



## ASSESSMENT OF NOISE LEVELS GENERATED IN SWINE PRODUCTION UNITS IN IBADAN, NIGERIA

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### ABSTRACT

The increase in pork consumption globally in recent times has led to a corresponding increase in pig production with more people being employed in the industry to provide the needed services. Pigs are known to generate a lot of noise which could constitute a potential health hazard and against which remedial measures must be taken. The establishment of the levels of noise generated in piggery production units and their possible consequences on the workers in such units was the main objective of this study. The research execution consisted of a simple survey among piggery workers to obtain information relevant to noise generation and effect; and physical measurement of the levels of noise generated in selected piggery farms in Ibadan, Nigeria. The survey revealed that workers spend between 3-6 hours daily within the units and wear no noise protective devices. The levels of noise generated in the farms ranged from 95-103 dB (A) and especially during feeding period and other activities. The duration of these noises which are mainly intermittent ranged from 30 to 150 minutes. These levels of noise and the periods for which they last are above the maximum levels of 99 dB (A) over a period of 19 and 140 minutes specified by NIOSH and OSHA respectively. Swine workers in Ibadan, Nigeria are exposed to excessive occupational noise hazards and remedial measures are desirable in order to protect them. The provision of Personal Hearing Protective Devices (PHPDs), adequate medical check-ups as well as use of personal noise dosimeters for the swine workers and good housing structures and facilities for the animals are recommended.

**Keywords:** swine, noise level, piggery production unit, noise exposure, decibel, noise hazard.

### 1. INTRODUCTION

The movement of and communication between people and animals, machine operations and contacts between objects create pressure waves in the air which at certain ranges of frequencies can be interpreted by the human ear as sound. Sound becomes a noise when the level is such that it appears displeasing to the individual exposed to it. Noise is an environmental pollutant but it differs from air and water pollution in that it disappears fast and does not remain in the environment for long.

Noise emanates from many sources depending on the location. In a typical farm environment, these could be from traffic generated by assorted service vehicles within the farm, livestock and poultry which is at its peak especially at feeding time when they struggle for feed and peck on the metallic feed troughs. Facilities such as fans, generators, light bulbs, electric motors and similar facilities generate little noise within the building but the aggregation of which could be significant and result in discomfort to both humans and livestock. Wildlife noises from various wild animals and birds, bird-scaring devices, stationery processing equipment especially in processing centres and farm workshops also generate substantial noise (Evans, *et al.*, 2004).

Noise is known to have a lot of negative effects on humans and livestock and hence efforts are usually made to keep it within the limits in which it will not constitute a problem. Two aspects of noise that are of concern to humans are the level and period of exposure. While a high level noise may be tolerated for a short period, a low level may be harmful under long term exposure. This explains why codes specify what exposure period is permissible at various noise levels. As the sound

level increases, the permissible duration of exposure decreases. Eight hours of exposure is permitted at 80 dB (A) and the Occupational Safety and Health (OSHA, 1993) requires that employees be placed on a hearing conservation program if they are exposed to average noise levels of 85dB or greater over 8 hours of work per day.

Exposure to excessive noise has a lot of negative impacts on the victims. The most common effect is hearing impairment in which the ability of the individual to hear and participate in conversation is greatly reduced (Baker, 1997). Noise annoys, awakens, angers and frustrates people. It disrupts communication and individual thoughts; and affects performance capability. (WHO, 2001; Godson, *et al.*, 2009; Gordon, 2006))

The resultant effect of excessive noise exposure has been studied in many fields. Wilkinson (2002) reported a study in which a person in distress in a noisy environment received no help from passerby because her cry could not be heard while a similar person in a quiet environment was readily attended to. Baker (1997) reported that students in a quiet environment performed better than those in a noisy area because the students and teachers in the quiet school had fewer distractions and concentrated more on teaching and learning. Various studies have revealed the extent to which agricultural workers are at great risk from noise induced hearing loss from farming tasks and activities. Winters *et al.* (2005) reported that 92% of 182 dairy farmers interviewed in Japan were found to have functionally significant hearing loss while in Saskatchewan, 31% of 1, 418 farmers had early signs of hearing loss resulting from their routine activities.



Concerned about the negative effects of noise, various efforts have been made to limit the level of noise to a tolerable limit. Methods adopted include legislations which aim at limiting the amount of noise allowed in various work places and other activities, reduction of noise level at its source with methods which include the reduction of vibration of the engine, proper maintenance and reduced sound propagation by use of barriers, and the use of personal protective devices such as earmuffs and earplugs.

Pig is one of the popular livestock reared worldwide and because of the high demand for pork; the production has increased in the past few years. The World pork production was reported to have increased by 27% between 1997 and 2005 while the global pig consumption increased by 15.1% between 2000 and 2005 with the total global consumption for year 2005 at 93 million (Plain, 2006; USDA, 2006). The world pig population was estimated at approximately 9.4 million out which 5.1 million were produced in Nigeria in 2002 (FAO, 2002). For both cultural and religious reasons, a bulk of the pork production in Nigeria is concentrated in the South western region with Ibadan and its environs as major production and consumption centres. Towards meeting the increasing demand, the industry has shifted from small family farms to larger production units, many owned by large corporations. (Jones, 2004). Pigs are generally known to generate substantial noise especially at feeding period and the changes in the levels of swine production have been accompanied with increase in noise generation which may

affect the health of the workers. Unfortunately both the employers and employees in this sector show little or no concern about the noise generated. There is also no significant research on this subject carried out locally in Nigeria. It is therefore important that the level of noise generated in these units is established so that appropriate precautions can be taken to protect the workers against the dangers of noise pollution. This is the main thrust of this study the objective of which is to access the level of noise generated in piggery units in Ibadan and where workers are under threat, recommend ameliorating measures.

## 2. MATERIALS AND METHODS

### 2.1 Study area

The study area for this work is Ibadan which is located within the Southwestern part of Nigeria between longitudes 3° and 4° E and latitudes 7° and 8° N. The area lies within the rainforest region and has two distinct seasons, the raining season from April to October with an August break and dry season from November to March. A good percentage of the populace is engaged in agriculture producing both crops and animals. Livestock, poultry and fish farming are widely practiced and the production of pigs is one of the major livestock activities.

A total of ten piggery farms fairly evenly spread across the city and cuts across private farms and those owned by teaching and research institutions were used for this study. The data on these farms are presented in Table-1.

**Table-1.** Data on piggery farms used in the study.

S. No.	Name of farm	Animals population	Number of employees
1	University of Ibadan Teaching and Research Farms (UIT and RF)	241	8
2	Barryts Farms Limited (BFL)	84	4
3	Southern Farm, Institute of Agric Research and Training (IAR and T)	260	10
4	Bora Farms, Moor Plantation. Apata (BF/MP)	229	7
5	Timo Farms, Ajibode	66	6
6	Barag Farms, Barracks Area, Ojoo	61	3
7	Aroro Farms, Arulogun Road, Ojoo	60	6
8	Baba-Ibo Farms, Ajibode	87	5
9	Baba-Junior Farms, Apete	93	4
10	James Piggery, Ajibode	72	5

### 2.2 Research execution

The research execution consisted of a survey and physical measurement of noise levels

#### Survey

A simple structured questionnaire to obtain information considered of relevance to the study was developed. Information of interest included employees

working periods, awareness of noise effect and workers' perception of their environment and attitude to noise control devices. The questionnaires were distributed among the workers in the farms and during the administration; further information was gathered through personal communication and observation. Four of the farms were then selected for sound level measurements.



### 2.3 Measurement of noise level

Figure-1 shows a typical layout of a piggery unit and the positioning of the measuring equipment. A Noise Level Meter Extech Instrument Model No: 407732 (Class 2, Type IEC6F22) was used in taking the noise levels. The noise levels were measured according to the specifications of the British Standard BSI (BS: 7445) and the State of Oregon Sound measurement procedures (British Standard, 2003; Anonymous, 2011). Other equipment used for the determination of the weather conditions included the digital anemometer (La Crosse technologies, Model No: EA-3010U) and digital psychrometer (Extech Instruments, Model No: RH300). The parameters measured at each

point of measurement were ambient air Relative Humidity (RH), Dry-Bulb temperature ( $T_i$ ), and Average Noise Levels (NL).

Measurements were taken at positions that were central to the Swine Confinement Buildings (SCBs) or sections within the SCBs at one hour intervals for an average of 8 hours per day for two weeks, which were then averaged.

Measurements at each time of measurement were made over 10 minutes (i.e.  $\pm 5$  minutes). For instance, the measurements at 10:00 am were made between 09:55 and 10:05 am.

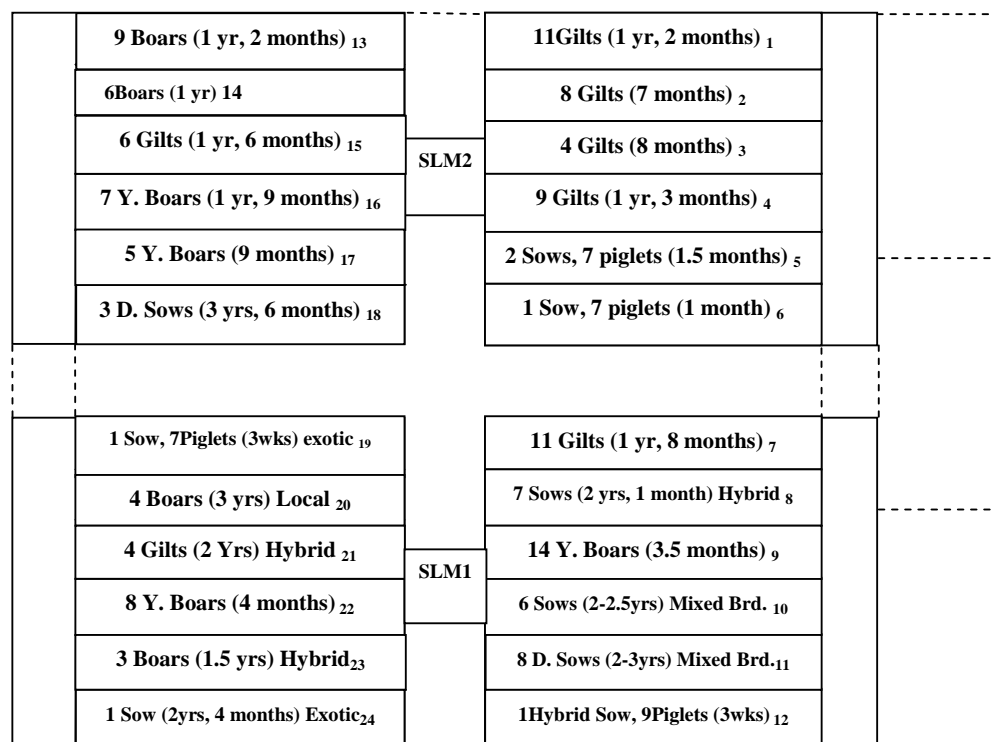


Figure-1. Typical layout of a piggery unit.

## 3. RESULTS AND DISCUSSIONS

### 3.1 Survey

Figure-2 shows the daily exposure periods of workers to noise. These periods are shared between feed mixing, livestock feeding and cleaning of the units. Coincidentally, these are the activities that generate the highest noise in the livestock building. 78% of the respondents agreed that the noise to which they are exposed is dangerous, 8% do not agree while 14% were undecided. There was no where that protective noise devices were in use neither was the workers familiar with them. Many of them however expressed willingness to use them if they can be provided.

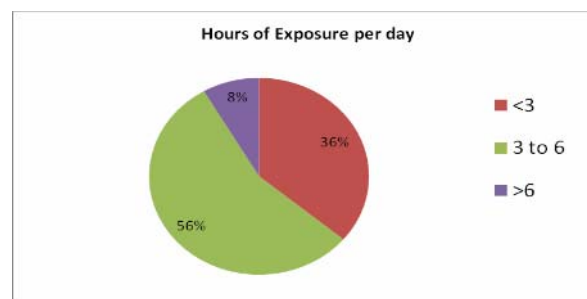


Figure-2. Daily hours of workers' exposure to noise.

### 3.2 Measured results

The summary of the noise levels, temperatures and relative humidity measured in the various farms are presented in Table-2.

**Table-2.** Summary of measured data for piggery units.

Farm	Parameters	Time of measurement							
		9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00
UIT and RF	Temp °C	30.9	31.2	31.3	33.1	35.2	34.6	34.9	35.1
	RH %	59.3	57.5	58.3	50.0	43.5	44.9	49.0	46.5
	Noise dB	76.7	78.9	88.5	96.8	60.9	61.9	64.6	57.7
BFL	Temp °C	29.5	29.5	30.2	32.4	32.6	33.4	32.2	33.1
	RH %	72.3	70.1	65.7	56.8	59.6	55.2	57.1	56.1
	Noise dB	70.5	77.6	82.3	84.4	75.7	71.8	75.7	71.7
IAR and TSF	Temp °C	27.8	29.4	30.1	30.7	31.8	33.9	33.1	32.0
	RH %	85.0	77.0	77.5	70.3	65.6	59.9	65.6	68.0
	Noise dB	90.4	96.6	99.9	73.2	74.0	81.5	71.3	72.5
BF/MP	Temp °C	27.8	29.1	29.9	30.9	33.7	31.9	33.1	32.0
	RH %	81.3	75.9	73.9	69.3	59.8	65.8	65.6	68
	Noise dB	86.1	90.6	99.7	85.1	71.5	73.6	71.3	74.1

From Table-2, the level of noise generated varies from one farm to the other but in general, the range for all the four farms was from 81.2-103.6 dB (A) and the higher levels were mainly recorded during feeding times. The levels of noise permitted in such structures are maximum of 85dB over a period of 8 hours and 99dB over a period of 19 minutes under the NIOSH standards (Engineering toolbox, 2011). The implication of these measurements is that many piggery workers are exposed to excessive noise which even within that short periods of exposure is capable of causing harm.

The level of noise generated was found to be influenced by the feeding times, prevailing ambient temperatures, relative humidity and condition of shelter

At high temperatures, the animals are under heat stress as a result of the fat deposit under the skin and the animals adopt all methods to cool the body. The restlessness is accompanied with noise. On the contrary, noise reduces with increase in relative humidity as the body is cool and the animal is less restless.

Observations showed that in poor housing structures and facilities (e.g. poor roofing and leaking water troughs), the stress levels of animals, as indicated by the hard-breathing and restlessness of the animals, are increased at higher temperatures. Thus, there tend to be competition for the available shade, space and water, thereby leading to fighting and consequently, generation of high or potentially hazardous noise levels.

The study identified that most farms feed the animals on a regular pattern of once per day (with adequate quantity) but a few farms occasionally feed the animals twice per day (depending on the prevailing weather and animal conditions). Results showed that the highest noise levels are generated during feeding and feed-mixing operations. Even when sufficient feed will be provided, animals struggle and fight to get the first share

during which there is high noise generation within the unit. In farms where feeding is done twice daily, the workers are exposed to more noise than in farms where feeding is once daily.

Observations and the results of survey conducted showed that human activities such as the presence of strangers, sudden interference with animals resting position, re-arrangement and sorting of animals contribute to generation of high noise levels in the swine production units. The presence of strangers in the unit creates anxieties in the animals and this is accompanied with loud noise. Similarly, animals' activities such as mating, fighting or competition for space, food, water, as well as mother-piglets communications also sometimes lead to generation of some high level of noise.

#### 4. CONCLUSIONS AND RECOMMENDATIONS

Workers in Swine Production units in Ibadan are exposed to Noise Levels of as high as 95-103 dB (A) which are mainly recorded during feeding operations and cleaning of the units when the animals are disturbed. The level of noise generated is aggravated by the ambient temperatures, multiple daily feeding, presence of strangers and poor accommodation. Workers spend between 3 and 6 hours in the piggery units during which they are exposed to high intermittent noise. The noise levels to which the workers are exposed and the durations of exposure are higher than the of the NIOSH permissible level of 99 dB (A) over 19 minutes period. It is concluded that the swine workers are exposed to excessive noise and remedial measures are desirable.

Towards ameliorating the possible negative effects of over exposure of noise on the workers, the following recommendations are made:



- a) Good conditions of the swine production structures and facilities such as good roofing systems and water troughs should be ensured in order to help the pigs in maintaining good body temperatures and consequently reduce the stress levels of the animals thus minimizing the periods of generation of potentially hazardous noise levels by the animals.
- b) Since it appears a bit difficult to reduce the exposure periods of the workers, it is recommended that swine workers should embrace the use of Personal Hearing Protection Devices and it should be mandatory for employers to provide them and enforce their use.
- c) At regular intervals, the Swine workers should undergo a medical check-up to ensure that they are not having noise related ailments and where such exists, immediate action should be taken
- d) It is recommended that the workers be provided with Noise Dosimeters in order to be able to detect when noise is becoming excessive.

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