Rjeas Research Journal in Engineering and Applied Sciences 1(3) 156-159 Rjeas
© Emerging Academy Resources (2012) (ISSN: 2276-8467)
www.emergingresource.org

ASSESSMENT OF NOISE LEVELS GENERATED IN SOME FEED MILLS IN IBADAN, NIGERIA

Yahaya Mijinyawa, Chukwufumnanya Rosemary Ogbue and Odunola Emmanuel Arosoye
Department of Agricultural and Environmental Engineering
Faculty of Technology,
University of Ibadan, Ibadan, Nigeria
Corresponding Author: *Yahaya Mijinyawa*

ABSTRACT

The recent upsurge in the demand for livestock and poultry products in Ibadan has resulted in increased demand for feeds resulting in expanding and increasing feedmills. Feedmills generate substantial level of noise which could be injurious to workers and remedial measures are best taken with knowledge of the level of noise exposure. This study aimed at establishing the level of noise exposure of feedmill workers in Ibadan using a structured questionnaire and noise level meter to obtain relevant data. The noise levels generated in the feed mills ranged from 82.5 – 113.9 dB while most of the employees work between 8-10 hours daily for six days in a week and in some of the mills, the employees work all days of the week. The noise levels and exposure periods in many of the mills were above the code specification of a maximum noise level of 85dB over an 8-hour working period. There is no provision of noise control devices for the workers in most of the mills and in the few cases where they are provided, the workers rarely use them. Towards ensuring a safe working environment, noise control devices should be provided for all workers in the mills and their use enforced, machines should be regularly maintained so as to reduce warbling of components which increase the noise generated and employers should consider the reduction in working period in order to minimize the noise exposure period.

KEYWORDS: Feed Mill, Noise Exposure, Hearing Impairment, Sound Level Meter, Earplugs

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 unpleasing to the individual exposed to it. Even though it is often assumed that the higher the level, the tendency is for it to be unpleasant, this is usually not the case in practice but rather varies with time and individuals. Music at high level may be acceptable by an individual while a discussion at lower level but which does not interest the individual exposed to it, may be a noise. Simply put, noise is an unwanted sound. Noise emanates from many sources depending on the location and in agricultural environments and activities; these could be from service vehicles and tractors, stationery equipment in processing centres and farm workshops, livestock and poultry units. The aggregation of noise from these sources could be significant and capable of causing discomfort to both humans and livestock. Exposure to excessive noise has negative impacts on the victims, the most common being hearing impairment in which the ability of the individual to hear and participate in conversation is greatly reduced (Baker, 1997). Although hearing loss is the most clearly measurable health hazard, noise is also linked to other physiological and psychological problems. It annoys, awakens, angers and frustrates people. It disrupts communication and individual thoughts; and affects performance capability. 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 passersby 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.

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 one may be harmful under long term exposure. In general, as the sound level increases, the permissible duration of exposure decreases. Levels and permissible exposure periods vary from 85dB for 8 hours to 115 dB for 15 minutes daily and the Occupational Safety and Health (OSHA, 1993) requires that employees be placed on a hearing conservation program if they are likely to be exposed to noise levels for a period longer than code specification. 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 legislation such as the Environment Conservation Act (1989) and the Road Traffic Act (1996) 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 reduce sound propagation by use of barriers, damping, isolation, muffling, noise absorption, mechanical isolation, variations in force, pressure or driving speed, and the use of personal protective devices such as earmuffs and earplugs.

A feed mill is a centre that is equipped with buildings and machinery for the production of feed for animals. Typical feed mill equipment include hammer mill, mixer, pelletizer, extruder, material handling equipment such as the screw, belt, pneumatic conveyors and the bucket elevator and dust collectors while the materials that are milled include maize, soya meal, bone meal, corn bran, wheat bran, groundnut cake, palm kernel cake, oyster shell and additives such as lycene. Substantial noise is generated while these equipment are in operation which is a health hazard often overlooked but which in practice should be effectively monitored (North Caroline Department of Labour, 2009; Arthur *et. al.* 2004). In recent times, there has been an upsurge in the number of eateries in Ibadan resulting in increasing demand for beef, chicken, fish and snail. There has also been an increased interest in raising these animals at cottage levels both for individual need and as sources of income. In responding to the challenge of providing feeds for the increasing animal population, many existing feedmills have expanded their capacities while a number of new ones have emerged, with many of them working for longer periods than they previously do. In order to ensure a noise safe working environment, information on the noise level generated in these feed mills is desirable. The availability of this vital information motivated this work. The objective of this work was therefore to establish the level of noise generated in feedmills in Ibadan and where workers are under threat, recommend remedial measures for the health and safety of mill workers.

MATERIALS AND METHODS

Study Locations

The study area for this work is Ibadan the capital city of Oyo state and its environ. The state 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 state populace are engaged in agriculture producing staple crops such as grains and legumes, yam, cassava and cocoyam while plantation agriculture of cocoa, kolanut and oil palm produce is a major activity. Poultry, fishery and piggery are major animal agriculture while cottage keeping of goats and sheep are scattered over the whole state in both the urban and rural areas depending on feed from the feed mills. The mills used for this study were selected within the Ibadan metropolis and its environs and the spread was such as to include both small and medium scales and also evenly spread across the study area.

Research Approach

This research was executed in two phases comprising a survey and physical measurements of noise levels. A simple structured questionnaire to capture data on equipment and mill workers was designed and administered to 150 workers in the selected mills. During the administration of the questionnaire, additional pieces of information were gathered through focused group discussion, personal communication and observation.

The noise level was measured using a digital sound level meter, model 407768, 5-digit LCD display. The noise level meter consists of a microphone, electronic circuits and a readout display with a measuring range from 35-130dB. The meter was calibrated before usage. The measurements were carried out in accordance with the guidelines of the Canadian Centre for Occupational Health and Safety (CCOHS) and National Institute for Occupational Health and Safety (NIOHS). Noise levels were recorded by holding the microphone perpendicular close to the ear of the noise receivers while they kept their work postures (Plate 1). Five replicates of measurements over a two hour period spent at the mills while the machines were in operation were taken while in some cases, some mills were visited more than once to take readings which were eventually averaged to give the reported values.

(a)

(b)
Plate 1:Measurement of Noise Level at Operator Ear Level

RESULTS AND DISCUSSION

The main equipment found in most mills were the hammer mill and the mixer. The hammer mill which is the pivot of the mill does the grinding of the primary ingredients which are in most cases grains or legumes and when formulated, the feed is loaded into the mixer for thorough blending. In a few cases, the pelletizer is used where the feed is desired in pellet form. Most of the hammer mills had a capacity of 2 tonnes/hr while the mixer had a capacity of 1 tonne/hr. Material handling is done manually. The mills are all – purpose mills producing feed for virtually all animals including cattle, pig, goats, sheep, poultry, fish and snail. As a result of the erratic power supply from the Power Holding Company of Nigeria (PHCN), most of the mills visited had generators as alternative power source.

Virtually all the mills visited work for six days in a week with many of them using the same staff all through. The millworkers are predominantly males with age range from 23 to 56 years. From the survey, 42% of the respondents work for ten hours daily, 44% work for nine hours while only 14% work for eight hours and less throughout the six days that the mills operate in a week.(Table 1). About 50% of the respondents have been working in the industry for more than five years. Mill workers responses to noise and its management are presented in Table 2. About 85% of the respondents expressed dissatisfaction with the level of noise to which they are exposed during work with some stating that they have tolerated the situation because they have no other alternative of survival. It would therefore be good if this menace can be addressed especially as they cannot predict how long they will remain in the industry. Though there are noise reduction devices, 66% of the respondents claimed that they have never heard of such devices, some have heard but not used while only a few have used them and about 80% of the respondents expressed willingness to use the devices if they can be provided. Interestingly, while those who have neither used nor heard of the devices are desirous of using them, some of those who have been provided with the devices were reluctant to use them, giving no specific reasons for their action. Recognizing the role of equipment maintenance in noise reduction, due attention was given to this during the study. In about 65% of the mills, maintenance is carried out once in a month while in about 21% of the mills, the duration is between one and three months and in most cases the last Saturday of the month which coincides with the national environmental sanitation day. During such maintenance period, machine components are loosed and cleaned, and where necessary, parts are lubricated. Loose bolts and nuts are tightened. There were however some mills where there is no regular maintenance culture and repair is only done when the equipment breaks down. This was observed in about 14% of the mills surveyed.

Noise Levels

The noise levels measured at the operator ear level are presented in Table 4, and this varies from 82.5 to 113.9dB. Considering the daily working period of mill workers as presented in Table 1, the maximum noise level that should be tolerated in the mills should not be more than 85dB which from Table 4, is exceeded in virtually all the mills. In many of these mills where the permissible noise level is exceeded, the workers are not under any protection indicating that they are under threat from noise in the course of their duty. Such a high level of noise not only hinders the communication between the workers, but its long term exposure may also result in ill-effects, especially on permanent hearing threshold shift. During this study, two factors were found to influence the level of noise generated and these were the ambient noise and power source. Ambient noise is the noise level in an environment when no machine is working. In general, a location with higher ambient noise will record a higher value when machines are operated compared to another location with lower ambient noise with the same machines operated. The factors that could influence the ambient noise are location and power source. A location close to a highway is likely to have higher ambient noise arising from traffic than that located in a quiet neighborhood, while a mill that is powered by a generator will record higher noise aggravated by the generator than the one depending on public electricity. Although it is not necessarily a linear relationship, the level of noise from more than one source is usually higher than that from one of the sources. In some cases, a single machine is operated in a mill and at some others, more than one machines can be operated simultaneously. Whenever more than one machine is operated, the noise level within the mill will be higher.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

The noise levels generated in virtually all the feed mills investigated ranged from 82.5 to 113.9 dB while most of the employees work between 8-10 hours daily for six days in a week. Noise levels are aggravated by ambient noise levels and activity pattern in a mill. The noise levels and exposure periods in many of the mills were above the code

specification indicative of threat to employees' health. Many of the employees are not under any protection programme and many are not aware of such programmes but however express willingness to embrace such ideas if provided. There is need to take precaution to protect mill workers from noise hazards.

Recommendations

a) Towards ensuring a safe working environment, noise control devices should be provided for all workers in the mills and their use enforced, machines should be regularly maintained so as to reduce warbling of components which increase the noise generated and use of dampers, mufflers or silencers and an enclosures on feed mills equipment will reduced vibration and noise transmission to the mill workers. Employers should consider the reduction in working period in order to minimize the noise exposure period.

b) In the study carried out, it was observed that these workers are not only subjected to noise, but are also exposed to dust. To solve these problems, workers should be provided with nose masks and ear plugs, even if it is locally made to reduce the noise and dust perceived by feed mill workers.

c) Considering the role that hearing plays in our lives, it becomes necessary for government to protect those at risk from industrial hearing loss through enactment of laws to compel companies to develop hearing conservation programmes and see to its enforcement. This is necessary especially in small-scale enterprises such as feed mills which are overlooked by governmental agencies responsible for the enforcement of health and safety measures at the workplace.

d) Lastly, there should be a level of awareness to owners of establishments where noise is a major problem, about the use of noise control devices as this will help to improve the quality of working environment.

REFERENCES

Arthur L. Frank, Robert McKnight, Steven R. Kirkhorn,and Paul Gunderson (2004). Issues of Agricultural Safety and Health. Annu. Rev. Public Health 2004. 25:225–45

Baker, D E (1997). Noise: The Invisible Hazard. Department of Agricultural Engineering University of Missouri Columbia. (Accessed from http://www.nasdonline.org/document, March 20, 2011)

Canadian Centre for Occupational Health and Safety (CCOHS) http://www.ccohs.ca/. Accessed June 23, 2011

North Carolina Department of Labor (2009) A Guide to Safety and Health in Feed and Grain Mills. Department of Safety and Science Technology at Central Missouri State University, Warrensburg, Missouri

Occupational Safety and Health Administration, OSHA (1993) Permissible Noise Level recommended for eight hours of work per day. http://www.osha.gov/SLTC/noisehearingconservation /Accessed February 10, 2011.

The Environment Conservation Act (1989), http:// www.capetown.gov.za/en/CityHealth/Documents/Legislation/Act%20%20Environment%20Conservation %20Act%20-%2073%20of%201989.pdf. Accessed March 1, 2012.

The Road Traffic Act (1996) http://www.info .gov.za/view/DownloadFileAction?id=70930. Accessed February 24, 2012,

Wilkinson, H R.(2002). Avoiding Hearing Losses on the Farm. Michigan State University Extension. (Accessed from http://www.springerlink.com/ hearingloss, March 20, 2011)

Winters, M; E. MacIntyre, and C. Peters, (2005). *Noise and Hearing Loss in Farming*. Published by Farm and Ranch Safety and Health Association British Colombia, Canada. August 2005.Pp 6 – 10.

APPENDIX

Table 1. Working Period in Mills

Working Period Hrs./day	7	8	9	10
% of Total Mill Workers	3.0%	11%	44%	42%

Table 2. Mill Workers' Response to Noise

Information Requested	Responses	
	Yes	No
Are you satisfied with the noise level you are exposed to in your place of work	15%	85%
Are you aware of Noise Reduction devices	34%	66%
Are you willing to use Noise Reduction Device	80%	20%

Table 3: Maintenance Culture

S/N	Maintenance Practice	% of Mills Adopting the Method
1	Once a month	65
2	Between one and three months	21
3	No Regular pattern	14

Table 4. Noise Generated in Feed Mills

Mill No	Noise Level (dB)	Mill No	Noise Level (dB)	Mill No	Noise Level (dB)
1	91.2 ± 1.8	14	106.6 ± 6.6	27	103.1 ± 2.1
2	92.2 ± 1.3	15	94.6 ± 4.3	28	91.6 ± 0.8
3	95.5 ± 1.7	16	94.1 ± 6.3	29	92.4 ± 2.6
4	104.6 ± 6.5	17	88.2 ± 5.4	30	93.0 ± 3.7
5	100.6 ±5.4	18	95.0 ± 15	31	100.6 ± 0.3
6	100.5 ± 5.4	19	87.3 ± 13.1	32	113.7 ± 6.5
7	104.7 ± 1.5	20	89.7 ± 1.2	33	97.5 ± 5.5
8	82.5 ± 4.7	21	89.5 ± 0.6	34	109.5 ± 12.5
9	106 ± 3.0	22	92.5 ± 2.1	35	106.0 ±14
10	113.9 ± 2.0	23	94.0 ± 0.7	36	91.3 ±8.8
11	102.8 ± 4.6	24	101.2 ±3.1	37	90.7 ± 9.3
12	87.1 ± 1.3	25	96.0 ± 1.2	38	90.1 ± 1.9
13	100.5 ± 8.0	26	95.2 ± 4.8	39	87.7 ± 2.3