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Research Article

Effectiveness and Benefits of Biosecurity Practices in Small Scale Broiler Farmers in Ekiti State, Nigeria

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ABSTRACT: Biosecurity practices offer safe and profitable livestock management processes, with potential for sustainability in livestock business and safe human health. Therefore, this study examined the effectiveness and benefits of biosecurity practices among small scale broiler farmers in Ekiti State. Multistage, purposive and random sampling techniques were used to select 114 respondents for the study; data were collected using structured interview schedule, analysed with frequency counts, percentages, chi-square and pearson product moment correlation. More than half (53.5%) of the respondents were males (41-50years), married (68.4%). Majority of the producers (86.8%) had a flock size of 1001 to 5000 and 64.0% of them had more than 20 years experience. Many of the respondents recorded high benefits and effectiveness of biosecurity practices in their broiler farming, while exhibition of non-robust biosecurity practice was evident among the broiler farmers. Educational Status (χ^2=34.632), flock size (χ^2=28.337), age (r=0.162) and benefits of biosecurity practices (r=0.187) were significantly related to the effectiveness of biosecurity practices for broiler production. Hence, more robust information on biosecurity practices for broiler production through livestock extension agents should be disseminated to the broiler farmers, using channels of seminar and workshop with the collaboration of poultry association of Nigeria.

Keywords: Poultry, Effectiveness, Practices, Benefits, Biosecurity

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Nijerya- Ekiti'de Küçük Ölçekli Broyler Çiftliklerinde Biyogüvenlik Uygulamalarının Etkinliği ve Faydaları

ÖZ: Biyogüvenlik uygulamaları hayvancılık işletmelerinin sürdürülebilirliği ve insan sağlığının güvenliğinin yanı sıra güvenli ve karlı bir hayvancılık yönetim sürecini sağlar. Bu nedenle bu çalışmada Ekiti'de küçük ölçekli broyler çiftlikleri arasında biyogüvenlik uygulamalarının faydaları ve etkinliği değerlendirilmiştir. Araştırmaya katılan 114 çiftliği seçmek için çok aşamalı, amaçlı ve rastgele örnekleme teknikleri kullanılmıştır. Veriler yapılandırılmış görüşme tekniği kullanılarak toplanmış, frekans sayımları, yüzdeler, ki-kare ve pearson çarpım moment korelasyon tekniği ile analiz edilmiştir. Katılımcıların yarısından fazlası (%53.5) erkek (41-50 yaş) ve %68.4'ü evliydi. Büyük çoğunluğu (%86.8) 1001 ila 5000 kapasiteli küme sahipti ve %64.0'ü 20 yılı aşkın deneyime sahipti. Birçok katılımcı broyler çiftliklerinde biyogüvenlik uygulamalarının yüksek yararlarını ve etkinliklerini kaydederken, broyler yetiştiricileri arasında yeterli olmayan biyogüvenlik uygulamalarının sergilendiği ortaya çıktı. Broyler yetiştiriciliğinde; eğitim durumu (χ^2=34.632), sürü büyüklüğü (χ^2=28.337), yaş (r=0.162) ve biyogüvenlik uygulamalarının faydaları (r=0.187) biyogüvenlik uygulamaları ile önemli derecede ilişkiliydi. Bununla birlikte, broyler üreticilerine, hayvancılığa destek verecek birimler (extention agents) yoluyla, Nijerya tavukçuluk derneğinin işbirliği ile seminer ve workshoplar düzenlenerek broyler üretimi için biyogüvenlik uygulamaları konusunda daha güçlü bilginin yayılması gerekmektedir.

Anahtar Kelimeler: Kanatlı, Etkinlik, Uygulamalar, Faydalar, Biyogüvenlik

INTRODUCTION

Poultry has a great potential for economic and employment opportunities in the agricultural sector of Nigeria. It could limit the youth from jostling for non-readily available white collar jobs and provide social security for retired populace. Poultry is one of the quickest ways for rapid increase in protein supply, in the short run (13). Moreover, Izunobi (11) stated that poultry provides food, income, employment, industrial raw materials and manure for crop production. Poultry accounts for 58.2% of the total livestock production in Nigeria (4). In spite of the employment opportunities the poultry industry creates and holds for people with entrepreneurial spirits and its contribution to the national economy, poultry production is generally faced with low capital base, inefficient management, disease and parasite, housing and marketing problems among others (5). Generally, current and comprehensive information on the poultry production sector in Nigeria is lacking (2). Chicken remains the most popular and commercialized poultry sector in the country. It contributes to the rural and urban economies, with a quick return on investment for poultry farmers, realizable between six to eight weeks. Globally, over 70% of broilers are raised in quite similar indoor intensive farming systems (14) and observably, a small proportion is reared in less intensive farming system. Broilers are widely reared using deep-litter system, with wood shavings to absorb the chicken excreta, having tendency for ammonia break out, which could lead to respiratory diseases in chickens, lesions and zoonosis when not promptly and safely managed by the broiler farmers. High mortality rate of poultry flock and epidemics of avian influenza set into poultry through careless practices and non-consideration of biosecurity practices, to forestall economic losses of poultry farmers.

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Biosecurity has great potentials of reducing, controlling and preventing the spread of disease pathogens within the poultry flock and possible experience of zoonosis from poultry management. Biosecurity has potentials of not just helping to eradicate management risks posed by pests and diseases from biological agents such as man and animal contact with the poultry environment but helps guide against economical losses in the poultry farm. Poultry disease management involves biosecurity practices, medication and mitigation (9). Biosecurity measures are a combination of systems and practices to reduce the burden of any disease producing agent on the farms and therefore prevent the adverse effects of diseases on the farm (3). Cardona and Douglas (6) posited that a comprehensive biosecurity programme should include three major elements; isolation, traffic control and sanitation. Isolation could involve the erection of fences or barricades to the poultry house, quarantine of sick chickens from healthy chickens before giving medications and provision of footbaths as a matter of compulsion for anybody entering the poultry house, before being granted access to the poultry house for whatever course. In addition, traffic control could be considered as the restriction of humans, pets, vehicles, poultry equipment and new stock of day old chicks into the poultry farm. Sanitation involves the cleaning and disinfection of the poultry house and poultry equipment regularly, likewise provision of protective cloth, foot wear, compartment to individuals entering the poultry house on every visit. Hence, these procedures hold great potential of limiting the spread of pathogens and other disease causing agents into the poultry house, which poultry farmers seem not to be taking seriously, in terms of effectiveness.

Biosecurity, invariably posits quality assurance for poultry operators against high mortality losses and commercialization of safe poultry products that can guarantee good healthy chickens and poultry products raised and bought by consumers for healthy consumption. This could therefore assist the marketability, sustainability and optimal profitability of the poultry business over a long period of time. Biosecurity measures, which include cleaning and disinfection in the poultry industry remain critical to the production process, the efficacy of the disinfectants used at the small scale level of poultry operation has been scantly reported (7,10). The problem of meeting protein and caloric needs of the people through poultry products sold into the domestic markets without assurance of safety poultry management remains a contributory factor to the serious health hazard in the country. It is therefore, important to determine the benefits and effectiveness of the biosecurity practices carried out by these small scale broiler farmers who contribute to some extent the available poultry meat in our domestic markets and possible health implications of consumption in the study area. It is on this note that the study looked into the following objectives which are to;

a. identify the personal characteristics of the small scale broiler farmers in the study area.
b. determine the benefits of biosecurity practices to broiler farmers in the study area.
c. determine the effectiveness of biosecurity practices undertaken by the broiler farmers in the study area.

The hypotheses were stated in the null form (H_o)

H_o1: There is no significant relationship between the personal characteristics of the broiler farmers and the effectiveness of biosecurity practices for broiler production

H_o2: There is no significant relationship between the benefits of biosecurity practices and the effectiveness of biosecurity practices for broiler production.

MATERIAL and METHOD

This study was conducted in Ekiti State, Nigeria. The State which lies entirely within the tropics is located between Longitude 4^o 45^1 to 5° 45 ^{1}East of the Greenwich meridian and Latitude 7°15^1 to 8° $5'^1$North of the equator. It lies south of Kwara and Kogi States while it is bounded by Osun State on the west. It is also bounded in the south and in the east by Ondo State. The state enjoys a typical tropical climate with two distinct seasons, the rainy season which last from April to October and the dry season that spans for the remaining months (November to March). Temperature ranges between 21°C and 28°C with high humidity (8). Tropical forest exists in the southern part of the state while the guinea savannah occupies the Northern area of the State. The farmers in this state mainly engage in agricultural activities, with arable crop production as the major source of their livelihood, generating raw materials for their livestock production, as livestock production and artisanship remain secondary occupations among the farmers.

The study population consists of broiler farmers in Ekiti State. A total of six Local Government Areas (LGAs): Ado, Ikere, Oye, Irepodun/Ifelodun, Ido/Osi and Ikole LGAs were purposively selected for the study due to the dominance of registered broiler farmers with poultry Association of Nigeria in these areas. A total of 19 broiler farmers were randomly selected from each of the local government areas from the list of poultry farmers obtained from poultry farmers association in each of the local government area. A total of 114 respondents were selected for the study. Data were collected with the aid of a structured interview schedule. Respondents indicated the benefits of biosecurity practices from a list of biosecurity practices for broiler production on a three point scale of Highly beneficial (2), Beneficial (1) and Not beneficial (0). Frequency counts and percentages were used to summarize the data. Respondents reacted to the listed effectiveness of biosecurity practices on a three point scale of “Very Effective”, “Effective” and “Not Effective”, scores of 2, 1, and 0 were awarded to them respectively. A mean score was obtained for effectiveness of biosecurity practices for broiler production based on the scale. Respondents who scored below the mean value had low effectiveness, while those whose effectiveness score equals or greater than the mean had a high level of effectiveness of biosecurity.

RESULTS and DISCUSSION

Table 1 revealed that more than half (53.5%) of the respondents were males, a larger percentage (68.4%) were married and 51.8% were in the age category of 41-50 years. This implies that broiler farming was more practiced by the males, married and more of middle-aged, possibly due to the overwhelming family and social responsibilities on the male population than the females, leading them to broiler farming as a viable economic coping strategy to meet the demanding economic

responsibilities. This result confirms the findings of Olaniyi, Adesiyan and Ayoade (12) that married people account for majority of poultry farmers in Oyo State, Nigeria. Tuffour and Oppong (16) also supported the finding that majority of the poultry farmers in developing countries were males. Majority (86.8%) of the respondents had a form of formal education. This implies that the bulk of the educated respondents had opportunities to obtain, process and utilize biosecurity practices information as an important tool for a successful broiler production through diverse information sources read, sought and consulted. Tadesse (15) supported this finding that education is associated with receiving and absorbing of agricultural information and utilization of this information for improved farming practices.

Larger percentage (64%) of the respondents had a flock size of 1001 to 5000 while few (1.8%) of the respondents had a flock size of less than 500 broilers. This implies that the broiler farmers were practicing at a small scale level because of low economic potential to augment many family responsibilities and also, provides them an additional source of income to salvage economic servitude. Thus, small scale poultry farmers use very few salaried labour, if at all, but more dependent on farm families as labour to small flocks managed. Small scale poultry farm is faced with low opportunity for investment and security against risk. The analysis showed that all (100%) of the respondents belonged to poultry association while (54.4%) belonged to cooperative society. This indicates that poultry association and cooperative society remained respondents' sources of information on improved broiler production and beneficial information on reliable birds to stock, vaccines accessibility, sourcing of capital information and other relevant information for profitable broiler enterprise.

The result also showed that more than half (57.9%) of the respondents were Christians while Muslims (39.3%) and traditionalists (8.1%) were equally represented among the broiler farmers. This implies that all religion groups support broiler production. More than half (59.6%) of the respondents made a monthly income of ₦29,001 to ₦39,000 from their broiler enterprise. This may be due to low commercialization of broiler business by the broiler farmers in the study area. A larger percentage (64.0%) had poultry experience for more than 20 years yet this has not translated into higher incomes. Nonetheless, this could imply that the larger proportion of the broiler farmers, having been in the business for a long time, could be greatly influenced into adopting biosecurity practices for broiler production.

Table 2 revealed that majority (92.1% and 85.9%) of the respondents respectively identified routine cleaning of poultry house and poultry equipment aids decontamination of the broiler house as highly beneficial practices, likewise burning of dead birds as a disposal method, limited the susceptibility of broilers to infectious diseases respectively. These results are in line with Zavala (18) who reported that biosecurity ensures security of poultry farm from transmission of infectious diseases, parasites and pests. The implication of these results is that the broiler farmers noted great benefits on biosecurity practices for broiler farming. Large percentages (68.4%, 70.2%, 62.3% and 64.0%) of the respondents, respectively noted high beneficial gains from the use of different disinfectants to limit mortality record in the broiler farm, routine burning of poultry waste, use of disinfectants for washing hands and draining of broiler slaughter house with disinfectants regularly limit the breeding of pathogens and discourages disease outbreak in the broiler farm. These imply that the broiler farmers had high beneficial effects of using biosecurity practices in their broiler farms.

Table 1. Respondents' Personal Characteristics

Personal Characteristics	F	P (%)
Sex		
Male	61	53.5
Female	53	46.5
Marital Status		
Single	19	16.7
Married	78	68.4
Widow	13	11.4
Widower	4	3.5
Age		
21-30	11	9.6
31-40	20	17.5
41-50	59	51.8
51-60	18	15.8
Above 61	6	5.3
Educational level		
No formal education	15	13.2
Primary education	34	29.8
Secondary education	45	39.5
Tertiary education	20	17.5
Flock size		
≤ 500	2	1.8
501- 1,000	7	6.1
1,001-5,000	73	64.0
5,001- 10,000	25	22.0
Above 10,000	7	6.1
Membership of Association		
Poultry farmers association	114	100
Cooperative society	62	54.4
Religion		
Christianity	66	57.9
Islam	41	36.0
Traditional	7	6.1
Monthly Income		
Less than ₦20,000	11	9.7
₦20,001-₦29,000	21	18.4
₦29,001-₦39,000	68	59.6
Above ₦39,000	14	12.3
Poultry Experience		
Less than 10 years	8	7.0
11-20years	33	29.0
Above 20 years	73	64.0

F: Frequency, P: Percentage (%), Source: Field Survey, 2015* Multiple Response

More than half of the respondents (59.6%, 57.0%, 54.4% and 57.9%) respectively, noted high benefits from observing the presence of quarantine area in the broiler house, use of disinfectants for washing farm clothes and foot wear non-accumulation of broiler and poultry waste for manure sales to farmers and provision of clean overalls and boots for visitors limit the susceptibility of broilers to diseases. These imply that the broiler farmers took advantages of the benefits of biosecurity measures into their broiler farming. These results were in consonance with (1) that strict biosecurity measures in addition to vaccinations, are strategic prevention and control policies adopted to control some contagious poultry diseases, as vaccinations alone are not enough to control them under

field conditions. Less than half (49.1%) of the respondents had high benefits of fenced poultry farm limiting the entrance of pests into the broiler farm that could stir pathogens infestation and evasion of the poultry farm while (35.1%) recorded no benefit from birds earlier sold and rejected by consumers put under quarantine for a period of at least three weeks to limit the susceptibility of the broilers to diseases. These imply that the broiler farmers were either not aware or complacent of attracting pathogens and diseases to their flock from having non-fenced broiler farms and collecting back of birds earlier sold to customers back to the flock reared without quarantine for some days for appropriate observation and medication.

Table 2. Benefits of biosecurity practices among broiler farmers frequency (%)

Benefits of Biosecurity Practices	Yes	Highly Beneficial	Beneficial	Not Beneficial
Different use of disinfectants limit mortality record in the broiler farm	114 (100%)	78 (68.4%)	36 (31.6%)	0 (0%)
Routine burning of poultry waste limits pathogens breeding on the broiler farm	114 (100%)	80 (70.2%)	34 (29.8%)	0 (0%)
Routine cleaning of poultry house and poultry equipment daily aids decontamination of the broiler house	114 (100)	105 (92.1%)	9 (7.9%)	0 (0%)
Burning of dead birds as a disposal method limit the susceptibility of broilers to infectious diseases	102 (89.5%)	98 (85.9%)	4 (3.5%)	0 (0%)
Presence of quarantine area in the broiler house limits the spread of diseases from sick birds to other healthy birds	114 (100%)	68 (59.6%)	46 (40.4%)	0 (0%)
Use of disinfectants for washing farm clothes and foot wear at the broiler farm assures non-susceptibility of pathogens and diseases to the broiler farm	106 (93.0%)	65 (57.0%)	41 (35.9%)	0 (0%)
Non-accumulation of broiler and poultry waste for manure sales to farmers, limit breeding of pathogens and their infestation on the broiler farm	93 (81.6%)	62 (54.4%)	31 (27.2%)	0 (0%)
Use of disinfectants in washing hands disallows contraction of diseases from the broiler farm and transference of diseases from the poultry farm to people near and far from the broiler farm	95 (83.3%)	71 (62.3%)	24 (21.0%)	0 (0%)
Fenced poultry farm limits entrance of pests that could stir pathogen infestation and evasion of the poultry farm	98 (85.9%)	56 (49.1%)	42 (36.8%)	0 (0%)
Parking of vehicles at a distance from the broiler farm reduces the introduction of diseases to the broiler farm	87 (76.3%)	42 (36.8%)	45 (39.5%)	0 (0%)
Birds earlier sold and rejected by consumers, are put under quarantine for a period of at least three weeks limiting susceptibility of resident broilers to diseases	81 (71.1%)	22 (19.3%)	19 (16.7%)	40 (35.1%)
Provision of clean overalls and booths for visitors limit the susceptibility of broilers to diseases	112 (98.2%)	66 (57.9%)	42 (36.8%)	4 (3.5%)
Draining of broiler slaughter house with disinfectants regularly reduces and discourages disease outbreak in the broiler farm	97 (85.1%)	73 (64.0%)	24 (21.1%)	0 (0%)

Source: Field Survey, 2015 *Multiple Responses

Majority (83.3%, 81.6%, 86.8% and 82.5%) of the respondents respectively, identified quarantine of new birds from older birds reduces mortality losses of birds, regular disinfection of poultry house improves the control of diseases among their broiler flock and sanitation of poultry equipment with disinfectants before and after the stock of new birds have increased the survival rate of stocked chicks to maturity. Biosecurity practices enhanced broiler meat safety and reduction of air pollution around the poultry environment as very effective for safe, healthy and profitable broiler farming. These imply that majority of the broiler farmers had very effective results from the engagement of biosecurity for their broiler production. Large percentage (74.5% and 76.3%) of the respondents respectively observed that restriction of humans, pets and other animals as biological organisms into their poultry houses reduced the susceptibility of their broiler flock to diseases and burying or burning of dead birds away from their farms or on their farms, reduces diseases attack on their living birds as very effective measures to curb disease infestation in their broiler farm. These imply that many of the broiler farmers engaged in biosecurity measures with effective results of little or no disease record and low mortality rate of the broilers, which enhanced their productivity and profitability in broiler farming.

Substantial percentage of the respondents (62.3%, 62.3% and 60.5%) respectively maintained compliance of both staff and customers to foot bath on visit to their poultry farms, regular hygiene on their poultry farms have boosted the faith and patronage of customers in their broiler farms to assured believe of having disease-free

birds and attraction of good sales for their birds. In the same vein, replenishing of footbath daily limits microbial effects on their flock as very effective poultry measures to profitable broiler farming. These imply that the broiler farmers' biosecurity measures adopted were appropriate and effective for profitable broiler farming. More than half (56.1% and 50.9%) respectively identified biosecurity practices to increase the growth performance of their birds and the farm income from broiler farming and regular burying of litters have reduced poultry activities stirring air pollution and vector borne diseases into their flock. These imply that the adoption of biosecurity measures in broiler production by the broiler farmers have very effectively supported and optimized the broiler farmers' potentials of profitable broiler farming. The results were in line with United State Agency for International Development (17) that defined biosecurity as life and protection, with the two main objectives of biosecurity being bio-exclusion and bio-containment.

Few (20.2%) of the respondents maintained regular packing of vehicles many metres away from their poultry houses had been an effective way to reduce the susceptibility of their flock to diseases. This implies that many of the respondents did not have the knowledge of disallowing cars to be parked close to the broiler farm, a biosecurity practice that could lessen or eradicate the transmission of pathogens and diseases from the cars into their broiler farms.

Table 4 showed the level of effectiveness of biosecurity practices among broiler farmers with majority (83.3%) having a high level of effectiveness while few (16.7%) had low level of effectiveness of biosecurity practices for broiler production. This implies that large percentage of the broiler farmers engaged the use of biosecurity practices for their broiler production with success stories, as very effective and appropriate measures of realizing profitable and sustainable broiler production.

Table 3. Effectiveness of biosecurity practices among broiler farmers frequency (%)

Effectiveness of Biosecurity Practices	Yes	Very Effective	Effective	Not Effective
Quarantine of new birds from older birds reduces mortality losses of birds	114 (100%)	95 (83.3%)	19 (16.7%)	0 (0%)
Regular disinfection of poultry house improves the control of diseases among my flock	114 (100%)	93 (81.6%)	21 (18.4%)	0 (0%)
Sanitation of poultry equipment with disinfectants before and after the stock of new birds have increased the survival rate of stocked chicks to maturity	114 (100)	99 (86.8%)	15 (13.2%)	0 (0%)
Restriction of humans, pets and other animals as biological organisms into my poultry house have potential of reducing the susceptibility of my flock to diseases	102 (89.5%)	85 (74.5%)	17 (15.0%)	0 (0%)
Burying or burning of dead birds away from my farm or on my farm reduces diseases attack on my birds	114 (100%)	87 (76.3%)	27 (23.7%)	0 (0%)
Compliance of both staff and customers to foot bath on visit to my poultry farm have reduced the occurrence of disease infestation on my broiler farm	106 (93.0%)	71 (62.3%)	35 (30.7%)	0 (0%)
Biosecurity practices enhance broiler meat safety and reduction of air pollution around the poultry environment	97 (85.1%)	94 (82.5%)	3 (2.6%)	0 (0%)
Biosecurity practices increase the growth performance of birds and the farm income of broiler farmers	81 (71.1%)	64 (56.1%)	17 (14.9%)	0 (0%)
Regular burying of litters has reduced poultry activities stirring air pollution and vector borne diseases into my flock.	95 (83.3%)	58 (50.9%)	37 (32.4%)	0 (0%)
Regular hygiene on my poultry farm have boosted the faith and patronage of customers in my broiler farm to assured believe of having disease-free birds and attracts good sales for my birds	98 (86.0%)	71 (62.3%)	27 (23.7%)	0 (0%)
Replenishing of footbath daily limits microbial effects on my flock	87 (76.3%)	69 (60.5%)	18 (15.8%)	0 (0%)
Regular packing of vehicles many meters away from my poultry house have reduced the susceptibility of my flock to diseases	54 (47.4%)	23 (20.2%)	31 (27.2%)	0 (0%)

Source: Field Survey, 2015 *Multiple Responses

Table 4. Distribution of respondents on the level of effectives of biosecurity practices

Level of Effectiveness	Scores	Frequency	Percentage (%)	Max	Min	Mean
High	53.1 – 101.2	95	83.3	101.2	11.1	53.1
Low	11.1 – 53.0	19	16.7			

Table 5 shows that respondents sex (χ^2 = 11.921) and religion (χ^2 = 16.823) were not significant to the effectiveness of biosecurity measures taken by the broiler farmers in the study area (p>0.05). The results suggested that there were no differences in the level of activities of male and female respondents, as regards broiler farming. This showed there was no peculiarity of activities carried out by males and females in broiler farming, like other poultry operations, as all activities are tailored toward productivity and profitability of both male and female poultry farmers. Religion had no significant relationship with biosecurity measures undertaken in broiler farming. This could be as a result of all religions support for poultry operations, in fending livelihood and healthy living for religious faithful. However, there was a significant relationship between respondents educational status and the effectiveness of biosecurity measures undertaken for broiler production (χ^2 =25.631, p<0.000). This indicates that education allows for search of better practices and adoption of better practices which biosecurity offers and very effective for optimal livelihood activities proven among the broiler farmers in the study area. The flock size of respondents was also significantly related to the effectiveness of biosecurity measures taken in broiler farming (χ^2=28.337, p<0.05). The result suggests also that respondents with more flock size are more likely to seek and engage in better broiler farming of less risky poultry operations for optimal production and profitability. This may be as a result of the fact that the higher the flock size, the more the capital ventured into broiler farming, the drive to reduce losses and maximize production and profit potentials for sustainable increased broiler production.

Table 5. Chi-square table of selected personal characteristics of respondents and the effectiveness of biosecurity practices

Variable	χ^2	Df	P	Remark
Sex	9.703	1	0.09	NS
Religion	16.682	3	0.08	NS
Educational status	34.632	3	0.00	S
Flock size	28.337	3	0.04	S

NS: Not Significant, S: Significant

Table 6. Pearson Product Moment Correlation (PPMC) Relationship between age, benefits of biosecurity and level of effectiveness of biosecurity measures

Variable	r	p
Age of respondents	0.162	0.046*
Benefits of Biosecurity Measures	0.187	0.035*

*Correlation is significant at 0.05

Age was significantly related to effectiveness of biosecurity measures (r=0.162, p<0.05). This implies that age predicates better poultry experience, it attracts length of years of poultry experience suitable for embrace of biosecurity as a viable option to better profitability of the poultry business. The aged will likely adopt biosecurity measures better than the young as experience is gathered overtime in practice and observation. Moreover, the correlation value of 0.187 and p-value of 0.035 indicates that there was a significant relationship between the benefits broiler farmers derived from biosecurity measures adopted and the effectiveness of the biosecurity measures utilized. This implies that biosecurity measures were beneficial to the broiler farmers, possibly in terms of low mortality record, quality assurance of safe broiler chicks and broiler meat by customers, translating to more profit to the broiler farmers.

CONCLUSION and RECOMMENDATIONS

It is drawn from the study that biosecurity measures adopted for broiler farming are of high benefits and effectiveness to the productivity and profitability of the broiler farmers. Biosecurity measures were acceptable innovation, well embraced and practiced among the broiler farmers. However, biosecurity practice of restriction of cars into the broiler house was still observed and maintained at a low level, likewise re-introduction of broiler fowls earlier sold and rejected by customers to the broiler farm was not seen as disease and pathogen prone to the residential broilers among many of the broiler farmers. It is imperative for the broiler farmers to be educated on more biosecurity practices and advantages of them for better adoption and practice. The study also established that educational status, flock size, age and benefits of biosecurity practices were significantly related to the effectiveness of biosecurity measures upheld by the broiler farmers. Based on the findings of this research work, the following recommendations are made:

1. Government should collaborate with commercial banks in providing loan to assist the broiler farmers in registered poultry farmers association, where registered broiler farmers can access funds at very low interest rate and set up appropriate repayment mechanisms for sustainability of the loan empowerment programme and increased level of production.
2. There is the need to expand the knowledge of broiler farmers through involvement of public and private extension bodies, putting up more concerted efforts to sensitize the broiler farmers on a more robust biosecurity measures adoption to practice with better economic gains of improved adoption of biosecurity practices.
3. There is the need to encourage the non-employed youthful population in the country to take up broiler farming with the adoption of biosecurity measures for practice as self-employment creation in order to sustain the broiler production enterprise of poultry in the country.
4. Poultry farmers association of Nigeria should increase the awareness and consciousness of its members and members of the public through sponsoring awareness programmes on the mass media to members and potential broiler farmers, domesticating or commercializing broilers, by adopting biosecurity practices for profitable enterprise.

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