

**RECORD KEEPING IN MICRO-LIVESTOCK FARM MANAGEMENT IN SOUTHWEST NIGERIA**

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**ABSTRACT**

Re-emerging micro-livestock diseases is a threat to food security among low-income earners in Africa and can be significantly curtailed with efficient farm record keeping. However, several factors mitigate comprehensible record keeping in micro livestock production in southwest Nigeria. This study identified factors associated with record keeping in biosecurity measures among micro-livestock farmers in Southwest Nigeria. This study sampled 81 grass-cutter and rabbit farmers in Ekiti, Oyo and Ogun States through a multi-stage sampling procedure. Data on personal characteristics of farmers, knowledge, constraints, and regularity of record keeping were obtained with the use of structured questionnaire. Results were presented in tables and charts while relationships among variables were determined with the use of Chi square. Total mean age of respondents was 45 years. Respondents were able to communicate in English (95.1%) and Yoruba (82.7%) respectively. Knowledge of pen litter disposal record was highest (74.1%) among farmers. Record on feed production and feeding ( $\bar{x}=3.9$ ) ranked highest while record of infection was lowest ( $\bar{x}=2.33$ ) in micro-livestock farm management. Size of flock ( $\chi^2=9.25$ ;  $p < 0.05$ ), proficiencies in English ( $\chi^2=8.76$ ;  $p < 0.05$ ) were significant variables in record keeping for biosecurity in micro-livestock farm management. The study recommends regular training on simple record keeping procedures that is convenient for both literate and non-literate livestock farmers in ensuring biosecurity.

**Keyword:** Micro-livestock, record-keeping, farm management, biosecurity,

**INTRODUCTION**

Prevalence of infectious animal diseases has posed a key challenge for global livestock production (Kompas, Nguyen and Ha, 2015). Biosecurity is a comprehensive infections management practices, and has a serious implication for farmers due to its dimensions of effectiveness (Mehmet, 2018). Occurrence and spread of animal diseases can be because of intrinsic weaknesses in management practices and extrinsic factors along the livestock production value chain and the environment (Oladele, Kolawole and Antwi, 2013). The increasing threat from mostly re-emerging livestock diseases in the past few years is of major concern to livestock protein availability especially in low-income households. According to Oladele *et al.*, (2013) the re-occurring decimals of livestock disease outbreak effect is summarized in the physical, economic, social, health and psychological devastating impacts it has on immediate stakeholders in the livestock industry and the larger population as well. Kelly (2021) affirmed that the re-emerging, mostly zoonotic infectious diseases in livestock and human population is the consequence of demographic shifts in populations, climate change and food availability among others. Whatever is the causative factor, the increasing cases of protein malnutrition and decreasing food availability in households is a major concern for a sustainable development. A major source of protein in most households is animal protein which often are sourced from backyard livestock rearing. Micro livestock production is popular for the reason of food security among low-income households in Nigeria (Ogunniyi, Oluwafemi, and Adepoju, 2015) and will alleviate protein deficiency in most of the population in sub-saharan Africa (Asan 2013).

Micro-livestock is a term coined for species of livestock that are inherently small. These miniature animals are seldom considered in the broad picture of livestock development, but they seem to have a promising future, especially in developing nations or wherever land is scarce. Micro-livestock has been described as an asset in low-income households (Klapwijk, Schut, Van Asten, Vanlauwe, Giller, and Descheemaeker, 2020). Increased cases of food scarcity and obvious shortage in protein diet in Africa because of high vulnerability to climate change (Thompson, Berrang-Ford, and Ford, 2010), religious and ethnic crises, increase in human population has necessitated the rearing of micro-livestock by farmers. The numerous advantages of micro-livestock which include rapid reproduction rate which guarantee a readily acceptable meat on short time basis, relatively smaller pen size and little capital investment are a lot of encouragement to small holder farmers. These attributes make micro-livestock a significant contributory factor to food security in Africa households (Ogunniyi *et al.*, 2015; Ali and Khan, 2013).

Micro livestock production has contributed significantly to animal diet and household income in Nigeria (Popoola, Banjoko, Kehinde, Olupona, Fayemiwo, Durotoye, Harry, and Omole, (2020). Raising of micro livestock by rural households is becoming popular due to the fact that the households have realized the need to diversify their source of income, thereby reducing the risk involved in depending on crop production as the main source of income. Such micro-livestock widely bred in Africa include grass-cutters, snails, rabbits, quail among others (Asan, 2013). These have been used as a replacement to conventional animal protein like



beef, pork and goat meat due to economic down-turn and increased awareness of importance (Ogunniyi *et al.*, 2015).

The most common of the micro livestock in southwest Nigeria is the grass cutter and rabbit production (Popoola *et al.*, 2010) and are not left out in the incidences of emerging and recurring diseases such as cholera, diarrhea and mycotoxicosis which are caused by poor farm management. Such identified diseases affecting the micro livestock are posing a significant threat to its continued production especially among low-income household necessitating an efficient management system. Corroborating this opinion, Hernández-Jover, Gilmour, Schembri, Sysak, Holyoake, and Beilin, (2012) concluded that understanding of disease is an essential component of passive surveillance. Factors such as knowledge, beliefs, attitudes, and intentions influence individual's decision making for curtailing diseases among intending micro-livestock farmers. This position implies the high contributions of attitudinal issues and knowledge of effective livestock management is key to controlling diseases outbreak in livestock farms. Such management system includes record keeping. In Nigeria, most farmers do not attach a great deal of importance to record keeping in their farming operations, and only few literate farmers take pain to partially take record (Dudafa, 2013).

Regular monitoring of flock health and activities contributes enormously to the sustainability of flock with a low disease incidence (Alalade, Olorunfemi, Olaoye, Ladipo, and Yusuf, 2018). Grass-cutter and rabbit farming are profitable ventures in both rural and urban areas in southwest Nigeria. There has been concerted efforts by research institutes such as Institute of Agricultural Research and Training (IAR&T) at creating awareness on record keeping and biosecurity measures for livestock management in southwest Nigeria. However, how much do micro-livestock farmers know about biosecurity, what are possible challenges to biosecurity record keeping in grass cutter and rabbit farming and how does these affect record keeping in farm management biosecurity measures? This study hypothesized a relationship in the educational status, constraints faced and frequency of record keeping in micro-livestock farm management. Thus, concluding on factors that predisposes micro-livestock to emerging and re-emerging diseases.

Objectives of the study are;

1. Identify the personal characteristics of micro-livestock farmers
2. Determine the knowledge of biosecurity measures among micro-livestock farmers
3. Investigate the frequency of record keeping in micro-livestock farms
4. Identify major challenge to record keeping among micro-livestock farmers

## METHODOLOGY

Multistage sampling procedure was used to identify grass cutter and rabbit farmers in the zone. The first stage involves a random selection of three states (Ogun, Oyo and Ekiti States) in Southwest Nigeria. The second stage is the purposive selection of two peri-urban Local Government Areas (LGAs) in each state, making a total of Six LGAs. The third stage involves a snowballing method to locate grass cutter and rabbit farmers in the sampled LGA. The study sampled all the contacted farmers. In all, 81 farmers comprising of 24, 35 and 22 micro-livestock farmers in Ogun, Oyo and Ekiti States respectively were sampled. Data on respondent's personal characteristics, knowledge of biosecurity measures and challenges of record keeping were collected with the use of questionnaire/interview schedule. The dependent variable is the regularity of keeping record for biosecurity purpose in micro-livestock farm management. This was categorized into production, disease control and disposal records and was measured on a 5-point scale of never, daily, weekly, monthly, and yearly basis. Data collected were summarized using percentages, frequencies and means and analyzed using Chi square and Pearson Product Moment Correlation (PPMC) in SPSS version 20.

## RESULTS AND DISCUSSIONS

### Personal characteristics

The personal characteristics of micro livestock farmers in Table 1 (a and b) shows that the mean age of micro livestock farmers in Southwest Nigeria was 45 years  $\pm$  10.4. There were farmers of less than age 35 years (22.2%) old and 16.0% were above 56 years old in the production of micro livestock in Southwest Nigeria. This result suggest that micro livestock production can be managed by any matured adult. It is possible to start in a small scale at an early age and expand in the process of time. The study found both male (55.6%) and female (44.4%) farmers in the micro-livestock production. Most respondents (72.8%) were married, 8.6% were single while 16.0% were widowed. Average household size of respondents was 5 people per household. Micro-livestock is not prohibited by any of the three religions in the study areas as all types of religion, Christianity (64.2%), Islam (28.4%) and traditional (7.4%) engaged in the production. Most respondents (82.7% and 95.1%) indicated high proficiencies in Yoruba and English Languages respectively. This implies a distinct ability to seek and receive relevant agricultural information in both languages. This is justified by the result of the educational level which shows that majority (64.2%) had university education at both undergraduate and post graduate level. Most respondents (69.2%) got the foundation stock from either open market or from friends and family. Most (56.8%) respondents were into small scale micro-livestock production

(less than 50 animals) with total average stock size of 76 animals. This implies that most farmers are either still experimenting the production, are

constrained by one factor of production or have unfavourable opinion about the production.

**Table 1a: Description of respondents' personal characteristics**

Variables	Categories	Frequencies	Percentages
<b>Sex</b>	Female	36	44.4
	Male	45	55.6
<b>Age (years)</b> Mean age 45years±10.4	< 35	18	22.2
	36 – 45	24	29.6
	46 – 55	26	32.1
	Above 56 years	13	16.0
<b>Education attainment</b>	No education	5	6.2
	Primary	6	7.4
	Secondary	18	22.2
	University degree	42	51.9
	Post university degree	10	12.3
<b>Marital status</b>	Single	7	8.6
	Married	59	72.8
	Divorced	2	2.5
	Widowed	13	16.0
<b>Religion</b>	Christianity	52	64.2
	Islam	23	28.4
	Traditional	6	7.4

**Table 1b: Description of respondents' personal characteristics**

Variables	Categories	Frequencies	Percentages	
Ability to read and write Yoruba	Yes	67	82.7	
	No	12	14.8	
Ability to read and write English	Yes	77	95.1	
	No	4	4.9	
Household size (In numbers) Mean household size 5 people ± 2.7	1 – 5	48	59.3	
	6 – 10	26	32.1	
	Above 10	7	8.6	
	Size of flock	≤ 50	46	56.8
	Mean size is 76 ± 73.13	51 – 100	12	14.8
101 – 150		16	19.8	
151 – 200		2	2.5	
Above 200		5	6.2	
Attended Biosecurity training	Yes	25	30.9	
	No	56	69.1	
Awareness of biosecurity measures	Yes	46	56.8	
	No	35	43.2	

**Knowledge of record keeping among micro-livestock farmers**

Table 2 shows that the knowledge of pen litter used and disposed was highest (74.1%) among the farmers, record of footbath usage and maintenance was only known by 43.2% of the respondents while knowledge of general record keeping was indicated by 72.8%. High knowledge is expected from the respondents that had earlier indicated clear understanding of English and Yoruba languages (Table 1).

Knowledge is introduced by understanding of communication language thus, it is possible the respondents have had opportunities for trainings/workshops/lectures (as indicated in Table

1) or through other exposures like social media outlets on relevant micro-livestock biosecurity information that enhances their knowledge of salient issues in micro livestock production. However, lack of proper knowledge of 56.8%, 47.7% and 42.0% of the respondents on the use of footbath, of the need for proper and prescribed medication and approved sanitation of animals calls for concern. Factors that predispose livestock to diseases are highlighted in Minna-Eyovwunu, Akarue, and Emorere, (2019) as including proper medications and vaccination of animals. All these factors could have culminated into the result of the findings. Categorization of micro-livestock farmers according to mean responses shows that 53.1% had a high knowledge



of biosecurity measures. This high knowledge implies that many of the farmers already have information on biosecurity issues in their production

process. However, ability to convert this knowledge to a disease-free pen depends on other factors that are considered in this research.

**Table 2: Knowledge of record keeping among micro livestock farmers**

Record keeping issues (negative statements rephrased)	Yes	No
Record of vaccination of healthy livestock is necessary at regular interval	67.9	32.1
Prescribed medication record is to maintain healthy pen	54.3	47.7
Changing of liters should be at regular time and recorded	67.9	32.1
Cull (remove) chronically infected animals is done to avoid pen infestation	61.7	38.3
Isolating sick animals is done immediately after diagnosis	70.4	29.6
Record of pen liter used per production in biosecurity measure	74.1	25.9
Footbath are for all scale micro-livestock production	43.2	56.8
Farm cleanliness not necessarily for external auditing	58.0	42.0
Record keeping for all production categories is good for a healthy farm	72.8	27.2
Record keeping should be discussed with every worker	61.7	38.3
Knowledge Category	Percentages	Mean SD
High (10.0 – 13.80)	53.1	13.80±2.5
Knowledge Category	46.9	

**Respondents’ frequency of record keeping in micro-livestock production**

Table 3 shows the type of farm record keeping by respondents. The records are categorised into three (3) sub-set including production record, disease control record and disposal record (Sales/gift/mortality/consumption) for clarity of issues presented. The table shows that the highest frequency (43.2%) for any record kept by the micro livestock farmers was found in the disposal record category (monthly record of the numbers of animals sold) while the least (2.25% and 3.37%) records kept were daily livestock stocking and daily medication records respectively. The respondents were mainly into small scale production thus, daily activities such as medications and stocking might not be possible or might not be taken seriously. The table further shows that 32.1%, 28.4% and 28.4% of respondents never took any sanitation practices, infection and curling records respectively. These neglected records are relevant in micro-livestock biosecurity record keeping as it reflects little or no knowledge

of disease control in micro-livestock management among the respondents (Minna-Eyovwunu *et al*, 2019). The mean responses for each of the record keeping items showed the highest mean for feeds purchasing and production record ( $\bar{x}$ = 3.19) followed by micro livestock feeding record ( $\bar{x}$ = 2.92). These two are under production record category. On the other hand, the least mean were type of infections ( $\bar{x}$ = 2.33) and sanitation practices record ( $\bar{x}$ = 2.39) both under disease control record. These results suggest that record keeping for biosecurity is not of utmost importance to the micro-livestock farmers. Thus, issues such as prevention of re-emerging diseases and new diseases/infections is not regarded as it should be. Asan (2013) opined that livestock are carefully tendered based on purpose of production. In line with this, most of the respondents might be keeping the livestock as a secondary livelihood option thus not requiring much investment of time and energy to ensure biosecurity.

**Table 3: Distribution of micro livestock farmers according to frequency of record keeping**

Management type	Daily	Weekly	Monthly	Yearly	Never	Mean
<b>Production record</b>						
Livestock stocking	2.5	13.6	43.2	22.2	18.5	2.59
Feeds purchases/production	22.2	17.3	30.9	16.0	13.6	3.19
Livestock feeding	6.2	29.6	30.9	17.3	16.0	2.92
<b>Disease control record</b>						
Medications	3.7	27.2	29.6	19.8	19.8	2.75
Sick or culled livestock	7.4	18.5	27.2	18.5	28.4	2.58
Type of infections	9.9	6.2	19.8	35.8	28.4	2.33
Sanitation practices	12.3	9.9	14.8	30.9	32.1	2.39
Mortality	12.3	9.9	28.4	28.4	21.0	2.64
<b>Disposal record</b>						
Number of animals sold	12.3	13.6	43.2	9.9	21.0	2.86
Number of animals slaughtered	9.9	13.6	27.2	23.5	25.9	2.58
Number of animals gifted	11.1	4.9	38.3	19.8	25.9	2.55

### Challenges of record keeping among micro livestock farmers

Table 4 shows that constraint that was least severe by most (64.2%) respondents was bulkiness of record books. No trust in the feed labelling was only indicated by 38.3% of respondents as moderate severe while 30.9% (Most severe) were already weary of keeping biosecurity records. The mean item by item response of challenges faced by micro-livestock farmers shows weariness of record keeping ( $\bar{x}$ = 1.85) as the most severe challenge to biosecurity record keeping by the respondents. This was followed by lack of knowledge (not aware of the importance of record keeping as a biosecurity measure -  $\bar{x}$ = 1.78) and unscheduled medication

periods ( $\bar{x}$ = 1.76). However, the least ranked constraint was the bulkiness of record book. This results suggest the familiarization of respondents with books of large sizes and volumes thus record book was not posing any meaningful challenge to keeping biosecurity record. Furthermore, many factors could culminate to weariness of farmers in micro-livestock biosecurity record keeping. Such factors could be no formal requirement of previous records or it has no effect in curtailing new diseases. Whichever factor that contributed to the weariness in micro-livestock record keeping can be addressed by necessary biosecurity campaigns.

**Table 4: Challenges of Record keeping in micro-livestock management**

Issues of record keeping	Less Severe	More severe	Most severe	Mean	Rank
Weariness of record keeping	45.7	23.5	30.9	1.85	1 <sup>st</sup>
Not aware of the importance	44.4	32.1	23.4	1.78	2 <sup>nd</sup>
Medication at unplanned period	50.6	22.2	27.2	1.76	3 <sup>rd</sup>
Medication not regulated	50.6	24.7	24.7	1.74	4 <sup>th</sup>
Low literacy level	45.7	35.8	18.5	1.72	5 <sup>th</sup>
Lack of information record	54.3	24.7	21.0	1.67	6 <sup>th</sup>
Diet composition not in feed labelling	49.4	38.3	12.3	1.63	7 <sup>th</sup>
Livestock too many for record	60.5	18.5	21.0	1.60	8 <sup>th</sup>
Pilfering/ straying	58.0	33.3	8.6	1.51	9 <sup>th</sup>
Record books too bulky to keep	64.2	23.5	12.3	1.48	10 <sup>th</sup>

### Relationships of variables with the frequency of record keeping

The test of association in Table 5(a) shows a significant relationship between frequency of record keeping and other variables such as the size of flock ( $r= 0.316$ ;  $p < 0.005$ ) and knowledge of record keeping ( $r= 0.429$ ;  $p < 0.005$ ). The result suggests that the more the number of micro livestock in farm, the higher the frequency of record keeping. This implies that farmers with large size of farm are more careful to keep records of farm activities than the small-scale farmers. Ishola, Kadiri, and Aminu (2020) noted the importance of knowledge in maintaining production record.

Similarly, in Table 5(b) for the non-parametric tool, variables like the ability to communicate in English ( $\chi = 8.463$ ;  $p < 0.005$ ), the type of micro-livestock ( $\chi = 4.315$ ;  $p < 0.005$ ) and exposure to training on biosecurity measures in

livestock production ( $\chi = 9.767$ ;  $p < 0.005$ ) were significant variables to record keeping. Furthermore, the significance of abilities to read and write English language to record keeping for biosecurity is an indication that extension messages on biosecurity are disseminated in English language not wholly accessible to non-English literate. Ogunjimi *et al*, (2012) and Ishola *et al*, (2020) identified formal education training as one of the factors that influences production of micro-livestock.

In line with these findings, it could be affirmed that micro-livestock farmers that keep records are literate and mostly produce in a relatively medium to large scale. These results amplify the relevance of knowledge to record keeping in micro-livestock production. Such knowledge can be acquired through exposure to formal curriculum education or attendance of regular training.

**Table 5(a): Correlation of variables with frequency of record keeping in micro-livestock production**

Variable	N	r	P
Age	81	0.081	0.474
Size of flock	81	0.316	0.043*
Challenges of record keeping	81	-0.158	0.158
Household size	81	0.052	0.642
Knowledge of record keeping	81	0.429	0.000*



**Table 5(b): Test of associations (Chi-square) between variables and the frequency of record keeping in micro-livestock production**

Variable	df	$\chi$	P
Sex	1	0.159	0.823
Exposure to training	1	3.761	0.045*
Communicating English	1	4.761	0.048*
Communicating Yoruba	1	7.067	0.029*
Religion	2	3.176	0.204
Micro-livestock type	1	4.315	0.032*
Education status	4	8.795	0.066

## CONCLUSION AND RECOMMENDATIONS

This study found that micro-livestock farmers in southwest Nigeria had above secondary school education and had attended relevant training on biosecurity. Knowledge of biosecurity was high and the record of medications was the highest record kept by farmers. Micro livestock farmers kept more of production record than disease control records. Majority were into small scale production but are weary of record keeping. Awareness of biosecurity measure, previous exposure to training, challenges to record keeping and Knowledge were major factors that influenced frequencies of record keeping among micro-livestock farmers. This study advocates better campaign strategy from research institutes and concerned institutions on record keeping in micro livestock production to improve measures of biosecurity. Extension information on biosecurity measures should target all categories of farmers; either literate and non-literate, and specifically, small scale micro livestock farmers should be trained on record keeping as a measure of biosecurity.

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