 (78.4)	15 (17.0)	4 (4.5)	88 (100.0)

NOTES: Value outside bracket is observed frequency while value in bracket is percentage. Source: Field survey, Own results.

Table 3.
Number of farmers and breeding method in practice in Ekiti state.

Seasonal Period	Rainy Season (April–June)	Rainy Season (May–Oct)	Dry Season (Nov–April)	Total
No of Farmers	2 (2.3)	4 (4.5)	2 (2.3)	8 (9.1)

NOTES: Value outside bracket is observed frequency while value in bracket is percentage. Source: Field survey, Own results.

Table 4.
Percentage of farmers, and seasons in which they practiced controlled breeding of WAD goat in Ekiti state.

between May and October. The third category of farmers (2%) allowed animals to breed during the dry season between November and April. Thus, farmers' breeding season in Ekiti span mainly from April to October.

Farmers claimed that April to June has abundant grass that support natural breeding of goats. Edible crop residues and peels were also available during the harvesting and dry period from November to April, ensuring abundant feed resources for goat production. Since majority of backyard goat farmers were engaged in free-range goat production which promoted extensive uncontrolled free – range breeding. The practice of record keeping and pedigree tracking of kids born was unknown. Inadequacy or absence of housing, and use of informal housing types such as backyard, shed and open spaces, all promote the random mating system.

3.4 Sexual maturity and reproductive capacity of breeding flocks

Sexual maturity stage is also referred to as puberty in the matured doe. From our findings, early maturing males (bucks) begin mounting attempts at 6–7 months (52.3%), while late maturing males begin to mount females at 8–10 months of age (12.5%). Thus at 6–10 months, male goats could be observed fighting and mounting receptive does. Early maturing does begin to settle for mating with bucks from 7 months (44.3%). Thus, average sexual maturity of WAD goats in Ekiti ranged from 7 to 12 months (210–365 days) in both sexes. Late maturity in goats could have been caused by multiple factors such as low level or absence of supplementary feeding, and nutrition by farmers, low healthcare and low level general management. The average onset of puberty in WAD goat was reported as 141 days in Cameroonian dwarf goats of Croatia but varied with season [8]. It was recommended that does should be mated at 12 months and 20 kg body weight at first breeding [9], while sexual maturity age of 15–18 weeks [10] and 6–7 months [11] had been reported for male and female WAD goats. Our findings support the early sexual maturity age of 6–7 months reported in literature.

Kidding Interval is the interval between successive births in reproductive does. Kidding interval of 4–7 months (64%) was reported by farmers, although majority tilted towards 6–7 months. This was lower than the kidding interval of 7.3 to 9.4 months [12]. WAD goats in humid areas also exhibit shorter kidding intervals compared to other areas of the tropics probably because of the relative abundance of feed resources all year round. Mean kidding interval of 247 days (8.2 months) for WAD goats under formal breeding station management has been reported [13].

Parity is the number of times a Doe gives birth to kids in a year. Claims varied among farmers interviewed. 62.5% of farmers reported 1–2 kidings per year, while 12.5% reported 3 parities in 2 years. We noted that very prolific does could kid up to 3 times in 2 years. Since farmers did not keep formal record system, a doe that kidded in January and latter in October were easily taken as having kidded twice a year.

Prolificacy is the average number of young ones in each litter after birth, and also known as kidding rate. Nine percent (9.1%) of does gave birth to 1 kid at first kidding (parity). 48% of goats gave birth to 2 kids at second parity, while occurrence of 3 and 4 kids per litter at kidding were 13.6% and 15.9% respectively. The multiple births occurred as does progressed in their reproductive life-span, especially if doe flushing was done. Does become more prolific as they progressed to peak of their reproductive life, while bucks become more sexually active and experienced in mounting reluctant does. In humid environments, does are exposed to abundant feed resources during the harvesting period, and usually produced multiple births than those bred during other periods. Average litter size range of 1.42–1.79 kids had been reported [14, 15] at weaning. But the mean litter size was

2.07 for Sidama goats in Ethiopia [16], while [17] reported 1.86 weaned kids per litter but [18] reported average prolificacy of 4.64% for WAD goats.

Fecundity is the potential or the natural ability to reproduce, or the number of kids that a female goat gives birth to. It is also referred to as Kidding percentage. It is the average number of kids born by each doe in a year. Fecundity could best be estimated for indigenous free-ranging goats by summing up all surviving kids born by a doe in two years and dividing by 2 to obtain a mean, or it could be expressed as total number of kids born in two years. Mean fecundity of 91–130% had been reported for WAD goats under savannah conditions [19]. Both Prolificacy and Fecundity could be classified into low, medium and high categories for WAD does in humid tropics.

3.5 Kid nursing and management

Young goat kids were nursed and suckled by their nursing does for variable number of weeks. Experienced farmers (31%) allowed does to nurse kids for 4 to 6 weeks, while majority (60%) of farmers allowed kids to be suckled for 7–12 weeks before withdrawing the kids and re-breeding the does. Observations revealed that nursing does weaned kids naturally. This was accomplished by delivering frequent kicks to kids attempting to suckle. Thus, a pregnant doe back-kicks when nutritional demand of kid nursing, growing foetus, and own physiological maintenance are becoming too high to support. Few owners provided supplementary concentrate feeds to pregnant does at this period to support body and foetal development, and prevent abortion.

3.6 Selection practices and criteria

Knowledge on selection was known to about half (47%) of goat farmers but was only practiced by 7% for male breeders (bucks). Selection entailed making deliberate choice among males in the backyard flock, purchase of desired males (2%), or borrowing males from other farmers. This third option was not widespread among farmers because of the system of management which permits random mating of bucks with does (**Table 5**).

The use of purposeful selection criteria was low due to inadequate education and knowledge. Only 38% of farmers employed meaningful selection criteria on males and females in flock.

Table 6 lists the main selection criteria used for breeding in Ekiti. Selection in bucks was mainly based on health status and coat color (13 and 10, %); but on fecundity and coat color (19 and 9, %) in does respectively. These traits were easy

Male Selection	Yes	No	None Response	Total
Knowledge of Selection for goats	41 (46.6)	41 (46.6)	6 (6.8)	88 (100)
Selection of male within flock for mating	6 (6.8)	37 (42.00	47 (51.2)	88 (100)
Purchase of new males for mating	2 (2.3)	41 (46.6)	45 (51.1)	88 (100)
Borrow males for mating	0 (0.0)	43 (48.9)	45 (51.1)	88 (100)

NOTES: Value outside bracket is observed frequency while value in bracket is percentage. Source: Field survey, Own results.

Table 5.
Male selection for breeding among WAD goat farmers in Ekiti state.

Selection criteria/Sex	Male	Female	Total
Maturity Status	5 (5.0)	2 (2.3)	7 (3.9)
Flock record	4 (4.5)	3 (3.4)	7 (3.9)
Coat color	9 (10.2)	8 (9.1)	17 (9.7)
Health status	11 (12.5)	4 (4.5)	15 (8.5)
Fecundity	3 (3.4)	17 (19.3)	20 (11.4)
None response	55 (62.5)	54 (61.4)	109 (61.9)
Total	88 (100.0)	88 (100.0)	176 (100.0)
Average involvement in selection	6.4 (7.3)	6.8 (7.7)	13.2 (7.5)

NOTES: Value outside bracket is observed frequency while value in bracket is percentage. Source: Field survey, Own results.

Table 6.
Selection criteria used for breeding WAD goat by farmers in Ekiti state.

to observe without having to keep performance records. About 63.3% of farmers did not engage in purposive or organized selection, since flocks were permanently scavenging on the free-range. However, farmers readily cull sick bucks (12.5%) for sale or consumption, while retaining does for breeding. Average practice of selection for WAD management and breeding was 7.5%, while the none-response of 62% revealed the population of farmers un-involved in formal goat selection. The none-use of flock records for management, selection and improvement are main reasons for the slow pace of WAD goat development in Ekiti.

3.7 Breeding practices

Sires (**Table 7**) were used for breeding for variable number of years before disposal. 26% of farmers used them for 1–2 years, while 11% used desired and highly reproductive bucks for 3–8 years before disposal. Does were used till old-age. More than 63% of farmers gave no response on the number of years they kept breeding bucks, partly because they did not keep male goats but depend on random field mating. Sixty-nine percent (69%) of farmers (**Table 8**) engaged in pure breeding by mating of pure WAD male to pure WAD females within breed in the environment, through random mating. Sixty-one percent (61%) of farmers allowed their bucks and does to run together on free-range, while about 15% bred does in enclosed-yards.

	Years	Observed	% Farmers
Number of years for using Sires for breeding before sales	1 yr	14	15.9
	2 yrs	9	10.2
	3–4 yrs	4	4.5
	8 yrs	5	5.7
	None-response	56	63.5
	Total	88	100.0

Source: Field survey, Own results.

Table 7.
Number of years for using male WAD goats for breeding females before disposal.

Breeding Practice	% Yes	% No	% None Response	Total
Kept Females in an Enclosure or yard	13 (14.8)	34 (36.6)	41 (48.6)	88 (100)
Allowed Males to run with Females freely (Random mating)	54 (61.4)	3 (3.4)	31 (35.2)	88 (100)
Pure breeding	10 (11.4)	17 (19.3)	61 (69.3)	88 (100)
Line Breeding	4 (4.5)	18 (20.5)	66 (75.0)	88 (100)
Crossing within breed	2 (2.3)	58 (65.9)	28 (31.8)	88 (100)
Use of Artificial Insemination	2 (2.3)	79 (89.8)	7 (8.0)	88 (100)

NOTES: Value outside bracket is observed frequency while value in bracket is percentage. Source: Field survey, Own results.

Table 8.
Indigenous breeding practices among backyard WAD goat farmers in Ekiti state.

3.8 Linebreeding and crossbreeding

Line breeding involves breeding to a desired individual in a herd. This was only practiced by 5% of farmers, about 21% gave negative response probably due to lack of knowledge, and neither practiced controlled breeding nor confined housing; while 69% farmers remaining did not respond. Observation showed that most farmers attempted line breeding to a desired male, which runs with does in flock but most times on the free-range. Therefore, the paternity of subsequent progeny was doubtful. Crossbreeding was known and practiced by 2% of farmers. Methods employed included male exchange (10%), purchase of new male (4%) or borrowing of new male from distant farmers for mating own flock (1%). Mating was usually random within herd and neighborhood (>25%) and not organized, while only 3% of farmers employed mating ratio of 8–10 does per male in the survey area. This implied that breeding practice was highly unorganized and random, with high level of in-breeding.

3.9 Artificial insemination

Two percent of the goat farmers practiced artificial insemination (AI) either by themselves, by veterinary technician or extension officer. Majority (90%) of farmers did not engage in AI because 50% of them were unskilled and lack knowledge of AI. Moreover, it was expensive for about 3% of farmers, 2% had no facility to perform it on-farm, while 1% lack interest. The regular AI practitioners were extension workers and veterinary technicians who had skilled training and had practiced for several years, and performed the operation for other farmers who requested it (**Table 9**).

Culling was practiced by 46% of farmers as a WAD management practice (**Figure 1**). Criteria employed were old-age, economic (profit), infertility and natural destructive tendency (37, 5, 3 and 1%) respectively. Field observation showed that culling was popularly practiced by farmers who would rather remove 'unproductive' and troublesome animals. Culling helps to maintain genetic purity of backyard stock but the gains were usually canceled out by random mating with out-of-flock males during scavenging on free-range.

Figure 2 reveal the methods of management of unselected individual does and bucks. Culled does were managed by selling, consuming at home, given out as gift and lease out for contract rearing (33, 9, 5, 1%); while bucks were disposed mainly by sales and consumption (36 and 15%). Market observation revealed that majority

Disease	Observed	% Prevailence
Skin mange	50	56.8
Diarrhea	8	9.1
Ectoparasites	6	6.8
Intestinal parasites	10	11.4
Cold	2	2.3
Goat Flu	1	1.1
PPR	1	1.1
None response	10	11.4
Total	88	100

Source: Field survey, Own results.

Table 9.
Prevalent diseases of WAD goats in Ekiti state.

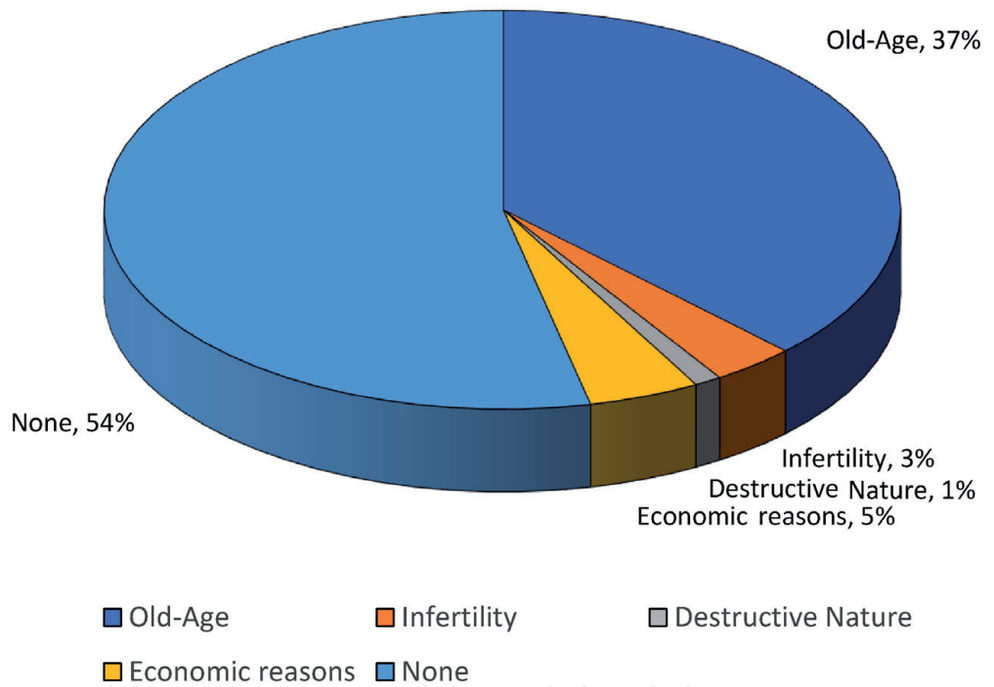

Figure 1.
Percentage of farmers and culling criteria practiced on WAD goats in Ekiti state. Source: Field survey, Jesuyon et al. 2021.

of goats offered for sales were primarily due to illness; and although treated for a period but failed to respond to treatment. These were presented in local markets for sale when considered safe for consumption.

3.10 Drenching and dipping

Drenching is the act of giving a broad-spectrum endo and ecto-parasitic drugs and intradermal injections to ruminants to deworm and delouse them. Drenching was practiced by 47% of farmers although the frequency of operation was not determined by survey instrument. About 14% of farmers interviewed used broad-spectrum ecto and endo-parasitic injections such as ivermectin, DDT powder for oral skin dusting, pour-on liquid chemical applied to the spine-line, and formal engagement of veterinarians where available and affordable. Dipping in acaricides' chemical-solution pool was rarely used for goats.

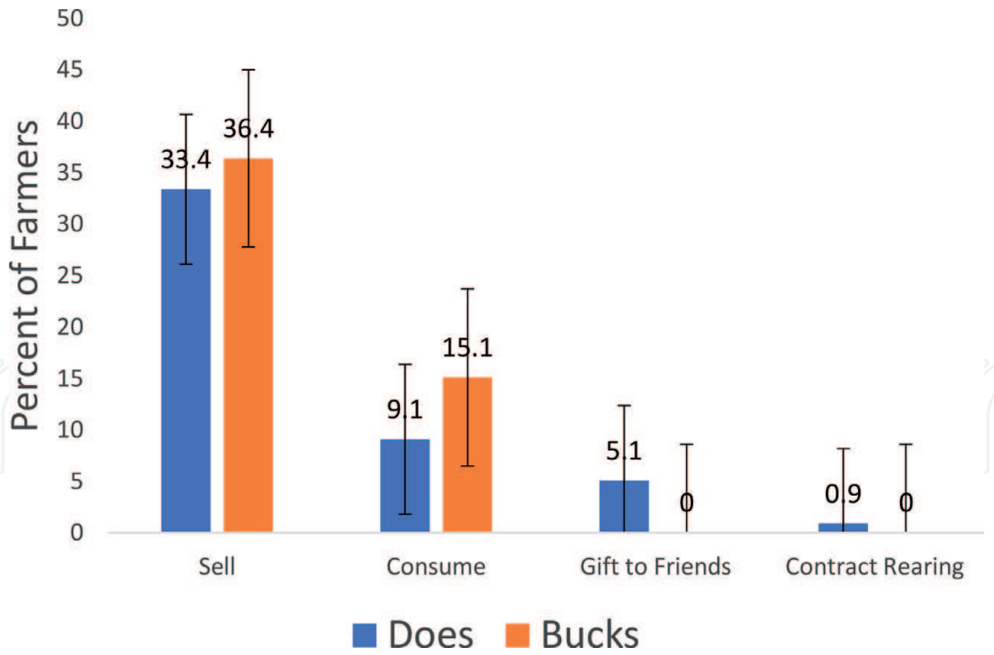

Figure 2.
Management of unselected goats for breeding in Ekiti state (with standard error bars). Source: Field survey, own results.

3.11 Castration

Twenty-four percent (24%) of farmers carried out castration for surplus males while 65% did not engage in castration due to health, religious (Islam, 1%) or customary reasons. Castration was conducted by some technically oriented farmers (2%), technical animal health assistants (TAHA, 2%), and veterinary workers (23%). Fourteen percent (14%) of farmers did castration at 2 months of age. Ten percent (10%) conducted castration of male at 2 weeks of age, while 2% of farmers did castration at 4–6 weeks of age. The late castration exercises were more painful for grown-up kid bucks. Investigations also revealed that 45% of farmers claimed ignorance of the benefit of castration, while 2% indicated lack of interest in castration probably due to religious or customary reasons.

3.12 Dehorning

Interviewed WAD goat farmers did not engaged in dehorning. Some 47% of farmers did not believe in the benefits of dehorning. About 6% believed that goats need the horns for protection from predators, for defense and offensive purposes. 1% of farmers would not consider dehorning for religious reasons. Muslims require perfectly intact animals without physical defects such as crooked legs, defective eyes, injuries, defective scrotum, broken horns etc. for religious celebrations, although would prefer sheep for religious celebration. Observations on the field revealed that most horns on goats got damaged due to frequent fighting among mature bucks and fragility of the horns.

3.13 Disease prevalence and treatment

Mortality occurred most during the rainy season (10%), and was lower in the dry season (3%) but generally at any time of the year (7%). Diseases that ranked highest were skin manges, intestinal worms, goat diarrhea and ecto-parasitic infestations (57, 11, 9 and 7, %). WAD goats were usually treated either by owner farmers using

local knowledge of ethnoveterinary medicine (18%) by a veterinary/extension/technical staff (69.3%) or by farmers' friends (1.1%). Samples of dead animals were rarely sent for post-mortem examination at veterinary clinic or laboratory for investigations/post-mortem examinations because veterinary clinics were non-existent in most farm communities. Only 9% of farmers investigated causes of mortality and invited technical staff or veterinarian to the backyard to investigate causes of death; but only 2% of farmers sought feedbacks from the laboratory or veterinary officer. About 75% of goat farmers did not consult veterinarian for examination, for lack of appreciation of the need (23%), lack of money for such elaborate investigations (2%), or considered it as waste of scarce resources (1%). As a result, endemic and zoonotic diseases festered in backyard flocks due to neglect, lack of proper disposal and handling of dead animal, and inability to recognize the signs of such diseases.

3.14 Disease prevention and healthcare provision

Seventy-seven percent of farmers had some knowledge of veterinary treatment and vaccination (**Table 7**). About 55% accessed veterinary services for treatment of their animals, while 21.6% of them could not probably due to distance to veterinarian, non-availability and high cost. Seventeen percent (17%) never engaged in regular prevention and healthcare provision. This group of farmers were reluctant to vaccinate due to high cost of veterinary services per head of goat. Even after reported vaccinations, 16% of farmers still incurred deaths from diseases claimed to have been vaccinated against in the wet season; while 45% did not record such death among treated animals. These deaths might be due to improper vaccination techniques, wrong diagnosis or late application. Farmers did not have formal health and vaccination records or programme in place for their flocks, because of the small number kept (8–12 goats per household), the highly dynamic and continuously changing structure of flocks due to natural and human decimating factors. Findings showed that employment of high level hygiene, dry atmospheric conditions, timely and proper vaccination, and good nutrition could reduce death of kids among flocks. Despite the perception of high resistance of WAD goat to diseases, this was rated by farmers as low (9–14%), but as inverse of disease occurrence, resistance to disease was deduced at 30% among less-closely interacting flocks under freely-scavenging management system in backyard farms (**Table 10**).

Health and management Practice	Yes	No	None-response	Total
Awareness and knowledge of veterinary treatment and vaccination	68 (77.3)	15 (17.0)	5 (5.7)	88 (100)
Access to veterinary services	48 (54.5)	19 (21.6)	21 (23.9)	88 (100)
Use of veterinary and advisory services	40 (45.5)	19 (21.6)	29 (33.0)	88 (100)
Drenching (deworming) of animals	41 (46.6)	31 (35.2)	16 (18.2)	88 (100)
Dipping of animals	12 (13.6)	49 (55.7)	27 (30.7)	88 (100)
Castration of males	21 (23.9)	57 (64.8)	10 (11.4)	88 (100)
Dehorning of males	5 (5.7)	76 (86.4)	7 (8.0)	88 (100)
Average use of management practices	34 (43.6)	38 (36.0)	16 (20.4)	88 (100)

NOTES: Value outside bracket is observed frequency while value in bracket is percentage. Source: Field survey, Own results.

Table 10.
Health care and management practices among goat farmers in Ekiti state.

3.15 Use of veterinary advisory services

About forty-six percent (46%) of farmers adhered to veterinary or extension workers' advice, 22% did not keep to such advice, while 32% were unconcerned about veterinary advice. There was a high level of farmer disregard for professional advice, but depend on age-long traditional methods of treatment. This scenario could be improved, by official encouragement and teaching of ethnoveterinary practices which are easily understood, cheap and embraced by farmers. Farmers' healthcare delivery to backyard goats was thus considered low compared to the required standard for high productivity.

3.16 External intervention on management, breeding and improvement

No formal institution was reported to be engaging farmers on goat production, improvement and conservation. Thus, deliberate and visible external intervention on indigenous goat farming was lacking. There was no reported case of governmental or non-governmental organization (NGO) aiding or supporting goat farming, or showing concerns on conservation and utilization of West African Dwarf goats. Findings revealed an age-long traditional attachment of the people to the breed. The customary and traditional values placed on WAD goats by the people ensured continued production, utilization, preservation and conservation of the breed. These factors combined to ensure the breed's continued production, existence and prevented its extinction.

3.17 Problems facing backyard goat breeding

Study revealed that goat production and breeding was conducted on free-range scavenging system. Farmers were inadequately skilled and equipped to carry out most technical breeding and management techniques to achieve high productivity and improvement. The most striking challenge before farmers was stealing and accidents (46%) leading high losses of goats and diseases (14%). Lack of adequate housing and range facility was also observed (6%). The scavenging system must be replaced with better systems such as backyard-confinement goat production system, mixed-farming with animal paddocks that focus on enterprise integration, resource recycling and efficient utilization, adoption of adaptable technology and sustainable goat-farming practices. The use of these approaches to solving these three major problems of farmers would boost productivity and improvement of WAD goat in Ekiti (**Table 11**).

Challenges	Response
Stealing and Accidents	40 (45.5)
Diseases and Poisons	12 (13.5)
Lack of confinement	5 (5.7)
Lack of feed and inadequate care	2 (2.3)
Inadequate cash for management	2 (2.3)
Lack of official and external assistance	1 (1.1)
None-response	26 (29.5)
Total	88 (100.0)

Source: Field survey, Own results.

Table 11.
Problems and challenges facing backyard goat farmers in Ekiti state.

4. Conclusion

High reproductive performance among indigenous WAD goats could be achieved through improved feeding, good housing system, paddocking of animals and adequate ethno- and or veterinary care to reduce mortality, losses, and thus improve prolificacy. Optimum management of the backyard goat would require adaptable technical innovations, training of farmers and extension service. The high percentage of farmers who did not answer some of the questions posed in survey instrument also provides important information for both researchers and Ekiti state authorities that could benefit from these findings. These results also call on the state authorities to put in place policies that may enhance significant goat farming productivity, continuous training and information for goat keepers and other livestock farmers.

Acknowledgements

This research project was funded by the Tertiary Education Intervention Fund (TETFund) Abuja, of the Federal Government of Nigeria, 2012 Intervention.

Conflict of interest

The authors declare no conflict of interest.

Notes/thanks/other declarations

Thanks to all undergraduate students who were involved in the administration of the questionnaires of this study.

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