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Impact of Post Flood PPR on Genetic Merit and Economics of Goat Farming in the Niger Delta Area of Nigeria.

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Abstract

The flood of 2012 was devastating to the social, economic and environment of the Niger Delta region of Nigeria. A study was undertaken to assess the impacts of the flood on goat farming and the incidence of Peste des petits ruminants (PPR) disease in two Niger Delta states, Bayelsa and Rivers. The study methodology involves physical assessment of the goats, interviews and questionnaire administration to goat farmers and marketers. A total of 735 mature goats sampled from various public and private farms were analyzed. Structured questionnaire was designed to elicit information from goat farmers and marketers. A total of 50 farms were sampled randomly across the two states. The study assessed the incidence of PPR disease before (2008-2011) and after the flood (2012). Results show that incidence of PPR disease in Bayelsa and Rivers State increased by 46% after the 2012 flood. Results also showed a high rate of infection, degree of mortality and low survival rates of goats occurred following the flooding. Observed data for genetic fitness of goat based on conception rate, percentage of kids born alive and born dead as well as survival rate of kids that survived PPR infection after the flood was inconsistent. The study concluded that the flood of 2012 and the associated PPR disease caused reduced productivity and economic losses in the goat farming industry.

Keywords: Flooding Impacts, Genetic Profile, Goat, Morbillivirus, Small Ruminants.

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Introduction

Phenotype is the product of genetic make-up and environment. The world environment in this context refers to all the input that is not transferred from parents to off-springs, which include nutrition, shelter and health status among a host of others. A negative effect of the environment will produce a resultant negative genetic expression. The expression of the full genetic potential of farm animals like goat can be seriously affected by disease environment and natural disaster. Peste des petits ruminants (PPR) is an important disease of small ruminants that is widely distributed in sub-Saharan Africa (Olatunde and Olayode 2008). PPR is considered one of the primary causes of small ruminant mortality (Awa and Ngo Tama, 1997; Awa *et al.*, 2000). PPR epidemics occur at given periods of the year, but vary slightly from region to region; causing flock mortality rates greater than 80% (Awa and Ngo Tama, 1997). The disease is caused by Peste des petits ruminant virus (PPRV), a member of the genus *Morbillivirus* of the family *Paramyxoviridae* (Abubakar, *et al.*, 2011). It thrives best in areas with high humidity and lowered temperature (Lawal-Adebawale, 2012). PPR, also known as goat plague is a very contagious viral disease of goats and sheep, characterized by pneumonia, diarrhea, fever, mouth sores, and has also been known to be lethal. PPR was first reported in 1942 in Cote d'Ivoire, West Africa (Hegde, *et al.*, 2008).

PPR affect both sheep and goats but it is more severe in goats than sheep. (Singh, *et al.*, 2004). In sub-Saharan Africa where sheep and goat rearing accounts for about 20% of all meat produced, and in Nigeria where sheep and goats constitute a large part of the economic base of smallholder arable farmers, PPR and its devastating effects on small ruminant herds severely limits and often decimates small ruminant holdings and depletes already poor households of their source of income (Taylor *et al.* 2006; Opasina 1985; George *et al.* 2001).

Flood is a natural disaster that negatively impact on the environment. It destroys farm shelters, thus exposing farmers and their livestock to environmental extremes of weather. The flooding experienced in the Niger Delta area of Nigeria in 2012, rendered many farmers and their animals homeless. Farm animals that were not killed by harsh weather were faced with the aftermath of diseases. Goat PPR was recorded on many goat farms in the Niger Delta. Ohimain *et al.* (2014) reported the effects of the 2012 floods on biodiversity, particularly vegetation and wildlife. To the best of our knowledge, no author has reported the impacts of the flood on small ruminants. Hence, the aim of this study is to present preliminary data on the impacts of the 2012 flood on goat farming systems and the incidence of PPR in the Niger Delta with a focus on Bayelsa and Rivers States.

Materials and Methods

The study was conducted in Bayelsa and Rivers States located in the rainforest zones of the Southern part of Nigeria. Six Local Government Areas (LGA) comprising of three LGA each from the States were randomly selected; Ogbia, Yenagoa, and Southern Ijaw LGAs in Bayelsa. Ahoda East and West as well as Ogba/Egbeme/Ndoni LGAs in Rivers States. Data on a total of 735 mature goats sampled from various public and private farms in Bayelsa and Rivers States in the Niger Delta area of Nigeria were analyzed for this study. Structured questionnaire was designed to elicit information from goat farmers and marketers from the coverage selected States. A total of farms were randomly sampled across the two states participated in this study. The data collected was analyzed using simple descriptive statistics. Frequency distribution and distribution charts were done using the Excel Statistical package for windows 2007.

Results and Discussion

Frequency of PPR incidence in Bayelsa and Rivers State from 2008 to 2012 is presented in Table 1. A build up was observed between 2009 and 2011. However, available data for 2012 showed up to 46% increase of PPR incidence after the flooding. In the different States also, the values of frequency of PPR incidence was highest in 2012 in both Rivers and Bayelsa with 24 and 22 farms reporting PPR incidences respectively. Rate of infection, mortality and survivability of goat taken from fifty different goat farms (Figure 1) showed a high rate of incidences after the flood, high degree of mortality and low survival rate among mature infected goats. Observed data for genetic fitness of goat based on conception rate, percentage of kids born alive and born dead as well as survival rate of kids that survived PPR infection after the flood (Figure 2) was inconsistent.

The incidences of PPR infection in goat farms and among goat marketers were common before 2012 increased enormously after the flood in 2012. The flood and its attending lowered temperature must have provided enabling environment for the activation and proliferation of hibernating PPR virus cysts. Lawal-Adebawale, (2012) reported that Peste des petits ruminant virus (PPRV) thrive best in areas with high humidity and lowered temperature. Farm Shelters and goat sales sheds were observed to be either flooded or damaged in all of the local government areas where the study was conducted. During the flood, animals that survived were allied together to safety in herds and crowded into shelters where they were found; this proximity must have led to the rapid spread of the diseases among goats. Peste des petits ruminants (PPR) is a highly contagious viral disease of goats and sheep. Goats are severely affected, whereas sheep undergo a mild form of the disease (Diallo, *et al.*, 1994, 2007). The disease occurs in epidemic waves and transmission requires close contact (Taylor, *et al.*, 2006). Odo (2003) found PPR prevalence in goats in southeast Nigeria ranged from 0–18% depending on the breed and observed that there was no cure for the disease, but treatment for secondary bacterial and parasitic infections increased recovery rates.

The present study showed that rate of morbidity and mortality can be very high in the incidence of PPR infection with attending lowered survival rate. In its acute form mortality ranges from 10–95%, with higher mortality in young animals and goats. (Fadiga, *et al.*, 2013), but morbidity and mortality rates tend to be lower in endemic situations (Blood and Radostits 1989). PPR is recognized as the most important constraint to small ruminant production in Nigeria because of its endemicity and records of morbidity (100%) and mortality (90%) (Nduka and Ihemelandu 1973; Opasina 1985; Majiyagbe, *et al.*, 2004). Goats genetically are the most prolific of all ruminants; producing twins and even triplets. Reduced productivity was

observed among the studied herd and this could easily be ascribed to the negative environmental pressure imposed on their genetic potentials by the flood and PPR infection they have had to battle with. Combine effect of Flooding and PPR can be devastating on herds and severely limits their genetic potentials, while further depleting poor farming household source of income. Other researchers share the same view and have thus reported similar findings (Taylor, *et al.*, 2006; Opasina 1985; George, *et al.*, 2001).

The effects of PPR on goat farming economy can be deduced from the high morbidity and mortality rate. Kid losses through still birth and abortions also constitute great losses to farmers and marketers. The cost incurred in preventive and curative treatment as well as cost of producing goats that will never be sold because of mortality can be enormous. Singh, *et al.*, (2004) found that PPR causes large economic losses due to high mortality and morbidity rates in infected sheep and goats and that outbreaks were more severe in goats than sheep. Kumar, *et al.*, (2003) estimated mortality and morbidity losses in goats in India as an economical model related economic loss to increased death rate, lower milk yield, decreased body weight, increased kidding interval and more. Since the earliest documented report of PPR in Western Nigeria in the 1930s, the disease has been reported in all other regions of the country with records of morbidity and mortality ranging from 50–100% and 21–100%, respectively and economic/financial losses due to mortality, poor feed conversion and productivity, and cost of medication (Durojaiye, *et al.*, 1983; Ezeibe and Wosu 1997; George, *et al.*, 2001).

Conclusion and Recommendations

The present study elucidated the fact that genetic merit of farm animals and their productivity can be influenced by environmental factors; in this case, disease and natural disaster like flood. It further revealed that the flood of 2012 and the attending PPR infestation in the Niger Delta caused reduced productivity and economic losses in the goat farming industry. Further study to better understand the genetic implication of diseases like PPR on farm animals' productivity is recommended for future studies.

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Tables

Table 1: Frequency of PPR incidents in Bayelsa and Rivers States from 2008 – 2012

	Bayelsa State	Rivers State	Total	Percentage (%)
2008	8	8	16	16.32
2009	2	2	4	4.08
2010	4	6	10	10.20
2011	12	10	22	22.45
2012	24	22	46	46.94
total	50	48	98	

Figures

Figure 1: Rate of Infection, mortality and survivability of PPR infected goats

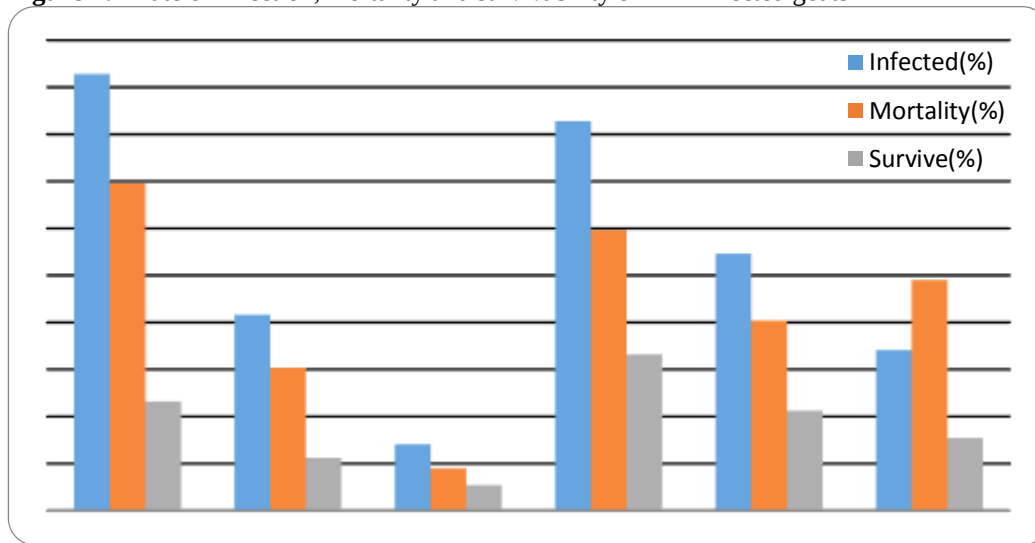


Figure 2: Indices for Genetic fitness of goats after the flood

