

Analysis and evaluation of mortality losses of the 2001 African swine fever outbreak, Ibadan, Nigeria

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Abstract The mortality losses of pigs of various age groups affected by the 2001 African swine fever outbreak in Ibadan Nigeria were analyzed and evaluated. Thirty one thousand nine hundred and sixteen (31,916) pigs on three hundred and six (306) farms reported by the Pig Farmers Association of Nigeria and

the State Ministry of Agriculture and Natural Resources were involved. Gross mortality was ninety one percent (91%), while age group mortality ranged from 75.9% (growers), 83.1% (weaners), 91.2% (finishers) and 99.8% (piglets); to 100.0% in gilts, sow and boars. Losses were estimated to worth nine hundred and forty one thousand, four hundred and ninety one dollars, sixty seven cents (US \$941,491.67). Highest financial loss was from sows (29.5% of total loss), followed by gilts (16.6%), finishers (15.2%), weaners (10.7%), boars (10.6%), growers (10.6%) and piglets (8.2%). Average mortality loss per farm of \$3076.77 was of great financial and socioeconomic consequences for a developing country like Nigeria with a low Gross Domestic Product figures. In conclusion, the need to immediately revisit and take recommended actions on the 1998 Report of the FAO Consultancy Mission to Nigeria on Control and Eradication of an Outbreak of African swine fever in Western Nigeria is stressed.

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Introduction

The disease African Swine Fever ASF, a severe viral disease of pigs that could result in nearly 100% mortality rate, usually results in devastating effects on a country's economy, agriculture and food security (Vapnek, 1999). It is a transboundary disease, epidemic

diseases which are highly contagious or transmissible and have the potential for very rapid spread, irrespective of national borders, causing serious socio-economic and possibly public health consequences (EMPRES <http://www.fao.org/EMPRES/default.htm>). There is as yet no vaccine against ASF and mass slaughter is the only available means to prevent further virus transmission (Wilkinson 1989).

ASF in West Africa In other parts of West Africa (apart from Nigeria), the disease was reported in Senegal in 1978 and retrospective studies carried out indicated that ASF was present in Casamance and Guinea Bissau. Other outbreaks were reported in Cameroon in the mid- and late 1980s. Although not reflected in OIE bulletins, ASF was confirmed for the first time in Cape Verde in 1980. In 1996, Côte d'Ivoire was stricken by an ASF epidemic, while in 1997 Benin and Togo joined the ranks of the affected countries. Pig losses have been very heavy, resulting in some countries losing one third or more of their pig population (EMPRES Transboundary Animal Diseases Bulletin No. 14-2. <http://www.fao.org/docrep/003/X8491E/X8491e00.HTM>).

Socio-economic effects: According to the Pretoria-based Agricultural Research Council, an outbreak in Cameroon between 1982–1983 cost an estimated \$4.5 million, with farmers compensated by the state. The 1996 outbreak of African swine fever in Cote d'Ivoire is said to have cost that country some US \$9.2 million (Agricultural Research Council, South Africa 1998). Compensation payments to farmers alone (the rate of compensation fixed at about one-third the market value of a slaughtered pig) amounted to US \$2.3 million (US Department of Agriculture Report 1998). In Benin Republic in 1997–1998, pig producers lost more than \$6 million (Basckin 1998).

In Ghana, over 200,000 pigs were slated for compulsory slaughter to contain the outbreak of ASF in the greater Accra and Central regions where 700 pigs were initially killed by the outbreak in October 1999. The World Bank also responded positively and made funds available (US\$300, 000) from the National Livestock Services Project as a compensation fund for farmers whose pigs were destroyed under the stamping out order. This policy entailed the destruction of all animals on affected premises, including slaughter of free-range village pigs in and around affected areas. Farmers were paid

at a cost price of €3 000/kg live weight (US\$1= Cedis €3 000) (EMPRES Transboundary Animal Disease Bulletin AFRICAN SWINE FEVER.htm). The sum of \$300,000.00 earmarked by the World Bank and FAO to pay compensation to affected farmers was inadequate as most farmers would be unable to restart their farms with the promised compensation, since most of them cannot recover their loss. “*It is a sad event watching your animals being killed at a go with the capital investment vanishing and yet destroying them is the only solution,*” one farmer cried (Markon 1999). In addition to poultry, pork is a major food product, and a source of export revenue, in many developing countries. Foot and Mouth Disease and Africa swine fever have taken their tolls on the piggery industry in recent years (Preslar 2001).

ASF in Nigeria

Disease history The first unconfirmed outbreak of ASF in Nigeria was in 1973 at a commercial piggery in Ogun State (S.W. Nigeria) which caused 100% mortality. The first confirmed outbreak was reported in Lagos and Ogun States in September 1997. Between September 1997 and July 1998, outbreaks of ASF were reported in Lagos and Ogun states in Southwest Nigeria. According to a FAO consultant's opinion, the infection came likely from the OUÉMÉ department in Benin (El-Hicheri 1998). ASF was initially declared in Lagos and Ogun States, bordering the Benin Republic. It has also been reported in virtually all the Southern and Middle Belt States of the Nigerian Federation. African swine fever (ASF) outbreaks were first confirmed in Nigeria in November 1997 by Dr Davies, FAO Consultant, in an ASF assessment mission in Nigeria, Togo and Ghana (El-Hicheri 1998) An outbreak of ASF reported around Lagos between 1997 and early 1998 was isolated and the ASF virus strain involved in the outbreak was identified by Odemuyiwa et al (2000).

Mortality losses A trend of high mortality levels has been recorded throughout the country between September 1997 and October 1998. In Lagos State, about 3000 pigs were reported dead while the number in Ogun State was 12,000, for a total losses of 15,000 pigs recorded for the two outbreaks in 1997. The mortality rates in these states were between 85% and 100%. The total number

of declared dead pigs in that period reached 125, 000 in nine (9) States of the Federal Republic: Lagos State, Ogun State, Kaduna State, Benue State, Enugu State, Akwa Ibom State, Rivers State, Plateau State and Delta State. Outbreaks were also reported in neighboring Osun state (ProMED-mail 1998; ProMED-mail post 1998). In Oyo State, the study area of this paper, not a single case was officially reported despite the proximity of infected areas in Ogun state and Osun State.

Socio-economic effects in Nigeria Before the ASF epizootic, the pig production had been the fastest growing livestock industry in Nigeria. The epizootic considerably reduced the pig population of the infected states and led to disastrous socio-economic effects. An outbreak of the disease in just one state (Lagos) in Nigeria in 1998 cost that state's farmers US \$ 8.4 million in just six months (Lagos State Nigeria 1998).

Pigs contributed significantly to the economic welfare of the rural population. Consumption of their products played an important role in the social and cultural life of most of the communities in the southern and Middle-Belt States, providing cheap meat and contributing by pork supply to traditional marriages and burial rites. In addition, pigs provide a ready and regular source of cash to meet the rural families' needs, such as paying school fees and expenses, health expenses and farm inputs, on a day to day basis. In many affected areas, parents were not able to send their children to school because of the heavy losses in their pig herds (El-Hicheri 1998).

2001 ASF outbreaks The year 2001 witnessed outbreaks of ASF in various parts of Africa including Nigeria. Fresh outbreaks of ASF was reported by ProMED-mail in Democratic Republic of the Congo (April 2001), Benin Republic (May 2001), Togo (June 2001) South Africa (August 2001), Tanzania (August 2001), Kenya (September 2001), Zambia (September 2001). A report of unexplained deaths in pigs at the Teaching and Research farm of the University of Ibadan, to ProMED-mail by the first author in August 2001 was finally confirmed as an outbreak of ASF by PCR and virus isolation at the Exotic Diseases Division of the Onderstepoort Veterinary Institute, Pretoria South Africa (ProMED-mail, PRO/AH/EDR> Unexplained deaths, pigs - Nigeria (Ibadan) (05) 20011007.242807-OCT-2001; ProMED-mail, PRO/AH/EDR> African

swine fever - Nigeria (Ibadan) 20011028.266228-OCT-2001; Babalobi et al 2003). Similar outbreaks were reported in the same period in other parts of Ibadan city in Oyo State and in the neighboring southwestern states of Nigeria, and confirmed by immunoblotting assay and Indirect Enzyme Linked Immunoblotting Assay (ELISA), (Olugasa et al 2005).

Objective of study In response to the debilitating effect of the confirmed 2001 ASF outbreak in Ibadan, and due to the fact that there is no known vaccine yet against ASF, the authors above embarked upon “*An investigation of the presence of neutralizing antibodies against African swine fever (ASF) virus and its potential for immune protection*”, under a Senate Research Grant SRC/FVM/4B/2001 of the University of Ibadan, Ibadan, Nigeria. This was in an effort to provide a possible panacea to the socio-economically and financially debilitating ASF disease. In addition, the principal investigator embarked on a PhD study on the Epizootiology of ASF in the study area (Olugasa 2006).

Objectives of paper This paper is an age-group analysis of related mortality data collected in the course of the above investigation. It aims to put a financial and socio-economic value on the losses resulting from the 2001 ASF outbreak in Ibadan Oyo State Nigeria, and provide recommendations towards curbing such outbreak.

Materials and methods

Study areas were farms in Ibadan Oyo State (Latitude 7° 23' N and Longitude 3° 56' E), (Fig. 1), where outbreaks of ASF were reported by the Pig Farmers Association of Nigeria and the Ministry of Agriculture and Natural Resources MANR Ibadan, Oyo State. (Although there were six hundred and one (601) registered members of the list of the Pig Farmers Association of Nigeria, only three hundred and six (306) responded to research study (Olugasa 2006)).

Mortality figures were collated from recorded retrospective data got from these two bodies. Mortality patterns across age/production groups was assessed while mortality cost were estimated based on the prevailing market prices by 2001, with a view to determine resultant financial losses. Enquiries were also

Fig. 1 Location of study area Ibadan, Oyo State Nigeria



made on resultant socioeconomic effects on the pig-farmers' livelihood through interviews with affected farmers, the leaders and officials of the two bodies above.

Results

A total of thirty one thousand nine hundred and sixteen (31,916) pigs were present in 2001 on the three hundred and six (306) affected Ibadan farms reported by the Pig Farmers Association and the State Ministry of Agriculture and Natural Resources (Table 1). A total of twenty nine thousand and forty four (29,044) pigs financially worth one hundred and thirteen million, nine hundred and thirty nine thousand naira (N113, 939,000.00), about nine hundred and forty one thousand four hundred and ninety one dollars, sixty seven cents (US \$941,491.67), at the 2001 market price, reportedly died during the outbreak (Table 2). Conversion rate \$1.00=N120.00). Average mortality

loss per farm was \$3076.77 while gross mortality on the 306 farms was ninety one percent (91%). Apart from the 10.4% loss in sows, percentage loss from the gross mortality decreased with age, ranging from 32.1%, 20.8%, 13.1%, 11.1%, 8.1% and 3.8% respectively in piglets, weaners, growers, finishers, gilts and boars (Table 2). Age group mortality ranged from 75.9% of growers, 83.1% of weaners, 91.2% of finishers and 99.8% of piglets; to 100.0% in gilts, sow and boars (Table 3). Highest financial loss was from sows (29.5% of total loss), followed by gilts (16.6%), finishers (15.2%), Weaners (10.7%), boars 10.6%), Growers (10.6%) and piglets (8.2%)-Table 3. Economically, some of the piggeries were closed down which meant some of the workers lost their jobs and means of livelihood. Socially, families were destabilized and one person was reported to have died, apparently as a result of distress. Some carried out panic selling of their pigs, which further complicated the spread of the disease and increased the financial loss. There was no compensation paid by the Nigerian

Table 1 Population of pigs on three hundred and six (306) Pig Farmers Association of Nigeria (PFAN) and State Ministry of Agriculture and Natural Resources (MANR) farms in Ibadan, Oyo State, Nigeria, 2001

Farm size	Piglets	Weaners	Growers	Finishers	Gilts	Sows	Boars	Total No. of pigs
Small	6504	4878	2981	1897	1084	1626	542	19512
Medium	1904	1596	1232	1148	784	728	252	7644
Large	1008	812	784	714	476	672	294	4760
Total (%)	9,416 (29.5%)	7,286 (22.8%)	4,997 (15.7%)	3,759 (11.8%)	2,344 (7.3%)	3,026 (9.5%)	1,088 (3.4%)	31,916 (100.00%)

Source: Olugasa 2006

Table 2 Number of pigs that died and financial loss due to ASF 2001 outbreaks in Oyo State, Nigeria

Age Group	No. dead (% of total death)	Unit price (Nigeria Naira)	Loss (Nigeria Naira)	^a Loss in US Dollars (% of total loss)
Piglets	9,314 (32.1%)	N1, 000.00	N9, 314, 00.00	\$77,616.67 (8.2%)
Weaners	6,053 (20.8%)	N2, 000.00	N12, 106,000.00	\$100,883.33 (10.7%)
Growers	3,791 (13.1%)	N3, 000.00	N11, 373,000.00	\$94,775.00 (10.1%)
Finishers	3,428 (11.1%)	N5, 000.00	N17, 140,000.00	\$142,833.33 (15.2%)
Gilts	2,344 (8.1%)	N8, 000.00	N18, 752,000.00	\$156,266.67 (16.6%)
Sows	3,026 (10.4%)	N11, 000.00	N33, 286,000.00	\$277,383.33 (29.5%)
Boars	1,088 (3.8%)	N11, 000.00	N11, 968,000.00	\$99,733.33 (10.6%)
Total	29,044 (100.0%)	–	113,939,000.00	941,491.67 (100.0%)

^a: A conversion rate of N120.00 to US \$1.00 used.

Source: Olugasa 2006

Government. (Until the recent outbreak of Avian Influenza in Nigeria, Nigeria has not been observing any Slaughter-and -Compensation policy for any livestock disease outbreak).

Discussion

Average mortality loss per farm of \$3076.77 per farm from the 306 farms affected is of great financial and socioeconomic consequences for Nigeria whose Gross Domestic Product GDP per head is at \$692.00 (Nigeria 2007 <http://en.wikipedia.org/wiki/Nigeria>). Gross mortality of ninety one percent (91%) was consistent with previous accounts of the devastating effects of ASF epizootics (El-Hicheri 1998, Gumm 1998, ProMED-mail 1998, FAO 2001 <http://www.fao.org/docrep/003/x9800e/x9800e00.HTM>). The 100.0% in gilts sow and boars effectively retarded (if not close down) affected piggeries; whose owners,

if bold enough to attempt to restock, will have to pay high purchase replacement stock to resume production. Age group mortality ranging from 75.9% (growers), 83.1% (weaners), 91.2% (finishers) leaves room for “survivors”, which many devastated farmers depend on to continue their piggery project.

ASF spread throughout Nigeria and the result of pigs/pig products movements over considerable distances also suggests that human factor should be considered as the most important means involved in the ASF spread. Pig markets also played an important role in spreading ASF, as some of the outbreaks were declared in the big markets of Kafanchan in Kaduna State, Gboko in Benue State and Makodi (Markudi?-authors) in Adamawa (Benue?-authors) State (El-Hicheri 1998). The continuous presence of recovered pigs in the pig population means there is a high probability that recovered ASF pigs will be involved in stock trade and breeding activities. As a result of the critical role of trade, middlemen and breeders activities in the spread of

Table 3 Herd mortality distribution in three hundred and six (306) farms affected by 2001 ASF outbreak in Ibadan, Oyo State Nigeria

Herd Age Group	Herd Composition (Percentage)	Mortality loss (Number)	Mortality loss (Age group Percentage)	Percentage of total mortality	Mortality cost (naira)	Mortality cost (US Dollars)	Percentage of total mortality cost
Piglets	9416 (29.5)	9314	98.9%	32.1%	N9,314,00.00	\$77,616.67	8.2%
Weaners	7286 (22.5)	6053	83.1%	20.8%	N12,106,000.00	\$100,883.33	10.7%
Growers	4997 (15.7)	3791	75.9%	13.1%	N11,373,000.00	\$94,775.00	10.1%
Finishers	3759 (11.8)	3428	91.2%	11.1%	N17,140,000.00	\$142,833.33	15.2%
Gilts	2344 (7.3)	2344	100.0%	8.1%	N18,752,000.00	\$156,266.67	16.6%
Sows	3026 (9.5)	3026	100.0%	10.4%	N33,286,000.00	\$277,383.33	29.5%
Boars	1088 (3.4)	1088	100.0%	3.8%	N11,968,000.00	\$99,733.33	10.6%
TOTAL	31,916 (100)	29,044	91.0%	100.00%	N113,939,000.00	\$941,491.67	100%

ASF-virus carrier pigs, the pattern of spread of ASF outbreaks within southwestern Nigeria from 1997 has been described by the acronym “TRAMMEBA” (TRADE, MIDDLE MEN AND BREEDERS’ ACTIVITIES) (Olugasa and Ijagbone 2007).

The 1998 FAO consultant report (El-Hicheri 1998) expressed fears to see the ASF evolving to an enzootic, as the disease was losing virulence and shifting from the acute form to a sub-acute form, allowing more infected pigs to escape death. This has come to pass and this could be responsible for the recurrent epizootics in the last decade. Long time considered as a 100% killer of infected herds, ASF in its less acute form has a lower mortality rate, allowing a greater number of pigs to survive. Such “survivors” are virus carriers and can continue to carry the ASF virus for prolonged period, most likely for as long as they live, perpetuating therefore the ASF domestic cycle; observed from time to time, a “heat up” of the disease and the reoccurrence of the cycle of large outbreaks and higher losses. Under these conditions, the seven (7) millions pig population in Nigeria is under threat of extinction and the food security of the country population is seriously endangered (El-Hicheri 1998).

Unlike its response to Rinderpest outbreaks amongst the Fulani pastoralists of Northern Nigeria, veterinary authorities pay scant attention to ASF outbreaks among the pig-farmers of the middle belt and southern Nigeria, especially as no compensation has ever been paid for livestock epizootic losses until the recent Avian Influenza outbreak in Nigeria. Though the decision to eradicate rather than to live with the disease and all its socio-economical impacts is hard to take, there has been non enforcement of the slaughter policy and no attempt to pay any compensation to affected farmers, despite recommendations by the Abeokuta (Ogun State) meeting of Nigeria’s Federal and State Directors of Veterinary Services as far back as October 1998 (El-Hicheri 1998),

Apart from the direct financial and socio-economic effect on the pig farmers, piggery epizootics also have indirect effects on the nation’s economy. The economic impact of outbreaks of Classical Swine Fever CSF, an European “counterpart” of ASF has been listed to include

1. Removed animals
2. Reduced value of removed animals

3. Destroyed material
4. Cleansing and disinfection
5. Idle production factors
6. Restocking
7. Reduced net cash- flow trade and industry
8. Rendered animals
9. Reduced valued animals
10. Increased costs

All these above inflict various costs to the Pig producers, Trade and Industry, Sectoral funds, National government/society and the European Union (Saatkamp et al. 2000).

The economic impacts of transboundary diseases (including the ASF), has also been listed (FAO 2001 <http://www.fao.org/docrep/003/x9800e/x9800e00.HTM>) to include

- reduced production leading to reduced farm income
- variations in prices and market effects (usually a reduction when there is health concerns)
- Public health concern
- International trade implications
- Budgetary financial implications of control/eradication measures
- Negative effects on Food Safety and nutrition effects.

Virtually all these effects have been experienced by the Ibadan pig-farmers and the larger societal economy as a result of the 2001 ASF outbreak. A variety of social damages ranging from a farm family that lost the life of a wife as an indirect consequence of the disease, to a family that had to recall the children from school training occurred. Most families were destabilized and vigorously resorted to herbal trials for possible remedy to ASF. Where the facilities were available, farm families adopted risk-sharing strategies in form of diverting into fish farming, poultry production and wage jobs/salary earning ventures. Sharing risk with fish farming in particular gave effective financial returns to some affected farmers and the courage to undergo gradual physical, mental and social re-stabilization (Olugasa 2006).

ASF eliminated the attainment of pig producers target for sale or slaughter at usual predetermined weight resulting in severe wastages in production. Prior to ASF outbreak two broad factors, namely poor quality feeds resulting from unbalanced rations (Adesehinwa and Ogunmodede 1995), and infectious

diseases (Djoukam 1998) were attributed responsibility for dwindling profit of pig production in south-western Nigeria. ASF outbreaks have become the paramount source of dwindling profit rather than poor quality feed (Olugasa 2006).

All said the 2001 ASF outbreak in Oyo State has devastating effect on the social and economic wellbeing of pig farmers and their household. It has therefore created a national disaster situation that requires government intervention. ASF epizootic severely disrupted the breeding, general production management efforts to minimize cost and optimize profitability in pig production. It is unlikely that farmers would be able to pull together the huge cost involved in the control and stamping out of the disease on short term if left without support, especially from government.

Although large commercial producers can usually take protective long term measures on their business, smallholders are often unable to protect themselves against the heavy and repeated losses, leading many of them to leave the business. The high proportion of these small scale pig farmers (61.13%) is a cause for national attention for the pig farming which has supported many families in Oyo State (Olugasa 2006).

Cost of inputs for farm biosecurity

Testing of pigs prior to purchase and in quarantine is a cardinal strategy in the control and stamping out of ASF as a biosecurity measure. A combination of polymerase chain reaction PCR and the immunoblotting assay are required for this. The unit course for this procedure, including test reagents and labor is five hundred and thirty- three naira (N533, 00/\$44.44) at the 2001 market price (see Table 4).

While N533.00 (US \$44.44) is a relatively high cost in view of the number of animals to be tested and the 2001 value of the naira, some other practices such as changing the people flow during chores by going from

young to old stock will be little cost. Other costs are operating expenses incurred on ongoing basis. Still others require an initial investment that is spread over time with relatively little operating cost. The cost of essential inputs for biosecurity on all ASF affected farms in 2001 was estimated at ninety-nine million, three hundred and two thousand, three hundred and ninety two naira (about US \$827685.77) (see Table 5).

Cost-benefit ratio

The cost-benefit ratio of the designed control measure to the cost of African sine fever outbreak was therefore 113,939,000: 99,302,392 or 1: 1.5. The situation however becomes 113, 939, 00: 100192392 or 1:1, when other important biosecurity costs are added (Olugasa 2006) (see Table 5).

Pig farmers have several ways to reduce the risk of African swine fever on their herd. The decision as to which strategy to adopt depends on several factors. It also varies from one farm to another. In evaluating the biosecurity strategy based on the TRAMMEBA pattern of spread in Oyo State, the combination of methods which are capable of achieving effective control of the disease has been shown to also have sufficient cost-benefit advantage, even at a short term (Olugasa and Ijagbonne 2007).

Dr. El-Hicheri, the FAO Consultant on ASF, in his 1998 report has stated a comprehensive strategy to respond to ASF outbreaks in western Nigeria (El-Hicheri, 1998). Among others he suggested

1. The ASF control programme initially directed to the primary infected States (Lagos and Ogun States) should now cover the whole country. The consultant emphasized the importance of the epidemiological investigation and the epidemiological surveillance as a tool for an efficient eradication programme. An epidemiological assessment of

Table 4 Unit cost of testing pigs for the presence of ASF in Oyo State, Nigeria

(A)	Test (PCR or Immunoblotting assay)	Naira	
(B)	Number of pigs	3	
(C)	Cost per test	400	
(D)	Test cost	1,200	(B x C)
(E)	Labour	400	
(F)	Total cost	1,600	(D + E)
(G)	Total cost per head	533	(F/B)

Source: Olugasa 2006

Table 5 Direct costs for farm biosecurity against ASF at current market price in Oyo State, Nigeria, in 2001

Cost Estimation		Large scale N	Medium scale N	Small Scale N	All farms N
1	Carcass Disposal	1,632000	1,060800	806,400	3,499200
2	Quarantine Animal entering the herds	19,596675	19,213209	23,886481	62,696365
3	Cost of buying only from herds with trusted animal health programme	4,037894	7,339321	13,643212	25,020427
4	Testing for ASF	4,352000	2,121600	1,612800	8,086400
Total		29,618569	29,734930	39,948893	99,302392
Additional important biosecurity cost items that may be added to the control strategy against ASF					
*5	Coverall and boots	3,44960	2,80280	1,258240	1,883480
*6	Facility investment decision	89,600	98,280	28,6720	474600
*7	Improved safety in Feed delivery per day	120,000	130,000	640,000	890,000

*Important additions to the basic strategic cost items

Source: Olugasa 2006

the situation should precede any control strategy applied.

2. Considering the different epidemiological situations prevailing in the states, the consultant proposed to adopt for the newly infected states the three phases- strategy: an emergency phase, a surveillance phase and a restocking phase.
3. In the primary infected states, the strategy should directly start with the second phase. Such strategy needs adequate funding as it is obvious that an important gap exists between the activities to be carried out and the financial means provided.
4. It has been noticed, through field visits performed by the consultant in 5 states, that there are not adequate operational funds to enable veterinary staff to perform control and surveillance operations. Funding is still the major issue. The FAO consultants suggested to the FDL and PCS to approach national and international funding organization such as the: National Disaster Relief Fund, Family Support Programme, Petroleum Trust Fund, ECOWAS, UNDP or EU.

To support and assist the Nigerian authorities to control the ASF epizootic, FAO has sent international consultants to provide technical assistance; the TCP also procured an equipment, materials and supplies. The purpose was to assist in establishing field and laboratory diagnostic capabilities, to diagnose rapidly the disease if it appears in any area of the country, to train veterinary staff in early warning, quick reporting, information and epidemiological surveillance and

to advise on ASF control strategy and control/eradication measures to be implemented.

The consultant recommended a whole series of measures including:

1. formation of eradication bodies,
2. funding of the operational programme,
3. declaration of a state of animal disease emergency,
4. information and public education,
5. improvement of the reporting system,
6. extension of the training programme,
7. implementation of investigation and surveillance programme,
8. destruction of residual pigs,
9. closure of pig-markets,
10. adoption of a compensation policy,
11. laboratory activity and
12. starting of a study on the social and economical effects of the ASF epizootic.

He concluded in 1998 that until then, most of the already recommended measures have not yet been implemented, allowing ASF to spread country wide and become a national disaster. He correctly predicted that the 1997–1998 outbreaks of ASF may develop into a serious epidemic covering most of Nigeria. Nothing has changed since then; rather things have turned very negative.

Conclusion

In conclusion, even though in 1997/98 when the ASF outbreak was first confirmed in Nigeria, not a single case

was officially reported in Oyo State, despite its proximity to infected areas in neighboring Ogun State and Osun state (El-Hicheri 1998). But pathetically, since then at least four recurrent outbreaks of such catastrophic effects have been reported. In the Oyo State study area.

The financial, social and economic effects of ASF in southwestern Nigeria, as in other affected areas are as phenomenal as the effects of Rinderpest outbreaks on pastoralists. Any sincere effort to address the effect of livestock epizootics on food security and the attendant financial, social and economic effects in Nigeria, without curbing the issue of ASF outbreaks will be incomplete. And there is not better way to address the ASF issue in Nigeria than to revisit the Report of the FAO (ASF) Consultancy Mission to Nigeria compiled by El-Hicheri 1998; and take recommended actions. Lest not only that the pig population in Nigeria is wiped out, but their owners/pig-rearing population becomes financially, socially and economically bankrupt.

Recommendations

To stem the outbreaks of ASF and the resultant socioeconomic effects of its gross mortality losses in study especially on small scale pig producers who form the bulk of affected farmers, the following measures are recommended, (in addition to the the eralier recommendations of El-Hicheri 1998 and Vapnek 1999;

1. A nationwide surveillance of ASF status in Nigeria should be immediately embarked upon similar to the present AI surveillance.
2. All newly introduced pigs should be quarantined and access restricted to visitors and stray animals
3. Use of protective clothing and uncontaminated daily feed delivery should be strictly enforced on pig farms
4. Basic piggery socioeconomic biosecurity measures should be put in place by public health authorities in Nigeria Cleaning-up training procedures before entering new farms should also be part of the measures
5. Pig farmers should invest heavily from limited funds on biosecurity measures to to control and eradicate ASF in Southwesey Nigeria.
6. Extension services of state and veterinary institutions should be able to locate clean uninfected

stocks ang present information on ways to get them for stocking and restocking programs.

7. The newly introduced slaughter and compensation eradication policy should be extended to curbing ASF outbreaks (as well as other transboundary diseases). This has been recommended by the Abeokuta meeting of, Federal and State Directors of Veterinary Services as far back as October 1998 (El-Hicheri 1998), despite the fact that the decision to eradicate rather than to live with the disease and all its socio-economical impacts is hard to take.
8. ASF should be treated as a Foreign Animal Disease of Public Health importance and should be accordrd a similar prevention and control attention as given to other Transboudary Diseases like Rinderpest.
9. The FAO, UNO, OIE/WAHO, the EU, USA and other international bilateral organizations should provide adequate funding to stem the tide of ASF outbreaks, as being done to Avian Influenza outbreaks.

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