AFRICAN SWINE FEVER CONTROL IN IBADAN, NIGERIA: PROBLEMS, NEEDS AND VETERINARY EXTENSION OPPORTUNITIES

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ABSTRACT

African swine fever (ASF) is a widely discussed disease in Ibadan, Nigeria, where high mortality losses occurred in outbreaks in the city between 2001-2006. To study the level to which ASF containment technologies were adopted and factors associated with adoption behavior, a sample of 60 pig farmers was selected from six local government areas in and near Ibadan. Essential data were collected using a questionnaire. Assessment criteria in forms of frequency, percentage, mean and product moment correlation coefficient were calculated. Results showed that the majority of pig farmers did not adopt ASF biocontainment technologies, since 86.7% (52/60) were at a low level of adoption behavior, 10% (6/60) at a medium level, and 3.3% (2/60) at a high level. A farmer's income from piggery, knowledge of biocontainment technologies, and frequency of extension contact had positive and highly significant relationships ($r \geq 0.787$) on levels of adoption. Specific needs and emerging opportunities for farmer participatory learning were indicated. It was recommended that Pig Farmers Association should constitute Farmer Field Schools, where the State Ministry of Agriculture and Natural Resources (MANR) would be involved in production of ASF virus-free pigs, and the current services by University-based officers to the early detection of pigs infected with the ASF virus will be optimized.

Keywords: African swine fever, control, extension opportunities, Ibadan Nigeria.

INTRODUCTION

Pig production is a source of employment and livelihood in Nigerian agriculture (Olufemi and Agbede, 1999). During the past decade (1997-2007) pig rearing that had been one of the livestock industries growing most quickly in southwest Nigeria (Dixie and Jaeger, 2001) became one at a high risk of losses from African swine fever (ASF), an infectious disease recently introduced into Nigeria (El-Hicheri, 1998; Babalobi *et al*, 2003; Babalobi *et al*, 2007; Olugasa and Ijagbone, 2007). In East and South African countries ASF is one of the most serious obstacles to the development of pig production (Plowright *et al*, 1994). West Africa has recently had the same experience as Southern Africa (Ayoade and Adeyemi, 2003).

ASF is a severe viral disease of pigs that can result in a mortality rate of nearly 100% and can have devastating effects on a country's economy, agriculture and food security (Vapnek, 1999). It is a transboundary disease, being highly contagious and has the potential for very rapid spread causing serious socioeconomic and possibly public health consequences (EMPRESS, 2007:). There is as yet no vaccine against ASF. Hence, a slaughter policy with adequate compensation, and the strict quarantine of pigs and their products at borders and on farms are necessary to stop the current outbreaks of ASF in southwest Nigeria (El-Hicheri, 1998).

The first outbreak of ASF was reported in Ibadan in June 2001 (Babalobi *et al*, 2003). The disease continued to spread from farm to farm through contact with infected and carrier pigs during stock trade, breeding activities and farm visits (Olugasa and Ijagbone, 2007). The cost of mortality losses in Ibadan and environs owing to ASF outbreaks in 2001 alone were estimated to be US$ 941,491.67 (Babalobi *et al*, 2007). This severe and devastating disease of domestic pigs requires a firm control and eradication programme to ensure profitable agriculture.

All available strategies to prevent the escape of a disease agent currently on a farm or in an operation are collectively termed biocontainment practices. Biocontainment technologies include providing a facility to isolate pigs on farms, testing for ASF infection, removing infected pigs, disposing of dead pigs, disinfecting premises, and other indirect containment techniques, such as ensuring the hygiene of feed delivery vehicles. Biocontainment practices are emphasized in infectious diseases that are enzootic in a population of animals, such as ASF is in Ibadan (Esuruoso *et al*, 2005). This author therefore embarked on a multidisciplinary research project to implement early detection, tracking and technology transfer for the biocontainment of ASF-infected pigs in Ibadan, southwest Nigeria, in 2007. The objective of the research and education project was to develop and disseminate to pig farmers effective and acceptable biocontainment technologies for ASF control in collaboration with Oyo State Agriculture Development Project (ADP) in Ibadan, southwest Nigeria. (MacArthur Re-entry Grant Ref No: 800/406/54/2006/ REG/1 and Multidisciplinary Grant Ref. No: 800/406/54/2006/MRG/3).

The establishment in the 1990s of ADPs in all states of the Federation reformed extension services in Nigeria through the use of Training and Visit System (T and V) (Ogunsumi, 2008). This was in response to the meeting of the National Council on Agriculture held at Maiduguri in 1990. The use of the T and V approach in reaching farmers recognized the small-scale farmers as the focus to realizing the desired development in agriculture (Idachaba, 1980). The process of technology development, transfer and use is dynamic (Eponou, 1993; Esuruoso and Olugasa, 1997a and 1997b). Thus, biocontainment technology development and transfer to pig farmers must consider the needs, problems and behavior of pig farmers to ensure sustainable implementation. T and V however does not have the same proven farm-level disease control empowerment as Farmer Field School (FFS). FFS was first designed and managed by the UN Food and Agriculture Organization in Indonesia in 1989 to actualize acquisition and diffusion of knowledge among crop farmers to control an endemic crop pest (Feder *et al.*, 2004; Berg H van den and Knols, 2006). Since then more than two million farmers across Asia have participated in this type of learning. This paper presents an analysis and evaluation of the factors that influence the adoption of ASF biocontainment technologies among pig farmers in Ibadan, Nigeria.

MATERIALS AND METHODS

The study area was the city of Ibadan and its environs in Oyo State (Latitude 7^{o} 23^{1} and Longitude 3^{o} 56^{1}), where outbreaks of ASF had been reported by members of the Pig Farmers Association of Nigeria (601 registered members in Ibadan) and the Ministry of Agriculture and Natural Resources (MANR). Ten percent (60) were selected. In the first stage, six local government areas (LGAs) were selected out of 12 in Ibadan. The second stage was a random selection of ten farmers in each of the six LGAs selected. The sample size of 60 respondents was obtained, comprising both farmers having contact with the ADP in Ibadan and those without extension contact. Questionnaire was developed to obtain relevant information covering all aspects of the objective of the study.

Primary and secondary data were employed. Secondary data were obtained from the literature, project reports, official documents, publications, and personal consultations. Primary data were collected through the use of a validated questionnaire consisting of both open and closed-ended questions to obtain information from the target respondents. Three trained enumerators who have the knowledge of the dialect of the farmers were used to assist in the collection of the information required.

The survey instrument was divided into four parts;

A: Socio-personal characteristics

B: Income from piggery, ASF mortality losses and state compensation

C: Sources of information on biocontainment practices and extension activities

D: Biocontainment technologies adopted

The instrument for data collection was subjected to preliminary testing at the University of Ibadan Teaching and Research Farm, Ibadan, among farmers that were not included in the sample. Validity and reliability tests were carried out on the pre-test evaluation group. Validity tests were as follows:

(i) Face validity: To determine the extent to which the instrument measured what it was designed to measure, according to the subjective assessment of experts and researchers in veterinary extension, rural development, agricultural economics, and rural sociology in the University of Ibadan.

(ii) Content validity: This was to measure the adequacy of the contents and rating scales. The reliability test was employed on six respondents with two different methods of test and re-test, in which the questionnaire was administered to the same respondents (in the pre-test) on two occasions at a 4-week interval. The collected scores were subjected to Pearson Product Moment Correlation test statistics. The second method was the split-half method that gave the measures of the internal consistency of the instrument. The administered questionnaire had its items divided into two on an odd and even number basis. The data collection instrument was modified where necessary.

The study was carried out with seven independent characteristics of the pig farmers, (socio-personal, income from piggery and ASF mortality losses, biocontainment communication) and one dependent variable (y = Adoption of biocontainment technologies in piggery practices). The following independent variables were selected for the study: age, sex, educational level completed, occupation, mortality losses, state compensation, and extension contact.

The dependent variable of the study was the adoption of biocontainment technologies. To ascertain the extent of adoption of biocontainment technologies, the responses of respondents, were collected on five selected practices; isolation facility, testing for ASF, removal of ASF-infected pigs, disinfection and disposal of dead pigs, indirect ASF containment facility. The score was assigned for the adoption of each of the practices in the following way:

Adoption pattern	Score
Non-adoption	0
Partial adoption	1
Complete adoption	2

The total score for a respondent was obtained by summing up the score obtained on all practice. The minimum possible score was 0 and the maximum was 52. The adoption level of the respondents was measured by making use of the adoption index earlier used by Rahman, (2007).

$$\text{Adoption index} = \frac{\text{Respondent's total score}}{\text{Maximum possible score}} \times 100$$

Depending upon the extent of adoption of biocontainment practices, the respondents were categorized as follows:

1. Low adopters (up to 33%)
2. Partial adopters (34 – 66%)
3. High adopters (67 – 100%)

RESULTS AND DISCUSSION

The majority of the respondents were within the ages of 31 and 50 years (58.33%) (Table 1). These pig farmers usually had between 1 and 5 years of experience and had other jobs apart from pig production. Their other jobs included artisanship, civil service, and trading. All the high-level adopters were full-time pig farmers aged between 41 and 60 years. The majority of the low adopters were part-time pig farmers aged between 31 and 50 years (59.62%). The majority of respondents were male farmers (73.1%). Female pig farmers were less than half the number of male farmers (Table 1). Among the respondents, 78.8% (47/60) of the farmers had experienced ASF outbreaks on their farms at least once in the past 6 years. None of the farmers (0/60) had ever received State financial assistance in the form of compensation for mortality losses from ASF outbreaks between 2001 and 2006. This result agrees with an earlier report (Ogunsumi, 2008) that indicated the majority of livestock farmers in contact with ADP extension officers in the State were male.

This result also indicates that the greater the financial and socio-economic dependence on piggery, the higher the behavioral disposition to adopt biocontainment technologies. The majority of low-level adopters reckoned that ASF-recovered pigs were more resistant to the disease, and more suitable for production purpose than ASF-naïve pigs. Hence, they had no reasons to adopt biocontainment technologies that has cost implications and imposed some strictness on pig farmers and their workers (Babalobi *et al*., 2007).

Two major problems emanated from this position. First was the immediate scarcity of ASFV-free pigs in Ibadan. The second was the long-term adverse effect on pig production that encouraged further spread of the virus, thus causing more outbreaks and losses (El-Hicheri, 1998). There is need to educate pig farmers on the already compromised health status of pigs surviving ASF and that those pigs were not really immuned. This situation confirms earlier findings by this author on the high prevalence of ASF virus (ASFV) antibodies among pigs in Ibadan (Olugasa, 2007; Olugasa and Ijagbone, 2007). Continued presence of the virus in pigs will only lead to greater economic losses (Babalobi *et al*, 2007).

Pig Farmers' Association of Nigeria (PFAN) (93.3%) and friends/neighbors (83.3%) were the most important sources of biocontainment information to pig farmers in Ibadan (Table 2). These sources provided weekly information (friends/neighbors, 73.3%) and monthly information (Pig Farmers, Association, 86.7%) to the respondents. Members of the PFAN met once a month during which they discussed relevant issues for improving their practices. Invited resource persons also informed and trained farmers on new topics.

ADP officers did not visit many of the respondents (36.7%) in 2007 (Table 3). This appeared to be in conformity with current policy of the agency to visit the sub-urban (outskirt) farmers more often than urban (city) farmers. (Personal Communication). This also agrees with Ogunsunmi (2008) that farm visits by ADP officers were on the decline.

As a result of the disposition of pig farmers, the overall adoption behavior was low. Majority of the respondents 86.7% (52/60) were at low level of adoption behavior. Only 10% (6/60) of the respondents showed partial adoption behavior, and a minority of 3.3% (2/60) showed high level of adoption behavior (Table 4). All the biocontainment practices had cost implications to the pig producers (Babalobi et al, 2007).

Table 1: Distribution of respondents according to age, sex and farming experience

Variable	N = 52 Low adopter		N = 6 Partial adopter		N = 2 High adopter		N = 60 All respondents	
	Fre	%	Freq	%	Freq	%	Freq	%
Age group								
21-30	8	15.4	2	33.3	0	0	10	16.7
31-40	18	34.6	2	33.3	0	0	20	33.3
41-50	13	25.0	1	16.7	1	50	15	25.0
51-60	10	19.2	1	16.7	1	50	12	20.0
61-70	3	5.8	0	0	0	0	3	5.0
Sex								
Female	14	26.9	1	16.7	0	0	15	25
Male	38	73.1	5	83.3	2	100	45	75
Farming experience (year								
1 ≤ 5	37	71.2	2	33.3	1	50	40	66.7
> 05 ≤ 10	15	28.8	2	33.3	0	0	17	28.3
> 10 ≤ 15	0	0	2	33.3	1	50	3	5.0
ASF outbreaks in 2001-2006	41	78.8	4	66.7	2	100	47	78.3

Table 2: Sources of information on ASF biocontainment among respondents

Source of information	Not usually informative		Weekly information		Monthly information		Yearly information	
	Freq	%	Freq	%	Freq	%	Freq	%
Contact farmers	14	23.3	33	55	7	11.7	6	10
Extension agents	31	51.7	0	0	6	10	23	38.3
Friends/neighbors	10	16.7	44	73.3	6	10	0	0
Pig Farmers' Association (PFAN meetings	4	6.7	0	0	52	86.7	4	6.6
Newspapers/magazines	51	85	0	0	1	1.7	8	13.3
Radio	17	28.3	0	0	8	13.3	35	58.3
Television/video	45	75	0	0	0	0	15	25
Research institutes/ Universities	21	35	0	0	8	13.3	31	51.7

Table 3: Frequency of extension visit to farmers within 2007

Frequency of visit within 1 year	N = 52 Low adopter		N = 6 Partial adopter		N = 2 High adopter		N = 60 All responden	
	Freq	%	Freq	%	Freq	%	Freq	%
No visit	22	42.3	0	0.0	0	0	22	36.7
1-4 times	16	30.8	2	33.3	0	0	18	30.0
5-8 times	0	0.0	2	33.3	0	0	2	3.3
9-12 times	12	23.1	0	0.0	1	50	13	21.7
> 12 times	2	3.8	2	33.3	1	50	5	8.3

Table 4: Overall adoption of biocontainment technologies by respondents

S. No.	Level of adoption	Score index	Frequency (N=60)	Percentage (%)
1	Low adopter	Up to 33%	52	86.7
2	Partial adopter	34-66%	6	10
3	High adopter	67-100%	2	3.3

The most adopted practice was disposal of dead pigs and disinfection of premises. The range was from 3.3% at high, and 75% at partial levels (disposal of dead pigs and disinfection of premises) (Table 5); 1.7% at high, and 23.3% at partial levels (indirect spread containment facilities); 5% at high, and 16.7% at partial levels (removal of infected pigs); and, 5% at high, and 10% at partial levels (isolation facility); to 0% at high, and 5% at partial levels (testing for ASF, that was the least adopted practice).

The unit cost for testing of pigs prior to purchase was N533:00 (about $44.44) in 2001 (Babalobi *et al*, 2007). This amount was a relatively high cost in view of the number of animals to be tested. This cost may be a major reason for low adoption of this practice. Likewise, setting up an isolation facility required an initial investment that was spread over time with relatively little operating cost (Babalobi, *et al*, 2007); which explains why this practice was last but one on the scale of low adopted practices. Others, including the disinfection of premises, disposal of dead pigs, ensuring hygiene of farm workers, and feed delivery vehicles, and other indirect spread containment facilities were operating expenses incurred on ongoing basis. They had minimal initial investment requirements (Babalobi *et al,* 2007).

The job experience and age were not significantly related to adoption behavior of a pig farmer (r = 0.299 and -0.095 respectively) (Table 6). However, a farmer's income from piggery, the frequency of extension contact and the knowledge of biocontainment technologies were positively and significantly related to adoption level (Table 6). It is imperative to build strategies for promoting veterinary extension on this basis.

In earlier studies by this author and his colleagues, the cost of the basic inputs for biocontainment of ASF among 306 affected farms in Ibadan in 2001 was N99,302,392:00 (about US $827685.77) (Babalobi *et al*, 2007). This scenario gave a cost-benefit ratio of 1:1.5 (N99,302,392 : N113,939,000). The scenario however became 1:1 (N100,192,392 : N113,939,000), when other important biocontainment costs were added, including fencing of farm premises. Thus, the average cost of biocontainment/biosecurity per farm was N372,349:67 (or $3076.77). This was of great financial and socioeconomic consequences for a developing country like Nigeria with a low Gross Domestic Product figure (Babalobi *et al*, 2007).

Table 5: Distribution of respondents according to biocontainment technology adoption

S. No.	Level of adoption	Score index	Frequency (N=60)	Percentage (%)
A	*Isolation facility*			
	1 Low adopter	Up to 33%	51	85
	2 Partial adopter	34-66%	6	10
	3 High adopter	67-100%	3	5
B	*Testing for ASF*			
	1 Low adopter	Up to 33%	57	95
	2 Partial adopter	34-66%	3	5
	3 High adopter	67-100%	0	0
C	*Removal of infected pigs*			
	1 Low adopter	Up to 33%	47	78.3
	2 Partial adopter	34-66%	10	16.7
	3 High adopter	67-100%	3	5
D	*Disinfection of premises & disposal of dead pigs*			
	1 Low adopter	Up to 33%	13	21.7
	2 Partial adopter	34-66%	45	75
	3 High adopter	67-100%	2	3.3
E	*Indirect spread containment facility*			
	1 Low adopter	Up to 33%	45	75
	2 Partial adopter	34-66%	14	23.3
	3 High adopter	67-100%	1	1.7

Table 6: Relationship of ASF biocontainment adoption to independent variables

S. No.	Independent variables	Coefficient of correlation (r)
1	Age (X_1)	-0.095
2	Extension contact (X_3)	0.787
3	Farming experience (X_4)	0.299
4	Knowledge (X_6)	0.932
5	Income from piggery (X_7)	0.868

CONCLUSION AND RECOMMENDATIONS

Formal veterinary research has generated a vast amount of knowledge and fundamental insights into pattern of spread of ASF and ways to enhance its control (El-Hicheri, 1998; Olugasa and Ijagbone, 2007), but, their adoption by smallholder farmers, especially in Ibadan, has remained below expectations. It may be concluded that the traditional method of extending biocontainment technology to farmers is not sufficiently adequate at the moment in Ibadan in the case of African swine fever. Thus, a new approach is needed in which pig farmers are actively involved in the acquisition of biocontainment skills, geared to the specific physical, economic and social circumstances of these farmers.

First, it is recommended that the Pig Farmers Association in Ibadan should constitute FFS, where farmers through understanding, observation, experimentation and evaluation are equipped to address challenges and make appropriate changes in their farm management practices. (Feder *et al*., 2004). This approach was used to promote malaria control among crop farmers (Berg and Knols, 2006). This is the approach necessary for ASF control in Ibadan. FFS is a form of education that uses experiential learning methods to build farmers' expertise, and has proven farm-level disease control effectiveness.

Along with the FFS approach, it is recommended that the Oyo State MANR should implement the production of ASFV-free pigs, selling them at subsidized prices to the Pig Farmers Association running FFSs. The present service by University-based officers to early detection of pigs infected with the ASF virus should be made to serve the MANR pig project and the FFSs to attain both optimal results and sustainable control of ASF.

The present non-adoption of ASF biocontainment technologies by pig farmers has indicated the need for a new dimension to veterinary extension opportunities. Pig Farmers Association may fill this gap by running FFSs effectively and efficiently. The approach is practical and compliments State ADP-based extension services which is Government coordinated and has its own limitations in getting farmers to adopt ASF biocontainment.

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