Preventive Veterinary Medicine 144 (2017) 134–148

Contents lists available at ScienceDirect

Preventive Veterinary Medicine

journal homepage: www.elsevier.com/locate/prevetmed

Quantitative assessment of social and economic impact of African swine fever outbreaks in northern Uganda

Erika Chenais[a,b,*], Sofia Boqvist[b], Ulf Emanuelson[b], Claudia von Brömssen[b], Emily Ouma[c], Tonny Aliro[d], Charles Masembe[e], Karl Ståhl[a,b], Susanna Sternberg-Lewerin[b]

[a] National Veterinary Institute, Uppsala, Sweden
[b] Swedish University of Agricultural Sciences, Uppsala, Sweden
[c] International Livestock Research Institute, Kampala, Uganda
[d] Directorate of Production and Marketing, Gulu District Local Government, Uganda
[e] Makerere University, Kampala, Uganda

ARTICLE INFO

Article history:
Received 7 October 2016
Received in revised form 23 May 2017
Accepted 4 June 2017

Keywords:
Animal disease impact
Structured interviews
Smallholder pig farming
ASF
Socioeconomic
Household level

ABSTRACT

African swine fever (ASF) is one of the most important pig diseases, causing high case fatality rate and trade restrictions upon reported outbreaks. In Uganda, a low-income country with the largest pig population in East Africa, ASF is endemic.

Animal disease impact is multidimensional and include social and economic impact along the value chain. In low-income settings, this impact keep people poor and push those that have managed to escape poverty back again. If the diseases can be controlled, their negative consequences can be mitigated. However, to successfully argue for investment in disease control, its cost-benefits need to be demonstrated. One part in the cost-benefit equations is disease impact quantification. The objective of this study was therefore to investigate the socio-economic impact of ASF outbreaks at household level in northern Uganda.

In a longitudinal study, structured interviews with two hundred, randomly selected, pig-keeping households were undertaken three times with a six month interval. Questions related to family and pig herd demographics, pig trade and pig business.

Associations between ASF outbreaks and economic and social impact variables were evaluated using linear regression models. The study showed that pigs were kept in extreme low-input-low-output farming systems involving only small monetary investments. Yearly incidence of ASF on household level was 19%. Increasing herd size was positively associated with higher economic output. The interaction between ASF outbreaks and the herd size showed that ASF outbreaks were negatively associated with economic output at the second interview occasion and with one out of two economic impact variables at the third interview occasion. No significant associations between the social impact variables included in the study and ASF outbreaks could be established. Trade and consumption of sick and dead pigs were coping strategies used to minimize losses of capital and animal protein.

The results indicate that causality of social and economic impact of ASF outbreaks in smallholder systems is complex. Pigs are mostly kept as passive investments rather than active working capital, complicating economic analyses and further disqualifying disease control arguments based only on standard economic models.

1. Introduction

African swine fever (ASF), a fatal, haemorrhagic, viral infection of pigs, is regarded by many as the most important of all pig diseases (Sanchez-Vizcaino et al., 2012; Penrith et al., 2013). This is due to its transboundary nature, the often high case fatality rate (Plowright et al., 1994; Penrith and Vosloo, 2009; Costard et al., 2013), the fear it instigates in affected communities (Foueré, 2007;

* Corresponding author at: National Veterinary Institute, Uppsala, Sweden.
E-mail addresses: erika.chenais@sva.se (E. Chenais), sofia.Boqvist@slu.se (S. Boqvist), ulf.Emanuelson@slu.se (U. Emanuelson), claudia.von.Bromssen@slu.se (C. von Brömssen), e.ouma@cgiar.org (E. Ouma), alirotony@gmail.com (T. Aliro), masembe@cns.mak.ac.ug (C. Masembe), karl.stahl@sva.se (K. Ståhl), susanna.Sternberg-Lewerin@slu.se (S. Sternberg-Lewerin).

http://dx.doi.org/10.1016/j.prevetmed.2017.06.002
0167-5877/

Chenais et al., 2017) as well as the trade restrictions that follow reported outbreaks (Costard et al., 2009). ASF was first described in Kenya in the early 20th century when it affected settlers' domestic pigs with severe disease and high lethality (Montgomery, 1921). The virus was most probably present on the African continent long before the introduction of domestic pigs, circulating in a sylvatic cycle between wild African pigs and soft argasid ticks without causing disease in the indigenous wild pigs (Thomson, 1985; Bigalke, 1994; Jori and Bastos, 2009; Jori et al., 2013). In addition to the original, sylvatic transmission cycle, ASF transmission occurs between ticks and domestic pigs, directly between domestic pigs and via pig products (Costard et al., 2013). Recent outbreaks, in Africa and elsewhere, appear to be driven by human activities and trade, and to less extent associated with ticks or wild pigs (Vergne et al., 2015; Kukielka et al., 2016; Mur et al., 2016; Chenais et al., 2017).

Animal disease impact is multidimensional (Zinsstag et al., 2007), and include social and economic impact along the value chain (Rich and Wanyoike, 2010). In low-income settings, this impact keep people poor and push those that have managed to escape poverty back again (Krishna et al., 2004; Morens et al., 2004). As a consequence, outbreaks of infectious animal diseases might disrupt the livelihoods of poor livestock keepers in the same ways as civil unrest or other catastrophes (Wagstaff, 2006). In contrast to natural catastrophes, however, these diseases can be controlled, and the negative consequences are thus possible to mitigate. Depending on the disease and the associated legal framework, disease control investments can be made on global, regional, national or household level. To successfully argue for such investments, their cost-benefits need to be demonstrated. One part in the cost-benefit equations is disease impact quantifications.

Uganda is a low-income country in East Africa with approximately a quarter of the population living below the national poverty line (World Bank, 2016). Poverty is more prevalent in the rural areas (UBOS, 2014; World Bank, 2016). The country has the largest pig population in East Africa (FAOSTAT, 2013). The majority of pigs are kept on smallholder farms in the rural areas (Ikwap et al., 2014). Several recent studies confirm that ASF is endemic, and largely under-reported, in Uganda (Chenais et al., 2015; Dione et al., 2015; Muhangi et al., 2015; Nantima et al., 2015a; Kukielka et al., 2016; Chenais et al., 2017).

African swine fever is known to cause large social and economic impact (Nana-Nukechap and Gibbs, 1985; Fasina et al., 2012; Penrith et al., 2013; Swai and Lyimo, 2014). Impact is often said to be most severe for poor small holder farmers. The authors have previously studied the social impact of ASF outbreaks for smallholder farmers using semi-quantitative methods (Chenais et al., 2017). However, as the authors are aware, this impact have never been repeatedly measured and systemically evaluated on household level in the smallholder setting. The objective of this study was therefore to investigate and quantify the socio-economic impact of ASF outbreaks on household level in northern Uganda.

2. Materials and methods

The study was carried out in and around Gulu district in northern Uganda from March 2014 to March 2015, see Fig. 1. Gulu district is an administrative unit in the Acholi sub-region of northern Uganda. The sub-region has a tropical climate with a rainy season from April through November and a dry season from December to March. At the time of the study the district covered roughly three and a half thousand km^2 and was administratively divided into two counties, 12 sub-counties, 70 parishes and 294 villages (Gulu district local government statistical abstract 2012/13, 2013Gulu district local government statistical abstract 2012/13, 2013). The village is the smallest administrative unit. No formal household or animal registry exists. A human population census was conducted in 2014 and the equivalent for domestic animals in 2008. According to these, the district had approximately 500,000 inhabitants in around 90,000 households, including more than 6000 pig-keeping households (UBOS, 2008, 2014). The pig production is dominated by a low-input, free-range husbandry system (Ikwap et al., 2014).

2.1. Study design and participant selection

In a longitudinal study, structured interviews with 200 randomly selected, pig-keeping households were undertaken three times with a six month interval. Participants were randomly selected from a list of pig-owning households obtained from a survey performed between December 2013 and January 2014, and including four thousand pig-keeping households covering all 12 subcounties in the study area (Chenais et al., 2015). The random number function in Microsoft Excel (Microsoft, Redmond, WA) was used for the sample selection. The number of selected households was based on time and resources available for fieldwork. If a selected household could not be reached at the time of the first interview it was replaced with the nearest pig-keeping household in the same village. For the second and third interviews, no households were replaced, those that could not be reached were left out of the study. The respondent was an adult household member that was at home and available at the time of the visit, and who had sufficient knowledge of the family's pig keeping to adequately answer the questions. Whenever possible, the same person in each selected household was interviewed on all three occasions.

Interviews were conducted at the respondents' homes, or other places in the close vicinity (such as fields, working places and markets), in March 2014, September 2014 and March 2015. Data collected included family and pig herd demographics, social and economic characteristics of the household, pig trade and pig business. Indicators were selected based on the authors previous studies regarding socio-economic impact of ASF (Chenais et al., 2017). Questionnaires are displayed Appendix B. In the first interview, respondents were asked to consider the preceding 12 months for certain questions, and in the second and third interview, the time that had passed since the previous interview. With the purpose of promoting record keeping and improve the quality of the data in the coming interviews the respondents were given a notebook and a pen on each interview occasion and encouraged to note down events related to the pigs, with special emphasis on financial transactions and pig herd dynamics.

2.2. Data collection and handling

Data were collected using structured face-to-face individual interviews noting answers on paper questionnaires. The interviews were conducted in the local language (Luo) by two different interviewers, both of whom were native Luo-speakers and proficient in English. Answers were noted in English. The first author of this paper was present at half of the interviews, alternating daily between the two interviewers in order to provide consistency and supervision. The interviewers had been trained in participatory methods, research ethics and the implementation of the questionnaires prior to the start of the study. The questionnaires were constructed in English using the software EasyResearch (QuestBack International HQ, Oslo, Norway). Common agreement on the translation from English to Luo was reached by the interviewers and one of the author of this paper (TA). Before implementation, the questionnaire was pre-tested in households not included in the study, and adjusted accordingly. The same questionnaire was used for all three interview occasions, although with some changes. For example, household demographic data was only collected at the first interview and questions on attitudes towards ASF and bio-