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Pig Health Management Strategies among Farmers in Enugu State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author JMC designed the study, performed the statistical analysis and wrote the protocol. Author CEN wrote the first draft of the manuscript. Author ANA managed the analyses of the study. Author MNU managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aims: Pigs have been described as one of the most prolific and fast growing livestock that can convert food waste to valuable products. However, diseases pose significant challenge to efficient management and profitability of pig production. The study assessed pig health management strategies among farmers in Enugu State, Nigeria.
Study Design: Survey.
Place and Duration of Study: The study was carried out in Enugu State, Nigeria between January-June 2015.
Methodology: Two agricultural zones (Nsukka and Udi) out of six were purposively selected for the study due to high pig production in the zones. Structured interview schedule was used to collect data from 96 farmers. Data was presented using mean scores and percentage.
Results: Mange (M=2.77), trypanosomosis (M=2.33) and agalacia (mastitis) (M=2.21) were the major disease conditions in the study area. Disease preventive/biosecurity measures practiced by respondents include: constant observation of animals (M=0.90) and good health hygiene by staff

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(M=0.89). Farmers however poorly practice washing of hands thoroughly before and after visiting the pens (M=0.11), use of disinfectant in cleaning the pen among others. The indigenous method used by respondents in the treatment of diseases include: used of red oil (15%) and used dregs of palm oil preparation (13%) for the treatment of toxins/poisonings. About 4% used *okwete* (*Costus afer*) leaves. For the treatment of mastitis, 4.1% of the respondents used *eriri agwo-monkey rope (Parsonia straminea)* leaves while 6.1% and 1.0% used *Ogwu obara* leaves and *okwete* (*Costus afer*) leaves for the treatment of piglet anaemia.

Conclusions: Although farmers use preventive measures in their farms and also attempted to treat some of these diseases, efforts should be made by extension to further educate farmers on the need to improve on the use of disease control measures like the use of disinfectant in cleaning the pen and the provision of foot deep.

Keywords: Disease; prevention; biosecurity measures; indigenous treatment; farmers.

1. INTRODUCTION

Nigeria has the second largest population of pigs in Africa which accounts for approximately 4.45 percent of the total meat supply in the country [1]. Swine production plays a vital role in food security, poverty eradication, and employment generation in Nigeria [2]. Pigs contribute a lot to the livestock sector of the Nigeria economy. A livestock farmer in Lagos State confirmed that returns on investments in pig farming are high compared to other sources of animal protein [3]. It has been pointed out that piglets cost up to 3000 (15 USD) Naira [4], and a grown pig can sell for as much as 45,000 Naira (225 USD) depending on the weight and breed [5]. However, Nigeria imports live animals and animal products to the tune of 118 million Naira (737 500 USD) annually. This indicates a serious shortage of meat and other animal products, which leads to malnutrition [6]. It has been reported that the country imports 30% of the animals slaughtered for consumption annually and currently consumes only about 7 grams of animal protein a day against the required 35 grams [7], which implies the country must produce three times more animals than currently exist [8].

Pig represents one of the fastest ways of increasing animal protein [9]. Therefore, increased pig production in Enugu State where majority are Christians and therefore not forbidden from eating pork can bridge the gap between the current level of animal protein consumption and the recommended minimum level of animal protein required for healthy living. This assertion is attributed to the short gestation period and high level of fecundity and prolificacy of pig [10] coupled with potential for high income generation and high profits [11]. They excel above other red meat animals such as cattle, sheep and goat in converting feed to flesh. It has been noted that in Nsukka Local Government Area of Enugu State, pig is well valued because it is one of the requirements in marriages and burial rites; many other feast and festivals have special provision for pork [12].

Despite these advantages in pig production, over the years, productivity has been on the decline [13]. This may be because diseases and poor herd-health management practices pose significant challenge to efficient management and profitability of pig production [14]. Low productivity of pigs in Southeast Nigeria (in which Enugu is one of the states) has been attributed to high piglet mortality, low growth rate due to poor feed conversion ratio, and diseases such as helminthosis, coccidiosis, brucellosis, ecto--parasitism, African swine fever, and trypano-somiasis [15]. Hence, poor health management strategies may be the most limiting factors to improve production, management, marketing and supply of pork in the country.

For extension education to be effective in the study area on pig health management, information on how farmers manage pig health has to be provided. The study therefore sought to access pig health management strategies among farmers in Enugu State, Nigeria. Specifically the study ascertains pig disease prevalent in the study area; and identified treatment (indigenous and orthodox) options use by farmers.

2. MATERIALS AND METHODS

The study was conducted in Enugu State, Nigeria. The State is one of the thirty six (36) states in Nigeria. It is located between Latitudes 5° 56 ^{1}N and 7° 06^{1}N [16]. All pig farmers in the State constituted the population for the study**.** Two agricultural zones out of six (Nsukka and Udi zones) were purposively selected due to high

pig production in the zones. Two blocks (eight blocks per zone) were selected from each of the zones using simple random sampling technique giving a total of four blocks. Three circles (eight circles per block) were selected from each block using simple random sampling technique giving a total of twelve circles. A list of all pig farmers were compile for each circle by the community leader. From the list, eight pig farmers were randomly selected using simple random sample technique giving a total of ninety six (96) farmers that were used for the study. A pretested semi structured interview schedule was employed for collecting data through face to face discussion with the pig owners including key informant group discussion. Focus group discussion was also used.

To ascertain the prevalence of pig diseases in the area, respondents were provided with a list of pig diseases and asked to rate them on a three point Likert-type scale of "to a great extent, to a little extent and to no extent", and values of 3, 2, and 1 were assigned to them respectively. The values were added up and divided by 3 to get a mean value of 2. The prevalence of diseases with mean values less than 2 were regarded as low prevalence in the area.

To identify orthodox treatment options and preventive measures of diseases adopted by farmers, e.g use of iron dextran in treating piglet anaemia, use of vaccines in preventing some diseases e.t.c. Respondents were asked to tick USED or NOT USED against each response option. Values of 1 and 0 were assigned to both use and not use respectively. Any option with mean value that was greater than or equal to 0.5 was regarded as used while those less than 0.5 were taken as not used in the area for the treatment and prevention of diseases respectively.

To identify indigenous treatment options used by respondents, farmers were provided with a list of diseases and asked to indicate the treatment option they use against each disease.

3. RESULTS

Table 1 shows the results of the socio-economic characteristics of respondents. From the table, majority (65%) of the respondents were male. The mean age of the respondents was 42.9 years, majority (62.5%) was married and a large proportion (19.8%) had OND/NCE as highest educational qualification. Fifty one percent of the respondents had stock size between 21-40 pigs while only 13.5% had pig farming as a major occupation.

Table 1. Percentage distribution of respondents by socioeconomic characteristics of respondents

Socio-economic characteristics	Percentage	Mean
Sex		
Male	65	
Female	35	
Age		
21-30	17.7	
31-40	28.1	
41-50	29.2	42.9
51-60	17.7	
61-70	6.2	
71-80	1.0	
Marital status		
Single	26.0	
Married	62.5	
Widowed	11.5	
Educational level		
No formal education	13.5	
Primary school attempted	5.2	
Primary school completed	9.4	
Secondary school attempted	12.5	
Secondary school completed	17.5	
OND/NCE	19.8	
HND/First degree	15.6	
Higher degree	6.2	
Stock size (number)		
1-20	26.1	35
21-40	51.2	
41 and above	22.9	
Extension contact		
No	100	
Yes	0	

3.1 Prevalence of Pig Diseases in Enugu State

Mange (M=2.770), trypanosomiasis (M=2.33), agalacia (mastitis) (M=2.21), were the major diseases prevalent in the study area (Table 2).

3.2 Preventive/Biosecurity Measures Used by Farmers against Pig Diseases

Preventive/biosecurity measures practiced by respondents against pig diseases (Table 3) include: constant observation (M=0.90), good

health hygiene by staff (M=0.89), improving ventilation (M=0.85), preventing injuries by making the floor rough and not slippery (M=0.81), reducing stocking density (M=0.79), vaccination (M=0.79), administration of iron dextran at birth (3-5 days) (M=0.78) and culling of sick animals (M=0.71) among others

Table 2. Mean scores of prevalence of pig diseases in Enugu State

Disease/disease condition	Mean	Standard deviation (SD)
Poisoning	1.63	0.715
Metritis	1.40	0.571
Agalactia (Mastitis)	2.21*	0.739
Infertility, stillbirths and abortion	1.97	0.717
Piglet anaemia	1.53	0.648
Parakeratosis	1.29	0.597
White scours	1.86	0.659
Hog cholera	1.07	0.261
Foot and mouth disease	1.51	0.562
Rabbies	1.01	0.102
Swine pox	1.00	0.000
Pig influenza	1.08	0.278
Brucellosis	1.03	0.175
Salmonellosis	1.02	0.144
Trypanosomiasis	2.33*	0.763
Pasteurellosis	1.08	0.278
Leptospirosis	1.19	0.392
Swine dysentery	1.17	0.402
Tuberculosis	1.00	0.000
Balantidiosis	1.06	0.243
Anthrax	1.13	0.391
Helminthosis	1.84	0.786
Herniatim	1.31	0.529
Swine erysipelas	1.66	0.693
Coccidiosis	1.04	0.248
Mange	2.77*	0.492

Mean score ≥ 2.0

3.3 Orthodox Treatment Options for Pig Diseases

The treatment options used by pig farmers in treating pig diseases include (Table 4): use of ivomec^{R}, piprazine, pyrantel pamoate in deworming (M=0.79), use of iron dextran in treating piglet anaemia (M=0.72), use of oxytocin/ antibiotics in treating mastitis (M=0.59), use of injectable or oral antibiotics to treat white scours (M=0.56), and dipping the pigs in acaricides to treat mites/mange (M=0.53). Most pig farmers prefer to use antibiotics as drugs because they have wide spectrum application against infections [17].

3.4 Indigenous Methods of Treating Pig Diseases

Fifteen percentage of the respondents used red oil while 13% used fibrous *Elaeis guineensis* fruit waste (*Oguru akwu)* for the treatment of toxins/poisonings as shown in Table 5. Also, 4.05% used *Okwete* leaves (*Costus afer*). For the treatment of mastitis, only 4.1% used monkey rope (*Parsonia straminea*) leaves while 6.1% and 1.0% used *Ogwu obara* leaves and *okwete* leaves (*Costus afer*) for the treatment of piglet anaemia. For parakeratosis, a small proportion (2.0%) of the respondents rubbed fibrous palm kernel fruit waste (*Oguru akwu*) on the body of the animals, another minor proportion (2.0%) rubbed red oil while 1.0% rubbed diesel on the body of the animals. Only one percent of the respondents reported that animals should be fed well close to farrowing to prevent leptospirosis. Also, one percent rubbed diesel and red oil on the bodies of the pigs to treat swine erysipelas while 4.1% and 1.0% used bitter leaves (*Vernonia amygdalina*) and *Okwete* (*Costus afer*) leaves to treat balantidiosis. Again 1.0% gave the pigs bitter leaves (*Vernonia amygdalina*) as treatment to helminthosis while 4.0%, 2.0% and 3.0% rubbed diesel, fibrous palm kernel fruit waste on the animals' skin as treatment for mange.

4. DISCUSSION

Males dominating pig production in the study area is consistence with the findings of Machebe et al. [18] who reported that pig farming in Enugu State is a male dominated activity. Therefore any programme on pig production in Enugu State should be directed to males.

Mange, trypanosomiasis and agalacia (mastitis) were the major diseases prevalent in the study area. Mange is one of the prevalent pig diseases in Southern part of Nigeria which can cause considerable losses because of the extreme itching and continuous scratching of the affected area, especially when prevalence is high during the dry season [19]. According to Arends et al. [20]; Rehbein et al. [21], ectoparasites can have a major impact on the productivity and welfare of pigs. Through the damage of skin or other subcutaneous tissues, they cause hypersensitivity due to stimulation of immune system by salivary or faecal antigens, including the changes in behavior [22]. In addition, some ectoparasites can contribute to the spreading of other pathogens (protozoa, bacteria, viruses and

some helminthes such as tapeworms and round worms). Skin disease in a swine herd can adversely impact production by causing a significant decrease in growth rate and feed efficiency [23]. Skin lesions can decrease carcass value by causing damage to the hide and excess trimming at the packing plant in the case of breeding stock and feeder pigs, poor cosmetic appearance can have a detrimental effect of reputation and sales [23]. In pigs, the most common cause of mange is *Sarcoptes scabiei var. suis*, while demodectic mange (Demodex phylloides) occurs occasionally [24]. Sarcoptic mange is widespread in both indoor and outdoor pigs and is usually linked to poor housing conditions. These may be responsible for poor pig production in the study area which may have a serious financial impact on the farmers. Although farmers use indigenous treatment options to treat this disease, they may not be very effective since the dose and duration of treatment is not specific.

Nwanta et al. [2] stated that trypanosomiasis is prevalent among pigs in Southeast Nigeria The economic and social impact of trypanosomiasis is considerable, constraining livestock production and also arable farming where animals are not available for draught power. It has been found over the years that in a large number of African countries, agricultural development as a whole has fallen behind overall economic growth and the shortfalls are particularly serious in the livestock sub-sector [25]. African animal trypanosomiasis, transmitted by tsetse flies, is a major constraint limiting the optimal utilization of land for agricultural production in tsetse-infested areas of Ghana [26]. This disease may lead to serious loss of blood and loss of body weight of the animals and consequent economic loss to the farmers.

Mastitis is a disease syndrome that results in death of piglets through starvation and an increased susceptibility to other fatal diseases of the newborn. This disease is of major importance to the pork producer because of its economic impact. Disease in pigs not only results in economic losses, but also requires villagers to spend money to recover.

Table 3. Preventive/biosecurity measures to pig diseases

Preventive measure	M. Mean (M)	Std. deviation (SD)
Constant observation	0.90*	0.30
Washing hands thoroughly before and after visiting the pens	0.11	0.320
Quarantine incoming stock	0.46	0.501
Vaccination	0.79*	0.408
Culling of sick animals	0.71*	0.458
Provision of nutritious feeds	0.70*	0.462
Good health hygiene by staff	0.89*	0.320
Give them clean water and in enough quantity	0.64*	0.484
Provide foot dip with disinfectant	0.07	0.261
Use of disinfectant while cleaning the pen	0.14	0.344
Avoid moving of boars from one farm to another to mate	0.35	0.481
Control tse-tse fly in the farm	0.66*	0.477
Provide and clean wallow water troughs regularly	0.31	0.466
Netting the pig houses to keep flies away	0.64*	0.484
Burying of dead animals	0.22	0.417
Restriction of visits of other pig farmers	0.39	0.489
Administration of iron dextran at birth (3-5days	0.78*	0.416
Providing warm, clean creep area	0.23	0.423
Improve ventilation	0.85*	0.355
Reduce stocking density	0.79*	0.408
Prevent injuries by making the floor rough	0.81*	0.392
Improve hygiene of mating pens	0.34	0.477
Reduce feeding prior to farrowing	0.06	0.243
Use of special cloth while entering the farm	0.31	0.466
Disinfecting used equipment	0.08	0.278
Spraying acaricides in the pen to prevent mites	0.70*	0.462
Ensuring good hygiene in farrowing pens	0.55*	0.500

Table 4. Mean distribution of diseases treatment options used by farmers

Disease treatment options used by pig farmers	Mean (M)	Stnd. Dev.
Ivomec, piprazine, pyrantel e.t.c in deworming	0.79*	0.410
Oxytocin / antibiotics in treating Mastitis	0.59*	0.494
Oxytocin and antibiotics to treat metritis	0.32	0.469
Iron dextran or blood transfusion in treating piglet anaemia.	0.72*	0.452
Injectable or oral antibiotics to treat white scours	0.56*	0.500
Irypanocidal injection to treat trypanosomosis	0.38	0.489
Tetramycin in treating Balantidiosis	0.04	0.206
Addition Tylosin in water to treat swine dysentery	0.22	0.415
Provision of artificial milk to piglets in agalactia cases	0.12	0.326
Use of coccidiostats and water therapy to treat coccidiosis	0.00	0.000
Treatment of Hernia by conducting surgery	0.00	0.000
Broad spectrum antibiotics to treat diamond skin disease	0.46	0.502
Use of fluid therapy in treating white scours	0.46	0.501
Dipping the pigs in acaricides to treat mites / mange	0.53*	0.502

Table 5. Percentage distribution of respondents based on indigenous treatments options (n=50)

Disease/disease condition and indigenous treatment method	Percentage
Toxins/poison	
Eriri agwo leaves -Monkey rope *(Parsonia straminea)*	1.0
Fibrous palm kernel fruit waste	13
Red oil	15.2
Okwete leaves (*Costus afer*)	4.0
Potash	5.1
Mastitis	
Monkey rope *(Parsonia straminea)* leaves	4.1
Piglet Anaemia	
Ogwu obara leaves	6.1
Okwete leaves (*Costus afer*)	1.0
Parakeratosis	
Application of *Elaeis guineensis* fruit waste (*Oguru akwu)* on the body	2.0
Application of red oil on the body	2.0
Application of diesel on the body	1.0
Trypanosomosis	
Use of scent leaves (*Ocimum grattissimum*)	1.0
Leptospirosis	
Feeding of sow very well close to farrowing	1.0
Swine erysipelas	
Application of diesel on the body to remove scales	1.0
Application of palm oil on the body	1.0
Balantidiosis	
Use of bitter leaves (*Vernonia amygdalina*) to stop vomiting	4.1
Okwete leaves (*Costus afer*)	1.0
Helminthosis	
Consumption of bitter leaves (*Vernonia amygdalina*)	1.0
Mange	
Application of Diesel on the body	4.0
Fibrous palm kernel fruit waste	2.0

Words in parenthesis = Scientific names, Words in italics but not in parenthesis = Native names

Although farmers carried out some bio security measures in their farms, they did not practice foot dip, quarantine incoming stock, cleaning pen with disinfectant which are very important measures to reduce disease outbreak in the farm. Effective bio security cannot be overemphasized in a piggery. The more farmers are conscious of biosecurity measures, the

higher the chances of survival of their animals and thereby increasing productivity. Biosecurity practice is necessary to avoid the entry of pathogens into a herd or farm (external biosecurity) and to prevent the spread of disease to uninfected animals within a herd or farm and to other farms, when the pathogen is already present (internal biosecurity) (http://www.oie.int/doc/ged/D7635.PDF). The non use of these important measures by farmers may be as a result of ignorance, since farmers in the study area did not have any extension contact. According to Hollis [27], disease prevention or control begins with understanding what diseases and risks are present. Careful review of sources and health status lays the groundwork for the future. Following a complete review of health status, control measures are necessary to limit the negative impact of pathogens. Extension education is very necessary for any farming venture to succeed since the function of agricultural extension is to support farmers engaged in agricultural production and facilitate their efforts to solve problems; link to markets and other players in the agricultural value chain; and obtain information, skills, and technologies to improve their livelihoods. Therefore it is imperative for the government to revive the extension service in Enugu State.

The use of antibiotics by most farmers may be because they have a wide spectrum application against infections [28]. Farmers use sub lethal doses of antibiotics to prevent diseases and promote growth [29]. According to DEFRA, use of antimicrobial compounds in animals and man can increase the levels of resistance in the bacterial population [30] especially if they are use at sub lethal doses. This misuse may be due to ignorance. Therefore extension should ensure that these antibiotics are used under supervision.

The use of indigenous knowledge in treating mange corroborates with the finding of Okolo and Unaigwe cited by Fajimi and Taiwo [31] who reported that mange is treated by scrubbing the skin lesions with the fibrous palm kernel fruit waste (*Oguru akwu*) with the addition of lime, kitchen salt, lime juice (*Citrus auraatium*) and palm oil, for a couple of weeks. Research has found that ethnoveterinary treatments are the primary recourse for farmers when their pigs are ill. The study area had no widely recognized indigenous experts in ethnoveterinary medicine. Rather, ethnoveterinary knowledge was widely distributed among farmers of all ages within the study area. Almost all ethnoveterinary knowledge and practices result from daily experience with livestock. Given the prevalence of ethnoveterinary practices in farmers' animal health practices, it is important to validate the efficacy of these practices [32]. Knowledge of practices that are found to be effective should be dispersed among villagers. It is reasonable to suggest that farmers in this area would benefit from spreading knowledge within the same community, as well as between communities. Extension should have contact with the study area and facilitate the dissemination of the effective ethnoveterinary practices.

5. CONCLUSION

The study identified pig diseases prevalent in the study area such as trypanosomiasis and mastitis. Although farmers use preventive measures (maintaining good farm hygiene, constant observation, improving ventilation etc.) in their farms and also attempt to treat some of these diseases, efforts should be made by extension to further educate farmers on more effective preventive and treatment options as this will go a long way to boost pig production in the study area. Also, the indigenous methods use by farmers should be studied and encouraged and also disseminated to other communities and states in the country.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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