Original Research Article

Effects of Nutritional Practices and Production Systems on Small Ruminants' Health in Rural Households in Ekiti State, Nigeria.

ABSTRACT

The study assessed the effect of nutritional practices and production systems on the health of small ruminant animals reared among rural households in Ekiti State. A total number of 120 rural households were interviewed using a multi-stage random sampling procedure to elicit information from the rural households in Ekiti State. Most of the respondents were within their active age range, married with minimum household size, had least educational qualification and mostly reared sheep and goats. Disease outbreak, accident and stillbirth are the most common factors responsible for mortality experienced by the farmers, while diarrhea is the prevalent disease experienced by them. More than half (58.13%) of the farmers practice self-medication by purchasing antibiotics meant for humans from medicine stores and very few of them (18.33%) received intervention from the government in terms of medication. Only Thirty-three percent of the farmers offer supplementary feeding to their animals during the dry season. Chi-square analysis revealed a significant relationship (p=0.05) between nutritional practices and the health system of the small ruminants. Also, the Pearson Moment Product Correlation also revealed that a significant correlation (r_{cal}= 0.927) exists between production systems and the health of small ruminants in the study area which is significant at 0.05 level of probability. The study, therefore, concludes that if animals are poorly managed and fed without substantial intervention from the government in the Southwest Nigeria, they could be predisposed to diseases and injuries.

Keywords: Nutritional practices, Production System, Rural Households, Small Ruminants, Supplements

INTRODUCTION

The importance of small ruminants cannot be over-emphasized, they are important to mankind in three main ways; economically, managerially, and biologically (Devendra, 2013; Wodajo *et al*., 2020). Economic advantages include low initial investment and less risk of loss from individual deaths. Rearing of small ruminants can serve as a means of employment andas a secondary

occupation where it makes a substantial contribution to household income. In the developing world, they are usually managed by unpaid family labour with limited resource use for the supply of valuable products that are suitable for immediate family consumption. Sheep and goats can withstand drought than cattle due to their short reproductive cycle which allows them to quickly recover from rapid resumption of breeding following a drought (Oluwatayo and Oluwatayo, 2012; Akinmoladun *et al*., 2019).

Demand for both mutton and chevon would increase by 216% while supply is estimated to increase by 159% by 2050 due to population growth, increasing income, and change in consumer taste toward high-quality animal protein (FAO, 2018). In southwestern Nigeria, small ruminants are widely distributed among the rural population but have received limited attention because farmers lack access to land, capital, and labour, while opportunities to earn off-farm income are limited (Fakoya and Oloruntoba, 2009). Poor housing, inadequate health facility, and poor feeding characterised by a low input system have been observed to lead to low output in terms of productivity (Kosgey *et al*., 2006; Anaeto *et al*., 2009, Chah *et al*., 2013).

Aside from good housing, nutrition is the foundation of good health. Problems with nutrition result in energy and/or protein deficiency; thus making the animals susceptible to diseases, which they ordinarily would resist (Adegun *et al*., 2018). Feeding has been a very potent singular tool in manipulating livestock productivity as it constitutes a major constraint facing sheep and goat production in the tropics, both in terms of scarcity of grazing areas and effective utilization of pasture (Layansunya *et al*., 2005). Economic losses resulting from stunted growth, weakness, poor reproductive performance, or death in affected animals are unquantifiable (Lawal-Adebowale, 2012). He further stated that nutritional challenges facing the rearing of sheep and goats include some traditional laws restricting animal movements, lack of the adequate and right type of herbage, the poor plan for hay and silage utilization, and/or poor pasture utilization.

Production environments, the intensities, and purposes of production vary greatly within and across countries (Steinfeld *et al*., 2006). Ruminant production systems can vary from subsistence to intensive type, depending on locality, resource availability, infrastructure accessibility, food demand, and market potential (Wanapat *et al*., 2015). Animals raised under an extensive production system, though enjoy certain freedom, often face the challenge of nutritional deficiencies that automatically expose them to the risk of infection and diseases. Depending on climatic conditions and stocking density, the number of nutrients available can, for significant

periods, be less than the number of nutrients required by the animal. Thus, undernourishment is a potential threat to animal health in small ruminant production systems in developing countries (Lamidi and Ologbose, 2014). When the availability of nutrients is below the animal's needs, body reserves will be used in an attempt to maintain normal body functions in the animal. Malnutrition, and the associated lack of nutrients essential for the integrity of cells, can cause impairment of the immune system which can increase the risk of infectious diseases, resulting in an inflammatory response with associated pain and suffering (Keusch 2003).

From the foregoing, high standards of sanitation, good management, and adequate nutrition are essential to control diseases. Small ruminants in sub-Saharan Africa are plagued by a number of diseases and health challenges that are direct results of poor nutrition and type of production system, some of which are Peste des Petits Ruminants (PPR), pneumonia, diarrhea, abortions, and neonatal deaths (Anaeto *et al*., 2009). Pre-weaning mortality has been associated with the under-nutrition of breeding females while endo-parasites and ectoparasites also depress animal performance (Phengvichith and Ledin, 2007).

Some research had been conducted on small ruminants' production in Nigeria (Oladeji and Oyesola, 2008; Ajala *et al*., 2008; Hamzat and Amao, 2017). Most of these studies were undertaken in the guinea savanna and other southwestern states in Nigeria. Some intervention projects on small ruminants in southwestern Nigeria did not focus on production systems as it affects the health of the animals because there were not enough data to warrant valid assessments of the challenges posed by nutritional practices and management systems (Amole *et al*., 2014). This study is aimed to determine the nutritional practices and management systems as it affects the health of small ruminants reared by rural household farmers in Ekiti State. The specific objectives were to describe the demographic characteristics of the small ruminant farmers in the study area; ascertain the nutritional practices employed by small ruminant farmers in the study area; identify the health management practices of the small ruminant farmers in the study area; determine the significant effects of production systems on the health of small ruminant reared among the rural households; and determine the significant relationship between nutritional practices by the small ruminant farmers and the health of small ruminants reared by the farmers.

MATERIALS AND METHOD

Study area

This study was carried out in Ekiti State. Ekiti State was created on the 1st of October, 1996, carved out of the old Ondo State with its capital in Ado Ekiti. It is found in the South of Kwara and Kogi State, bounded on the east by Ondo State and on the west by Osun State. The state consists of sixteen (16) local governments and is further divided into three senatorial districts. The State experiences a typically tropical climate with two different seasons, raining season between April-October while the dry season is between November-March. The average annual rainfall ranges between 2000 mm - 2400 mm, the average annual temperature range from 20^0C - 27^0C, and 60% relative humidity. Ekiti State was purposively chosen for the study because it is an agrarian state and rural households in the state largely depend on agriculture and livestock production for their livelihood with exertion to rescue people from famine, poverty, and unemployment.

Sampling Procedure

All the rural households rearing small ruminant animals in Ekiti State constituted the population. A multi-stage sampling procedure was used to select rural households involved in small ruminant rearing in the study area. The stages include;

Stage 1: Random selection of the three (3) senatorial districts from the study area for adequate representation.

Stage 2: Random selection of two (2) Local Government Areas from the senatorial districts to make a total of six (6) LGAs.

Stage 3: Random selection of two (2) communities from the selected LGAs to make a total of twelve (12) communities.

Stage 4: Random selection of ten (10) respondents from the selected communities. Thus, a total number of 120 respondents were interviewed for this study.

Data Collection

Structured questionnaire was used as primary data to obtain relevant information from the respondents. Interview guides were used to elicit information from the respondents. Relevant information from annual reports, journals, textbooks, and the internet were also used as secondary sources of data.

Methods of Data Analysis

To achieve the set objectives of this study, the data collected were subjected to descriptive and inferential statistical analyses using SPSS. Descriptive statistics such as frequencies count,

percentage and mean were employed to describe the stated objectives. Chi-Square analysis and Pearson Product Moment Correlation (PPMC) were respectively used to examine the significant effects of nutritional practices and management systems on the health of small ruminants in the study area.

Descriptive analysis

Descriptive analysis was used to describe the demographic characteristics of the respondents, nutritional practices, management systems, health management practices, and the preventive measures employed in the area. Descriptive analysis was used to describe the current state of affairs and to capture the central tendencies as well as the degree of dispersal or variability.

Chi-Square Analysis

The Chi-Square analysis was used to examine the significant effect of nutritional practices on the health of small ruminants in the area.

$$X^2 = \frac{(O-E)^2}{E}$$

Where;

O_1 = the observed significant effect of nutritional practices on the health of small ruminants.

E_1 = the expected significant effect of production systems on the health of small ruminants.

Pearson Product Moment Correlation (PPMC)

This was used to analyze the significant relationship between the management systems practiced by the rural households and the health of the small ruminants in the area.

Mathematically, PPMC is represented as:

$$r = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{(N \sum X^2 - (\sum X)^2 (N \sum y^2 - (\sum y)^2)}}$$

Where: $\sum X$ = Summation of variables

$\sum Y$ = Summation Y

$\sum XY$ = Summation of XY

$\sum X^2$ = Square of summation of X

$\sum Y^2$ = Square of summation Y

N = Number of observations

$\sum XY$ = Summation of X multiply by Y

Y= Nutritional practices/ Production systems

X= Health of the small ruminants

Results and Discussion

Socio-Demographic Characteristics of Small Ruminant Farmers in the Study Area.

The result in table 1 shows that 33.33 percent of the respondents were between the age range of 41 – 50 years, while 28.33 percent of them were between the age range of 31 - 40 years and 16.66 percent were between the age range of 20 - 30 years. Also, 12.5 percent of the respondents were between the age range of 51 - 60 years, 5.83 percent of them were between the age range of 61 - 70 years and 3.33 percent of them were above 70 years of age. This shows that majority of the people involves in small ruminant rearing are below 50 years of age and this indicated that they are within their active age range. More than half of the respondents indicated that they were married (50.00%), divorced (25.00%), widow (20.83%) and widower (4.16%). This implies that responsible people are engaged in sheep and goat farming in the study area. About 41.66 percent of the respondents have a family size between 4 - 6 persons, while 30 percent of them have a family size between 1 - 3 persons. Also 16.66 and 11.66 percentages of the respondents have family sizes between 7 - 9 persons and above 9 persons respectively. This implies that responsible rural households were engaged in rearing of sheep and goat. About 37.50 percent of the respondents had primary school education, 33.33 percent of them had secondary school education while 16.66 percent of them had no formal education and just 12.5 percent of them had tertiary education. This implies that these farmers can appreciate and may easily embrace new technologies due to their level of education as corroborated with the findings of Abu-Shanab (2011).

About 33.34 percent of the respondents have between 21 – 40 years of experience in ruminant rearing, while 29.17 percent of them have between 31 – 40 years of experience and 16.66 percent of them have between 11 - 20 years of experience.

The respondents in the study area indicated that 66.66 percent of them did not belong to any social association while the remaining 33.33 percent of them belongs to one or more social association. Half of the (50.00%) of the respondents were predominantly farmer, while 37.50 percent of them were traders and 12.50 percent of them were civil servants. Less than half (43.33%) of the respondents have between 1 - 15 herds, while 31.66 percent of them have between 15 - 30 herds, and 25.00 percent have more than 30 herds. About 37.50 percent of the

small ruminant respondents indicated that they realized less than ₦31,000.00, while 29.16 percent of them realized between ₦31,000.00 – ₦50,000.00; 20.83 percent of them realized between ₦51,000.00 – ₦80,000.00, and 12.50 percent of them realized more than ₦80,000.00.

Table 1. Socio-Demographic Characteristics of the Respondents

Variables	Frequency	Percentage (%)
Age (Years)		
Below 30	20	16.67
31 – 40	34	28.33
41 – 50	40	33.34
51 – 60	15	12.50
61 – 70	7	5.83
Above 70	4	3.33
Marital Status		
Single	0	0.00
Married	60	50.00
Divorced	30	25.00
Widow	25	20.83
Widower	5	4.17
Family Size		
1 – 3	36	30.00
4 – 6	50	41.67
7 – 9	20	16.66
Above 9	14	11.67
Educational Qualification		
No Formal Education	20	16.66
Primary Education	45	37.50
Secondary Education	40	33.34
Tertiary Education	15	12.50
Years of Experience		
1 – 10	17	14.17

11 – 20	20	16.66
21 – 30	40	33.34
31 – 40	35	29.17
41 – 50	8	6.66
Membership of Social Association		
Yes	40	33.34
No	80	66.66
Primary Occupation		
Farming	60	50.00
Trading	45	37.50
Civil Servant	15	12.50
Herd Size		
1 – 15	52	43.33
16 – 30	38	31.67
Above 30	30	25.00
Monthly Income (₦)		
Less than 31,000.00	45	37.50
31,000.00 – 50,000.00	35	29.17
51,000.00 – 80,000.00	25	20.83
Above 80,000.00	15	12.50

Source: Field survey, 2022.

Nutritional Practices Employed by Small Ruminant Farmers in the Study Area.

The results in Table 2 shows the nutritional practices employed by the respondents. Half of them (50.00%) indicated that they used both scavenging and supplementation as modes of feeding their animals, while 25.00 percent employed only scavenging and the remaining 25.00 percent used only supplementation. Half (50.00%) of the respondents indicated that they give supplements to their animals during the dry season only, while 31.25 percent of them gives supplement to their animals at two-days interval and just 18.75 percent of them gives supplements to their animals on a daily basis. Yam and cassava peels were the main supplement given to the animals as indicated by 41.66 percent of the respondents, while 25.00 percent of them indicated that household waste, grains, cassava and yam peels were commonly given to the animals, and only 12.50 percent of them givens grains and yam peels to their animals. About

37.50 percent of the respondents indicated that they got these supplement as gift from friends and neighbours, while 25.00 percent of them got theirs by scavenge and another 25.00 percent of them got it via gift and only 12.50 percent purchased the supplements. Most (62.50%) of the respondents who fed their animals with supplements opined that they do so for good health and 25.00 percent of them indicated that they fed their animals with supplement for appropriate growth. Only 12.50 percent of them gives supplements to their animals just to reduce cost of production and to avoid theft. Half (50.00%) of the respondents indicated that they use to feed the animals with the supplements by pouring it on the floor of their pen, while 25.00 percent of them uses big bowls, 10.00 percent of them uses wooden pans and 10.00 percent of them uses trays.

Table 2. Nutritional Practices Employed by the Respondents

Variables	Responses	Frequency	Percentage (%)
Mode of Feeding Animals	Scavenging	30	25.00
	Supplementation	30	25.00
	Both	60	50.00
Do you give supplements to your animals	Yes	40	33.34
	No	80	66.66
How often do you give the supplement	Daily	15	18.75
	Two Days Interval	25	31.25
	Dry Season	40	50.00
Types of Supplement	Cassava/Yam peels	30	37.50
	Grains/Yam peels	10	12.50
	Households waste	20	25.00
	Cassava/Yam peels and Grains	20	25.00
Source of Supplement	Purchase	10	12.50
	Gift	20	25.00
	Scavenge	20	25.00
	Gift, purchase and scavenge	30	37.50
Reasons for giving Supplement	For appropriate growth	20	25.00
	Fast growth and good health	50	62.50
	To reduce expenses	10	12.50
How is the feed served?	Using big bowls	20	25.00
	Wooden pans	12	15.00
	Using trays	8	10.00
	On the ground	40	50.00

Source: Field survey, 2022.

Rearing practices and Management System Employed by Small Ruminant Farmers

The result in table 3 shows the rearing practices and management system employed the respondents in the study area. Less than half (41.66%) of the respondents indicated that they reared both goats and sheep, while 33.33 percent of them were only rearing goat and 25.00 percent of them were into sheep rearing alone. About 16.66 percent of the respondents have a mixture of both animals in the ratio of 60 goats and 40 sheep; while another 16.66 percent of them have a mixture 40 goats and 60 sheep, and 8.33 percent of them indicated that they have a mixture of 50 sheep and 50 goat ratio. About 33.33 percent of the respondents indicated that the reason for the specific species is because of the initial cost of purchase of the foundation stock, and for easy adaptability to environmental conditions; 16.66 percent of them also indicated that customers' demand instigated their choice of species and 8.33 percent of them indicated their choice of specie was influence by minimize risk and proliferation traits of such species.

More than half (58.34%) of the respondents indicated that they raised their herds for less than a year but more than six months before sales, 16.66 percent of them also indicated that they raised their herds for about two years before sales; while 16.66 percent of them raised their herds for more than three years before sales and the remaining 8.33 percent of them raised their herds for three years before sales. All the respondents interviewed recorded mortality of small ruminants due to disease outbreak as indicated by half (50.00%) of them, while 33.33 percent of them indicated that it was caused by accident and 16.66 percent of them indicated that it happened as a result of stillbirth.

Less than half (41.66%) of the respondents indicated they sell their animals at the city markets, while 33.33 percent sells at the local markets and 25.00 percent of them sells in the neighbourhoods. Half (50.00%) of the respondents indicated that they sell their animals as rams and bucks, while 41.66 percent of them indicated that they sell theirs as lambs and kids and the remaining 8.33 percent sells at any time, at any stage based on market demand and availability. Most (83.33%) of the respondents indicated that they did not derive any benefit or intervention from government and Non-Governmental Organizations (NGOs) for rearing ruminants while 16.66 percent of them indicated that they benefited from such interventions through medications.

Table 3. Rearing Practices and Management System of Small Ruminants Farmers

Variables	Responses	Frequency	Percentage (%)

The specie of small ruminants	Goats only	40	33.33
	Goat and Sheep	50	41.67
	Sheep only	30	25.00
Mixture Ratio	40 – 60	20	16.66
	50 - 50	10	8.34
	60 – 40	20	16.66
Reason for the specific specie	Cost of purchase of kid/lamb	40	33.33
	Adapt easily to environmental conditions	40	33.33
	Customers demand	20	16.66
	Minimum risk	10	8.34
	Proliferation	10	8.34
How long do you rear your animals before disposal.	Six months	20	16.66
	Less than a year	50	41.68
	Two years	20	16.66
	Three years	10	8.34
	More than three years	20	16.66
Do you record mortality	Yes	120	100.00
	No	0	0.00
How often do you have mortality	Every month	80	66.66
	Every quarter	30	25.00
	Rarely	10	8.34
Causes of mortality	Accident	40	33.33
	Disease outbreak	60	50.00
	Stillbirth	20	16.66
How do you market your animals	Local market	40	33.33
	City market	50	41.67

	Neighborhood	30	25.00
How do you sell your animals	Lambs or kids	50	41.67
	Rams or bucks	60	50.00
	Others	10	8.33
Any intervention from the government or NGO's for rearing ruminants	Yes	20	16.67
	No	100	83.33
If yes, what type of intervention	Concentrate/feed ingredient	0	0.00
	Medication	20	100.00
	Feed and medication	0	0.00

Source: Field survey, 2022.

Health Management Practices of Small Ruminant Animals in the Study Area.

The result in Table 4 shows the health management practices of small ruminant among farmers in the study area. More than half (58.34%) of the respondents indicated that diarrhea is the most prevalent disease affecting small ruminant animals in the study area, 25.00 percent of them also indicated that cold or catarrh is another common disease with their herds in the study area, while 8.33 percent of the respondents indicated bloat is another disease affecting their animals. Thus, diarrhoea was the prevalent disease affecting small ruminant animals in the area and this affirms the findings of Omoike (2006) and Dipeolu (2010).

More than half (58.33%) of the respondents indicated that they were able to identified the various types of diseases affecting their herds due to their personal experience over the time, while 41.66 percent indicated they were able to identify various diseases through consultation of veterinary experts. About 58.33 percent of the respondents indicated that they managed diseases outbreaks or infestations by self-medication while 41.66 percent of them indicated that they did

not consultation with veterinary experts. More than half (58.34%) of the respondents stated that they identified the specific diseases or infestations by personal observation due to their rearing experience over the year. About 57.14 percent of the respondents who did self-medication, used flagyl and tetracycline for treatment of disease outbreak within the ruminant animals, while 42.86 percent claimed to have used chloramphenicol. All the respondents who were involved in self-medication got the drugs they used from medicine stores. Most (75.00%) of the respondents said that the preventive measures used to mitigate the diseases outbreak were by keeping the surroundings clean while 25.00 percent of them indicated isolation of affected animals.

Table 4. Health management practices of small ruminant farmers

Variables	Responses	Frequency	Percentage (%)
Prevalent diseases affecting your animals	Diarrhea	70	58.34
	Bloat	10	8.33
	Catarrh	10	8.33
	Others	30	25.00
How do you identify the various types of diseases	Consultation of veterinary expert	50	41.66
	Personal experience	70	58.34
How do you manage the disease's outbreak or infestation	Self-medication	70	58.34
	Consultation of veterinary expert	50	41.66
If self-medication, how do you identify the specific disease or infestation	Observation	70	58.34
If self-medication, what kind of drugs is administered to the animals	Flagyl and tetracycline	40	33.33
	Chloramphenicol	30	25.00
If self-medication, what is the source of drugs	Medicine store	70	58.34
Preventive measures used to mitigate the outbreak of the disease	Keeping the surroundings clean	90	75.00
	Isolation of affected animals	30	25.00

Source: Field survey, 2022.

Chi-square analysis of the effect of nutritional practices on health of small ruminants reared in Ekiti State

The result in Table 5 revealed the significant relationship between the effect of nutritional practices on the health of small ruminants. Note, reject the null hypothesis if the p-value is less than the significant value (0.05). Since the p-value = 0.051 which is greater than the significant value (0.05), the null hypothesis **a = 0.05** is to be accepted and concluded at a 5% level of significance that affects the nutritional practices on the health of small ruminants in the area was significant.

Table 5: Chi-Square Analysis of the effect of nutritional practices on health of small ruminants reared

	Value	Do	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.817[a]	1	.051		
Continuity Correction	2.424	1	.120		
Likelihood Ratio	6.141	1	.013		
Fisher's Exact Test				.057	.047
Linear-by-Linear Association	3.784	1	.052		
N of Valid Cases	120				

The relationship between the management system practiced by the rural households and the health of the small ruminants in the study area.

The results revealed that r_{cal}= 0.927* which is significant at 0.05. This implies that there is a significant relationship between the management system practiced by the rural households and the health of the small ruminants in the area.

Table 6: Relationship between the management system practiced and the health of small ruminants reared in Ekiti State.

	N	Mean	Std. Deviation	r_{cal}	Sig.
Management system practiced by the rural households	120	20.24	1.825	0.927*	0.000

The health of the small ruminants in the area.	120	30.63	2.953		

P< 0.05 (Significant Result)

CONCLUSION

It is concluded that goat and sheep were the most preferred small ruminants reared by the rural households in Ekiti State, due to customer demands and easy environmental adaptation capacity. Most of the respondents got their animals by purchase from neighbourhoods. Disease outbreak, accident and stillbirth are the most common factors responsible for mortality experienced by the farmers, while diarrhea is the prevalent disease experienced by them. More than half of them practice self-medication, while very few of them received intervention from the government and they offer supplementary feeding to their animals during the dry season. There is a significant relationship between nutritional practices and the health system of the small ruminants. Also, there is a significant correlation between production systems and the health of small ruminants. It is therefore recommended that there should be government intervention for feed supplements, drugs, veterinary services, training or seminars for small ruminant keepers in the area.

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