Use of Antibiotics and Compliance with Standard Practices in Poultry Health Management among Farmers in Oyo State, Nigeria

***FADAIRO O. & S. AJAYI**

Department of Agricultural Extension and Rural Development
University of Ibadan
*Email: dairom2@gmail.com

Indiscriminate use of antibiotics has led to the problem of bacterial resistance which is a major global threat to human and animal medicine. Thus, ethical issues are being raised on the practices of poultry farmers in the health management of poultry birds, as studies continue to emphasize the contribution of poultry industry to health risks associated with bacterial resistance. It is against this background that this study assessed compliance of poultry farmers to the recommended practices for the use of antibiotics in poultry health management in Oyo state, Nigeria. A total of 106 poultry farmers were drawn using multi stage sampling procedure. Structured interview schedule was used to collect data on respondents' personal and farm characteristics, knowledge on proper use of antibiotics, factors responsible for antibiotics usage, awareness on hazardous health effect of the misuse of antibiotics and compliance to the recommended practices for use of antibiotics in poultry management. Data were analyzed using frequency counts, percentage, means, Chi square, Pearson Product Moment Correlation (PPMC) and t- test at p = 0.0.5. Compliance to standard practice for use of antibiotics in poultry health management was poor among 50% of the respondents despite high knowledge on proper use of antibiotics and awareness of the risks associated with its misuse among majority (64.2% and 67% respectively). Compliance was fairly high in administration of antibiotics and poorest in purchase regulations. Antibiotics use among poultry farmers was motivated by factors such as growth promotion ($\bar{X}$=2.38), for prophylaxis ($\bar{X}$=2.36) and prevention of possible infection ($\bar{x}$

=2.36). Age of farmers (r=0.211, p=0.030) and sex ($\chi 2$=0.271, p= 0.040) showed significant relationship with respondent's compliance to standard practice for use of antibiotics in poultry health management. The study conclude that crave for excessive economic gains and weak enforcement of poultry health regulations are major issues responsible for poor compliance to the recommended practices for the use of antibiotics in poultry health management in Oyo state.

Keywords: Poultry health, poultry farmers, antibiotic use, compliance

Introduction

The livestock industry is very important in the Nigerian economy because it provides a good source of animal protein such as meat, milk and egg that are rich in the essential amino acids required for body functions. Excess realized from such products could as well be exported for foreign exchange (Adepoju, 2008). The prominence of poultry in Nigerian livestock industry was further emphasized by Okunlola and Olofinsawe (2007) when they posited that poultry accounts for 25% of local meat production in Nigeria.

Despite the huge potential of poultry production in meeting human dietary needs as well as generating foreign exchange earnings, infectious bacterial diseases have been its major threat. Worst still is the protein deficiency gap common in many developing nations of the world which requires a more rapid expansion of the poultry industry if it must be bridged. Farmers' response to the above duo challenges of the poultry industry have encouraged increased antibiotics use in the industry in many countries of the world, Nigeria inclusive. Antibiotics usage has thus facilitated the efficient production of poultry, allowing the consumer to purchase at a reasonable cost, leading to high quality meat and eggs as well as reduce the impact of disease outbreaks (Al-Ghamdi et al, 2000).

Antibiotics are substances which are metabolically produced by microorganisms and which exhibit either an inhibitory or destructive effect on other microorganisms. In many developing countries, majority of the antibiotics are being used in poultry for treatment of infections for healthy birds. In addition, antibiotics are also used to counteract the adverse consequences of stress responses. Antibiotics are further used in veterinary

medicine to treat and prevent diseases and for other Purposes: including growth promotion in food animals (Phillips et al., 2004). Bacitracin, chlortetracyline, tylosin, avoparcin, neomycin, oxytetracycline, virginiamycin, trimethoprim/suiphonamide, lincosamides, cephalosporins etc are the commonly used antibiotics in poultry and some of which are of direct importance in human medicine.

The economic and health advantages of proper use of many antibiotics and have no doubt revolutionized intensive poultry and livestock production. Benefits of poultry antibiotics include production of higher outputs as healthier animals with increased weight put on more weight, and the meat derived from these healthier animals has lower levels of bacteria that can cause food borne illnesses in people. They are used as growth promoters at sub-therapeutic concentrations (50 - 100 $mgkg^{-1}$) in feed and act by suppressing harmful microorganisms. They also improve gut health, which leads to increase in feed conversion efficiency, optimization of genetic potential for growth and reduction of waste product output from intensive poultry production.

While antibiotics have made intensive poultry system to become a lucrative form of trade, its use in poultry production has also come under the lens in the recent times with questions being raised on its potential threat to human health. Consumer protection groups are pressuring regulatory agencies to reconsider the safety issues associated with antibiotics usage, and concern also raised in the livestock and poultry industries that antibiotics may be further restricted or even completely banned due to its associated health risks particularly to humans (Gary, 1999). Driven by this concern for human health, Denmark initiated in 1995 a process to end the use of antibiotics as growth-promoters in livestock production. This process involved both voluntary and legislative elements that led to the situation that virtually no antimicrobial growth-promoters have been used in Denmark since the end of 1999 (WHO, 2002).

In Nigeria however, indiscriminate use of antibiotics in animal agriculture is still widespread, particularly as feed additives (Smith et al, 2003, and Kabir et al, 2004). Worst still in Nigeria, the level of use of antibiotics in its poultry industry is presumably unknown and the attendant health risks associated with the level of use eludes not only the poultry farmers, but also the consumers of poultry products. USDHHS/ FDACVM (2012) reported that the use and misuse of antibiotics creates

more rapidly, antimicrobial-resistant bacteria than antimicrobial-susceptible bacteria and thus, increases the opportunity for individuals to become infected by resistant bacteria. In similar vein, CDCP (2013) observed that antibiotic resistance is associated with at least 2 million illnesses and 23,000 deaths each year.

According to a World Health Organization report (WHO, 2011), there is an urgent need for action in countering antibiotics resistance through a holistic, inter-sectoral, and multifaceted approach that should focus on all efforts to reduce unnecessary use of antibiotics, including those used in food production. Ogunleye et al, (2008) further reiterated the need for a critical review of the usage of antibiotics in livestock industry in Nigeria and the importance of taking concrete steps in terms of policy to curtail the indiscriminate use of antimicrobial agents in a bid to prevent the possible adverse consequences in animal production, as well as in humans. Provision of the necessary policy/regulatory framework for the Nigeria poultry industry as it is being clamored is therefore thought to require relevant baseline socio-economic data associated with anti-biotic use among Nigerian poultry farmers. It is against this background that this study was carried out to investigate use of antibiotics and compliance to standard practices in poultry health management among farmers in Oyo State, Nigeria.

The general objective of the study is to investigate use of antibiotics and compliance to standard practices in poultry health management among farmers in Oyo State, Nigeria. The specific objectives include to: determine personal and farm characteristics of farmers in the study area; examine their knowledge of proper use of antibiotics; identify factors responsible for antibiotics usage among the poultry farmers in the study area; investigate poultry farmers awareness of hazardous health effect of the misuse of antibiotics; and determine poultry farmers compliance to the recommended practices for use of antibiotics in poultry management.

Methodology

The study area was Oyo state, Nigeria. The population of study included all registered poultry farmers with poultry association of Nigeria (PAN) and those that are not registered with PAN in Oyo state. Multi-stage sampling procedure was used to select PAN and non-PAN registered farmers for the study. Multistage sampling technique was employed to

draw the sample size (Table 1). Four out of the 33 local government areas (Afijio, Lagelu, Egbeda, and Oyo west) in Oyo state were purposely selected based on the concentration of poultry farmers in the local government areas (L.G.As). A list of PAN registered farmers were obtained from each selected LGAs and Simple random sampling technique was used to select 40% of these registered farmers in the selected LGAs resulting into 60 PAN registered members. Snow ball sampling technique was used to generate a list of 92 non-PAN farmers and 46 of them representing 50% of the population were selected across the four LGAs. Thus, a total sample size of 106 respondents was used for this study. Using structured interview schedule, data was collected on the poultry farmers' knowledge of proper use of antibiotics, factors responsible for their antibiotics usage in poultry, awareness of hazardous health effect of the misuse of antibiotics and their compliance to the recommended practices for use of antibiotics in poultry management.

Table 1: Summary of sampling procedure

Study Area	No of PAN L.G.As	No of selected PAN L.G.As	Selected PAN L.G.As (25%)	No of PAN members selected in L.G.As	No of selected PAN members in selected L.G.As (40%)	Snow balled Non PAN members	Sample size(n)
Oyo State	16	4	Afijio	60	24	46	106
			Lagelu	42	17		
			Egbeda	27	11		
			Oyo West	20	8		

Respondents' knowledge of the proper use of antibiotics in poultry health management was measured by asking respondents to react to 20 knowledge statements which comprised of positive and negative items. Correct responses were scored 1. A mean score of 32.2 was determined and used to categorize the respondents into high and low knowledge categories. Factors responsible for the use of antibiotics in poultry health management were measured by listing 9 possible factors and asking respondents to list other factors. This was measured using Never, Sometimes and Always options which were scored 1, 2 and 3 respectively. Mean scores obtained for each factor was used to rank the factors in their other of importance. Respondents' level of awareness of hazardous health effects of misuse of antibiotics in poultry health management was measured by asking respondents to react to 13 awareness statements which comprised of

positive and negative items. Correct responses were scored 1 and incorrect 0. A mean score of 22.4 was determined and used to categorize the respondents into high and low awareness categories. Compliance to the standard practice for use of antibiotics was measured by generating 32 statements that covered various stages on the use of antibiotics such as purchase, dosage, administration and storage. Respondents reacted to the statements on a five point basis of Never, up to 25% of time, up to 50% of time, up to 75% of time and Always. The mean score for each stage of use was determined and used to compare compliance along the continuum of use.

Data collected was summarised using descriptive statistical tools such as percentages, mean, and frequency distribution, while Pearson Product Moment Correlation (PPMC) and t-test inferential statistics were used to test the hypotheses.

Results and Discussion

Respondents' enterprise characteristics

Table 2 on the respondents' enterprise characteristics shows that the commonly kept poultry birds among the farmers were layers (79.2%) and broilers (54.7%). This is probably due to the relatively high economic importance attached to these birds in Nigeria and the readily available market for their products particularly, during the festival periods. Majority (70.7%) kept above 3000 birds in their farms with the mean number of bird per farmer as 3,789. This suggests that most of the farmers operated at above peasant level and a confirmation of the report that Oyo State is among the leading states in poultry production in Nigeria (www.businesslist.com.ng).

A sizeable proportion of the farmers (41.5%) operated a combination of both cage and deep liter systems of poultry management. This practice was probably prevalent in order to combine the benefits of the two systems of management for a more efficient production system. Slightly above half (50.9%) of the poultry farmers had tertiary level education implying that the farmers were literate. This is expected to translate to improvement on the farmers' productivity due to ability to utilize innovative technology and improved production practices (Tirfe, 2014). However, only 14.1% of the poultry farmers had been in the business for over 10 years implying that a majority of them were still new entrants in

the industry. The foregoing suggests that the poultry farmers in the study area had promising enterprise characteristics but are still limited by years of experience in the industry.

Table 2: Distribution of respondents based on their farm characteristics (n=106)

Variables		Frequency (F)	Percentage (%)	Mean
Type (s) of birds	Broiler	58	54.7	
	Layers	84	79.2	
	Turkey	22	20.8	
	Quail	12	11.3	
Flock size	≤1000	19	17.9	3789.3
	1001-3000	12	11.3	
	3001-5000	68	64.1	
	5001-7000	4	3.8	
	7001-9000	1	0.9	
	>9000	2	1.9	
Housing management system	Deep litters	43	40.6	
	Cage	20	18.9	
	Both cage and deep litters	44	41.5	
Highest level of education	No formal education	3	2.8	
	Primary education	11	10.4	
	Secondary education	38	35.8	
	Tertiary/university education	54	50.9	
				6.3
Years of experience in poultry production	1-5	66	61.3	
	6-10	26	24.5	
	11-15	7	6.6	
	16-20	6	5.7	
	>20	1	0.9	
	No response	1	0.9	

Respondent's knowledge of the proper use of antibiotics in poultry health management

Tables 3 reveals that majority of the respondents (64.2%) had high knowledge of proper use of antibiotics in poultry management, while about one-third (35.8%) indicated low knowledge. The high level of education of the respondents (Table 2) may have increased their access to technical

information on drug use in poultry health management which could be a plausible reason for high knowledge of the appropriate use of antibiotics among the majority (Tirfe, 2014). This result however, is at variance with Sirdar et al. (2012) who observed a widespread lack of knowledge about drug behavior and its effects amongst Sudanese poultry farmers. Furthermore, the disaggregated data according to farmers' membership or non-membership of PAN shows a similar trend for both non registered and registered PAN members as both categories indicated high level of knowledge of use of antibiotics (63.3% and 65.2% respectively) in poultry health management. One would expect to observe a relatively higher level of knowledge among PAN registered members to justify the at least of the gains of membership activities such as workshop, seminars and other. This is however not so. This is probably a result of diffusion of knowledge between members of these groups over a period of time or an attestation to the argument of Adebayo (2000) that most farmers group are dormant in their activities and may not meet the aspiration of their members.

Table 3: Categorization of respondents based on their knowledge of proper use of antibiotics in poultry health management (n=106)

Knowledge	Scores	PAN members	Non-PAN members	All respondents	Mean
High	32-38	38(63.3)	30(65.2)	68 (64.2)	32.2
Low	27-31	22(36.7)	16(34.8)	38 (35.8)	

Figures in parentheses are percentages.

Factors responsible for use of antibiotics in poultry health management

Table 4 shows that factors such as growth promotion ($\bar{x}$=2.38), prophylactic use: prevention against possible infection ($\bar{x}$=2.36), therapeutic: treatment ($\bar{x}$=2.31) and drop in production ($\bar{x}$=2.31) were the most prominent factors underlining the use of antibiotics in poultry management in that order. Factors such as cheap cost ($\bar{x}$=2.00) and ease of access of antibiotics (mean=2.2) ranked lowest on the scale. The implication of this finding is that, respondents holds growth promotion, prevention against anticipated infections most important reasons for the use of antibiotics which portends danger for public health most especially consumers of poultry product because of the possible resultant effect that leads to bacteria resistance. The result agrees with Olatoye (2011) who

reported that a large percentage of poultry farmers in Oyo state, Nigeria used antibiotics for growth promotion.

Table 4: Factors responsible for the use of antibiotics in poultry health management among respondents (n=106)

S/N	Statements(factors)	Always	Sometimes Frequency	Never	Mean	Rank
1	When animals take ill to the point of increased mortality **(therapeutic).**	39(36.8)	61(57.5)	6(5.7)	2.31	3
2	When the production level drops i.e reduced laying, weight loss etc.	36(27.4)	67(63.2)	3(2.8)	2.31	3
3	Recommendations received from fellow farmers.	29(27.4)	69(65.1)	8(7.5)	2.20	6
4	Based on wealth of experience acquired in management of birds over the years (**farmers' experience**).	39(36.8)	60(56.6)	7(6.6)	2.30	4
5	Prevention against possible infection in a situation where disease is likely to occur if the drug is not administered (**prophylactic use**).	40(37.7)	64(60.4)	2(1.9)	2.36	2
6	For efficient feed conversion by birds **(Growth promoter)**	48(45.3)	50(47.2)	8(7.5)	2.38	1
7	Drop in consumption of feed by birds **(appetite boost)**	35(33.0)	61(57.5)	10(9.4)	2.24	
8	Cheap cost of antibiotics	25(23.6)	55(51.9)	26(24.5)	2.00	7
9	Easy access to antibiotics.	41(38.7)	41(38.7)	24(22.6)	2.20	6

**Figures in parentheses are percentages.*

Awareness of hazardous health effects of misuse of antibiotics in poultry health management

Table 5 shows that over two-third of the respondents fell within the high awareness category (67.0%) while a third of the respondents were in the low cadre (33.0%) of the awareness on hazardous health effect of the misuse of antibiotics. Also, awareness of the hazardous health effects of antibiotic misuse was higher among most of the PAN registered farmers (70.0%) when compared with their non registered counterparts (63.0%). The higher level of awareness among PAN members could be as a result of technical information that is regularly shared within PAN group. Relating this finding with Table 4 above, one can infer that farmers' awareness of the health hazards of the misuse of antibiotics in poultry health management

has not considerably translated to the expected refrain from its use particularly in unnecessary conditions such as for growth promotion. This act of ignore on the part of farmers is probably due to the quest for economic gains at all costs.

Table 5: Categorization of respondents based on their awareness of hazardous health effects of misuse of antibiotics in poultry health management (n=106)

Awareness	Scores	PAN members	Non PAN members	All respondents	Mean
High	22-26	42(70.0)	29(63.0)	71 (67.0)	22.4
Low	16-21	18(30.0)	17(37.0)	35 (33.0)	

Figures in parentheses are percentages

Compliance to standard practices for use of antibiotics in poultry health management

Appendix 1 shows the extent of compliance of poultry farmers to standard practices for use of antibiotics in the management of their birds. The distribution shows that compliance was highest in pre-drug administration procedure ($\bar{x}$=22.4) and dosage prescription ($\bar{x}$=22.1). On the other hand, compliance was lowest with respect to where and how the farmers purchase the antibiotics ($\bar{x}$=18.9). The low extent of compliance indicated on purchase of antibiotics suggests that the open market that is largely unregulated still remain the main source of uptake of poultry drugs among farmers in the study area. This finding is in consonance with Okoli *et al.* (2002) and Okoli *et al.* (2005) who reported that non-qualified personnel such as hawkers, small traders and illiterate market women are known to be involved in the retailing of veterinary drugs especially poultry medicines in south eastern, Nigeria. Furthermore, the summary table (Table 6) shows that just half (50.0%) of the respondents fell within the category of high compliance to standard practices. This is equally not good enough for the health of poultry consumers, as results indicates that a sizable proportion of poultry farmers are still indulged in unsafe practices in the poultry industry. The result is in tandem with the submission that the major factor associated with the presence of antimicrobials in eggs was a lack of compliance with withdrawal period and a lack of understanding that residues can pass from the chickens to eggs **(**Sirdar *et al.*, 2012).

The table further reveals that more PAN members (51.7%) fell within the high compliance category when compared to 47.8% of the non PAN members that fell within the same category. This distribution suggests that more PAN members complied with safety regulations for antibiotics use more than their counterpart who did not join the association.

Furthermore, the even number of respondents in the high and low categories indicates looming dangers of failed surgical procedure, increased disease level in health management of consumers of poultry product and the reduction in efficacy of antibiotics in the treatment birds because, it is expected that a higher percentage should conform with the standard practice in the use of this vital and "life saving drug" (antibiotics) for the drug to still remain relevant.

Table 6: Categorization of respondents based on their compliance to standard practices for use of antibiotics in poultry health management (n=106)

Compliance	Scores	PAN members	Non PAN members	All respondents	Mean
High	83-116	31(51.7)	22(47.8)	53 (50.0)	82.9
Low	53-82	29(43.8)	24(52.2)	53 (50.0)	

*Figures in parentheses are percentages

The result in Table 7 reveals that there is no significant relationship between respondent's knowledge of proper use of antibiotics and compliance to standard practice for use of antibiotics in poultry health management (r=0.002, p= 0.987). This suggests that there is no reasonable correlation between farmer's knowledge of use and compliance to antibiotic usage; an indication that better knowledge on appropriate use of antibiotics would not probably translate to improvement in compliance. In similar vein, respondents awareness of the hazardous health effects of misuse of antibiotics had no significant influence on their compliance (r=0.078, p=0.427). The reason for this is not far-fetched as the use of antibiotics seems to be propelled by economic gains rather than as prophylactic as might be expected.

Table 7: Relationship between awareness of hazardous health effects of misuse of antibiotics, knowledge of use and compliance to standard practices for use of antibiotics in poultry health management among respondents

Variables	N	r- value	p- value	Decision
Awareness	106	0.078	0.427	NS
Knowledge	106	0.002	0.987	NS

Table 8 reveals that there is no significant difference in compliance to standard practice in the use of antibiotics for poultry health management between PAN and Non PAN members (t=0.625, p= 0.093). This is contrary to apriori expectation as members of PAN are expected conform more to standard practices stipulated for the use of antibiotics. This suggests that PAN group is not as much concerned about the health of the poultry consumers as it is with improving the productivity of its farmers.

Table 8: Difference in compliance to standard practices for use of antibiotics in poultry health management between registered and non registered PAN members

Variables	Df	Mean	t-value	p-value	Decision
PAN	104	83.7	0.625	0.093	NS
Vs					
NON PAN		81.8			

Conclusion and Recommendations

The study concludes that compliance to standard practices for use of antibiotics in poultry health management was generally poor among the respondents. Worst still, is the fact that compliance was not influenced by the farmers' awareness and knowledge of risks of misuse but by economic gains. Furthermore, rather than being driven by prophylactic purposes, use of antibiotics in poultry health management was mainly underlined by desire to enhance economic returns by means of promoting a rapid growth of birds that are fed by the drugs. Worst still, the farmers association group that should serve as a veritable platform to promote behavioral change appeared to be docile in this aspect.

Establishment of a regulatory agency to enforce compliance with standard practices in poultry production would help curtail the spread of

resistant bacteria in both consumers of poultry products and birds and consequently reduce the health hazards threats created by the abuse and misuse of antibiotics in poultry health management. Also, the general public need to be sensitized on the health risks associated with the consumption of poultry products over fed with antibiotics. This will reduce the demand/uptake of such birds/products from the market and indirectly discourage poultry farmers from such abuses.

References

Adebayo, K. and E.T. Adeyemi (2000). Key issues in the sustainability of farmers group in Ogun state paper presented at the 6th Annual conference of Agricultural Extension Society of Nigeria held at university of Ibadan, pp:11.

Adepoju, A.A. (2008). Technical Efficiency of Egg Production in Osun State In International Journal of Agricultural Economics & Rural Development - 1 (1): 2008© IJAERD, 2008.

Al-Ghamdi, M., Z. Al-Mustafa, F. El-Morsy, A. Al-Faky, I. Haider and H. Essa, H. (2000). Residues of tetracycline compounds in poultry products in the eastern province of Saudi Arabia. *Public Health*, 114:300-304.

Centers for Disease Control and Prevention (2013). *Antibiotic resistance threats in the United States.* www.cdc.gov/drugresistance/ threatreport- 2013/ (accessed October 10, 2013).

Gary, L.C. (1999). *The Farmer's Pride, KPPA News, Vol 11, No. 2, July 7, 1999.*

Ogunleye, A.O., M.A. Oyekunle and A.O. Sonibare (2008). Multidrug resistant *Escherichia coli* isolates of poultry origin in Abeokuta, South Western Nigeria. Vet. arhiv 78, 501-509, 2008.

Okoli, I.C, C.N. Anyaegbunam, E.B. Etuk, M.N. Opara and A.B.I. Udedibie (2005). Entrepreneurial Characteristics and Constraints of Poultry business in Imo State, Nigeria. *Journal of Agriculture and Social Research,* **5**(1): 25-32.

Okoli, I.C., C.I. Nwosu, G.C. Okoli, N.J. Okeudo and V. Ibekwe (2002). Drug management of anti-microbial resistance in avian bacterial pathogen in Nigeria. *International Journal of Environmental Health and Human Development,* **3**(1): 39 – 48.

Okunlola, J.O and A. Olofinsawe (2007). Efects of extension activities on Poultry Production in Ondo State, South Western Nigeria. Agricultural Journal, 2: 559-563.

Olatoye, I. O. (2011). Antibiotics use and resistance patterns of *Salmonella* species in poultry from Ibadan, Nigeria. *Tropical Veterinarian*, **29**(1): 28-35.

Phillips, I., M. Casewell, T. Cox, T., Groot, B.D., C. Friis, C. Jones C. Nightingale, R. Preston and J. Waddel (2004). Does the use of antibiotic pose a risk to human? A critical review of published data. J Antimicrob Chemother, 2004.

Sirdar, M.M., J. Picard, S. Bisschop and B. Gummow (2012). 'A questionnaire survey of poultry layer farmers in Khartoum State, Sudan, to study their antimicrobial awareness and usage patterns', *Onderstepoort Journal of Veterinary Research* 79(1), Art. 361, 8 pages. http://dx.doi. org/10.4102/ojvr.v79i1.361.

Smith, S.I., O.O. Aboaba, P. Odeigha (2003). Plasmid profi le of *E. coli*0157:H7 from apparently healthy animals. African Journal of Biotechnology 2: 322-324, 2003.

Tirfe, A.G. (2014). Small holder farmers' innovation and its determinants: The case of Hirity Mekan seed producers' cooperative, Tigray Ethiopia. Developing Country Studies Vol. 4 No. 21, pp104-115.

USDHHS/FDACVM, (2012). Guidance for industry: The judicious use of medically important antimicrobial drugs in food-producing animals, US Department of Health and Human Services Food and Drug Administration Center for Veterinary Medicine, viewed 22 August, 2012, from http://www.scribd.com/doc/86485752/FDA-Draft-Guidance-209.

WHO (2002). Impacts of antimicrobial growth promoter termination in Denmark: World Health Organization.

WHO, (1997). Division of emerging and other communicable diseases surveillance and control. The medical impact of the use of antimicrobials in food animals. Report of a WHO meeting, Berlin, Germany, 13-77 October, 1997.

Appendices

Appendix 1: Respondents knowledge of the proper use of antibiotics in poultry health management (n=106)

S/N	Statements	Frequency(F)	Percentage (%)
1	Antibiotics can be used to cure infections caused by bacteria in birds such as fowl cholera, infectious coryza etc	102	96.2
2	Antibiotics can be used to cure infections caused by viruses such as Newcastle disease, marek diseases, and infectious bursal disease (Gumboro)	61	57.5
3	Use of antibiotics will instantly speed up the recovery of sick birds	99	93.4
4	Antibiotics is vital in to maintaining healthy birds	93	87.7
5	Antibiotics are introduced anytime when the performance of birds are low	73	68.9
6	There are specific dosages for different antibiotics	96	90.6
7	Antibiotics are administered only in oral form	47	44.3
8	Antibiotics are administered in both oral and in feed	91	85.8
9	All brands of antibiotics attack all bacteria (broad spectrum)	61	57.5
10	Antibiotics are bacteria specific i.e solely active against particular bacteria disease causing organism	89	84.0
11	Antibiotics can be mixed with vitamins when administered to birds	85	80.2
12	Antibiotics can be used to cure protozoan diseases like coccidiosis	69	65.1
13	There are some beneficial bacteria in birds which are good for their health	57	53.8
14	Continuous use of antibiotics causes resistance of bacteria	60	56.6
15	Frequent use of antibiotics will decrease its treatment efficacy	73	68.9
16	The efficacy is better if the antibiotics are newer and the price is higher	64	60.4
17	Drug susceptibility testing of bacteria" is to test if the antibiotic is efficient for infections by some bacteria	72	67.9
18	Antibiotic when not properly stored becomes infective	77	72.6
19	Antibiotic resistance can be picked up from the birds by you and your family	59	55.7
20	Abuse of antibiotics the main cause of bacterial resistance	68	64.2

Appendix 2: Respondents awareness of hazardous health effects of misuse of antibiotics in poultry health management (n=106)

S/N	Statements	Agree	
		Frequency(F)	Percentage (%)
1	Indiscriminate use of antibiotics would lead to new multi resistance strain of bacteria in birds	85	80.2
2	Abuse of antibiotics cannot lead to antibiotic resistance in consumers	74	69.8
3	Release of resistant bacteria due to improper disposal of poultry waste makes humans and animal susceptible. (Environmental pollution)	99	93.4
4	Overuse of antibiotics can lead to treatment failure in poultry.	95	89.6
5	Indiscriminate use of antibiotics overtime, for heath management of birds can lead failed surgical procedure in consumers of poultry product	75	70.8
6	Overuse of antibiotics increases chemical residue in birds.	80	75.5
7	Increased antibiotic use can lead to increased disease level among consumers of poultry products	70	66.0
8	Mishandling (other than procedure stated by the manufacturer or veterinarian) of antibiotics could lead failure of initial antibiotic treatment.	79	74.5
9	Antibiotics used over a long period can be associated with increased likelihood of infection in birds.	76	71.7
10	Antibiotics used over a long period can be associated Increased likelihood of infection in consumers.	55	51.9
11	Abuse of antibiotics results to limited range of usable antibiotics.	86	81.1
12	Misuse of antibiotics can lead to increased vulnerability in day old chicks.	77	72.6
13	Over-use of antibiotics can lead to increased cost of health management of birds.	81	76.4

Appendix 3: Respondents compliance to standard practices for use of antibiotics in poultry health management (n=106)

S/N	Statements	Never	Up to 25% of time	Up to 50%of time	Up to 75% of time	All the time	Mean
1	**PURCHASE** Purchase of drug is based on clinical diagnosis of certified animal health professional	11(10.4)	18(17.0)	35(33.0)	14(13.3)	28(26.4)	18.9
2	I read the label, package leaflet and, if available, safety data sheets before purchasing of antibiotics	5(4.7)	23(21.7)	12(11.3)	11(10.4)	56(51.9)	
3	Purchase of antibiotics strictly from registered veterinary store	6(5.7)	19(17.9)	14(13.2)	8(7.5)	59(55.7)	
4	I only buy drugs from stores recommended by certified animal health professional	14(13.2)	25(23.6)	11(10.4)	11(10.4)	45(42.5)	
5	I prefer patronizing drug hawkers because they are better alternative to registered stores because their drugs are cheaper	57(53.8)	17(16.0)	17(16.0)	6(5.7)	9(8.5)	
6	I seek only the help of drug retailers in buying antibiotics	28(26.4)	30(28.3)	24(22.4)	11(10.4)	13(12.3)	
7	Some of the foreign brands of antibiotics without NAFDAC- Registration number are better than the local ones that are registered	41(38.7)	13(12.3)	20(18.9)	13(12.3)	19(17.9)	
8	I keep purchase records of antibiotics used on the farm	12(11.3)	12(11.3)	20(18.9)	13(12.3)	49(46.2)	
	DOSE						
9	The dose stated on the brand of antibiotics are strictly followed	10(9.4)	8(7.5)	20(18.9)	20(18.9)	48(45.3)	22.1
10	Dosage recommended by veterinarian are adhered	15(14.2)	9(8.5)	28(26,4)	17(16.0)	37(34.9)	
11	I increase the quantity of antibiotics because of the severity of the prevailing disease	15(14.2)	16(15.1)	22(20.8)	24(22.6)	29(27.4)	
12	Withdrawal periods of drugs stipulated on label is observed	12(11.3)	13(12.3)	30(28.3)	8(7.5)	43(40.6)	
13	I sometimes reduce the stipulated withdrawal periods stated on label because are overly stated.	30(28.3)	15(14.2)	28(26.4)	6(5.7)	27(25.5)	

14	Time between the use of antibiotics and earliest possible slaughtering is at my discretion	21(19.8)	16(15.1)	25(23.6)	19(17.9)	25(23.6)	
15	I sometime continue treatment when prescribed treatment course has been reached(due to the fact that birds are still down with symptoms)	18(17.0)	19(17.9)	22(20.8)	15(14.2)	32(30.2)	
16	I keep records of administered (dose) antibiotics	12(11.3)	17(16.0)	21(19.8)	9(8.5)	47(44.3)	
17	**ADMINISTRATION**						
	Antibiotics are administered under the supervision of a veterinarian	18(17.0)	11(10.4)	27(25.5)	18(17.0)	32(30.2)	22.4
18	I administer antibiotics based on advice from fellow farmers that are experienced	17(16.0)	23(21.7)	20(18.9)	23(21.7)	23(21.7)	
19	I ensure those who administer the drug(antibiotics) are competent and properly trained	10(9.4)	14(13.2)	17(16.0)	18(17.0)	47(44.3)	
20	Highest standard of hygiene are followed when giving antibiotics to birds(which also include ready access non-chlorinated water and to suitable washing facilities) i.e bio-security	4(3.8)	15(14.2)	16(15.1)	17(16.0)	54(50.9)	
21	Antibiotics are administered to a group of animals when a proportion of the animals in the group exhibit clinical signs of disease.	12(11.3	16(15.1)	18(17.0)	14(13.2)	4643.4)	
22	Antibiotics are best applied in strict accordance with the manufacturer's instructions	14(13.2)	10(9.4)	21(19.8)	20(18.9)	41(38.7)	
23	Antibiotics are active against all micro infections.	11(10.4)	20(18.9)	20(18.9)	27(25.5)	28(264)	
24	Antibiotics are used to maintain birds when the temperature of birds drops or increase	28(26.4)	15.(14.2)	23(21.7)	22(20.8)	18(17.0)	
25	**STORAGE**						
	I do not buy more antibiotics than needed	17(16.0)	20(18.9)	17(16.0)	23(21.7)	29(27.4)	20.0
26	Separation of antibiotics from other veterinary drugs is non-negotiable	18(17.0)	20(18.9)	18(17.0)	21(19.8)	29927.4)	

27	Antibiotics are secured in lockable store that is safe from children, vermin and birds	12(11.3)	17(16..0)	11(10.4)	15(14.2)	51(48.1)	
28	I have a separate building where drugs are stored on farm.	21(19.8)	11(10.4)	14(13.2)	13(12.3)	47(44.3)	
29	I keep veterinary medicines away from domestic, office or public access areas as well animal feed, to reduce the risk of mix-ups, contamination or medicines being taken by mistake.	13(12.3)	13(12.3)	19(17.9)	17(16.0)	47(44.3)	
30	Keep store records for separately for antibiotics	12(11.3)	11(10.4)	19(17.9)	17(16.0)	47(44.3)	
31	My drugs are secured against theft and unauthorized access by my employees	10(9.4)	12(11.3)	20(18.9)	14(13.2)	50(47.2)	
32	Avoid stockpiles of waste antibiotics by adopting a "first-in, first-out"	8(7.5)	15(14.2)	18(17.0)	24(22.6)	41(38.7)	
	COMPLIANCE TOTAL						82.9

Figures in parentheses are percentages