

A pilot study of common health problems in smallholder pigs in Angónia and Boane districts, Mozambique

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ABSTRACT

A pilot survey was conducted in 2 districts in Mozambique to determine the most important health problems facing smallholder pig producers. While African swine fever is the most serious disease that affects pigs at all levels of production in Mozambique, it is likely that productivity is reduced by the presence of mange and gastrointestinal parasites, while in traditional systems the conditions are favourable for the development of porcine cysticercosis caused by the pork tapeworm *Taenia solium*, which poses a health risk to communities. Results of the pilot survey confirmed that, with the exception of African swine fever, ecto- and endoparasites are probably the most important health risks for producers. Porcine cysticercosis is more prevalent among pigs in traditional, free-ranging systems, while mange becomes a serious factor when pigs are permanently confined.

Keywords: African swine fever, Mozambique, parasites, pig, porcine cysticercosis, smallholders.

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INTRODUCTION

A pilot project whose objective was to propose ways to improve health and production in smallholder pigs in Mozambique in order to achieve better control of African swine fever (ASF) and porcine cysticercosis and thus improve the income of producers was conducted in 2 districts in Mozambique. Since control of both ASF and cysticercosis requires that pigs should be permanently confined, existing systems were studied in participation with the producers, the problems posed by those systems identified, and the constraints that would be imposed by permanent confinement of pigs considered.

The researchers were confronted by most of the problems inherent in on-farm studies, particularly those involving short-cycle species, and especially by the

loss to ASF of pigs that were included in the initial sampling. It was originally planned that the study would include an evaluation of the effect of anti-parasitic treatment during the course of the project, but to carry this out scientifically proved impossible due to off-take of pigs and also the impracticality of using some of the pigs as untreated controls, since this would have been unfair to the owners.

The purpose of this article is to present the results of the pilot study, to compare them with published data available on smallholder pigs elsewhere, and to evaluate the main threats to smallholder pig health based on the findings of the study.

MATERIALS AND METHODS

Localities

The 2 districts chosen were Angónia District in Tete Province and Boane District in Maputo Province (Fig. 1). Angónia District is characterised by pigs farmed in a traditional, free-ranging system in which pigs spend as much time as possible unconfined in order to feed themselves by grazing and scavenging, being confined at most during the season when crops are on the land, and/or at night to protect them from predators. The Boane District is close to the capital city, Maputo, and, while some pigs are still traditionally farmed, many of the producers have

adopted a more commercial approach to farming, with an eye on the market offered by the proximity of the city, and pigs are mostly confined. Angónia District is situated in an area where ASF is endemic^{1,9}, while Boane is situated in the area south of the Save River that was traditionally free of ASF but that has since the first incursion of the disease in 1994 been subject to sporadic outbreaks⁷.

Sample size

The sample size was calculated using the number of pigs in the district based on official figures from the livestock department and the known or estimated prevalence of ASF and porcine cysticercosis in each district. Pigs over 6 months of age were targeted during the initial survey, and pregnant sows and sows with unweaned litters were excluded to avoid stress and loss of piglets. After adjustment of the number of pigs calculated to exclude piglets under 6 months of age and sows as specified above, 49 pigs from Boane were selected and 91 from Angónia. The pigs were identified with numbered ear tags and although few identified pigs were still available to be sampled at the end of the project, samples were taken from piglets from the same herds. Selection of participating farmers (herds) was performed in consultation with the district extension officers. All of the participating farmers volunteered to take part in the project.

Collection of samples

Faecal samples were collected from the rectum into plastic bags and transferred to the laboratory on ice.

Skin scrapings were performed to obtain mange mites; other ectoparasites were collected by forceps.

Blood samples were collected by venipuncture using the jugular, brachial, or ear vein into blood tubes without coagulant and the serum was decanted and used for antibody detection.

Sample processing

Eggs of helminths and oocysts of coccidia were obtained by flotation using a saturated salt solution. The samples

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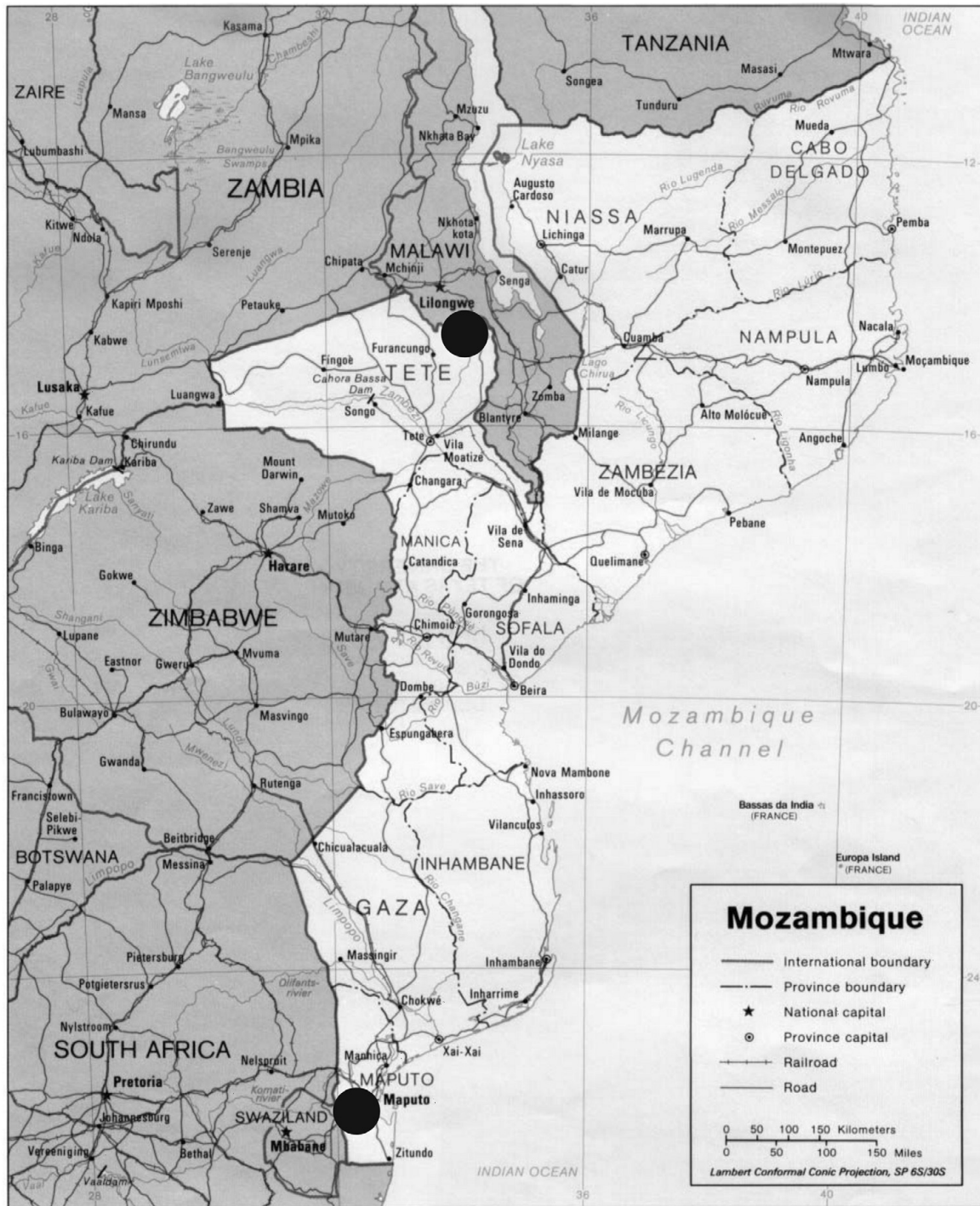


Fig. 1: Map of Mozambique showing the 2 study areas (●): Angónia district in Tete Province and Boane District in Maputo Province.

were evaluated quantitatively using the McMaster method as described by Thienpont *et al.*¹³, and the worm eggs were identified according to the same reference.

Material from skin scrapings was mounted on a glass slide in lactophenol, covered with a cover slip and examined microscopically for mange mites.

Ectoparasites were identified according to Soulsby¹⁰ to genus or species level.

Antibodies to ASF were detected using the Indirect ELISA based on the method used at the Onderstepoort Veterinary Institute, South Africa⁹.

Antibodies to cysts of *T. solium* were detected by an antibody ELISA using antigen obtained from purified cyst fluid prepared in house according to the method of Ito *et al.*⁵

Antiparasitic treatment

Infested pigs were treated at 3-monthly intervals (Boane) or 4-monthly intervals (Angónia) by the application of a dip of which the active ingredient was Amitraz against ectoparasites and injection of ivermectin at the recommended dose for pigs of 1 ml/33 kg against gastrointestinal parasites and immature mange mites.

Various brands of these products were used during the project, as no single commercial product was consistently available; for this reason the trade names are omitted.

Advice to farmers

Participating farmers were offered advice on ways to improve the hygiene of the area in which the pigs were kept and were provided with information during workshops and in the form of posters and pamphlets about parasites, common diseases of pigs including ASF, and good husbandry.

RESULTS

Pig lice (*Haematopinus suis*) were the ectoparasites found in the highest proportion in both districts, with 44.9 % of pigs in Boane and 59.3 % of pigs in Angónia being infested. Counts were not made, but large numbers of lice were often present, with many eggs visible on the hairs.

Sarcoptic mange was present only in pigs in Boane District, where 25 % of pigs were infested. A small number of pigs in Angónia had fleas (*Echidnophaga* sp.) (6.6 %) and/or ixodid ticks (11 %). One tick species was identified as a member of the genus *Rhipicephalus*.

Mixed infections occurred in about 10–12 % of the animals: 5 pigs in Boane (mange + lice) and in 11 pigs in Angónia (lice + ticks on 2 pigs, lice + fleas on 3 pigs, lice + fleas + ticks on 3 pigs).

Gastrointestinal parasites identified by eggs included *Ascaris suum*, *Hyostrongylus rubidus*, *Oesophagostomum* sp., *Strongyloides ransomi* and *Trichuris suis*. All were present at both sites, as well as oocysts of coccidia (Table 1).

At the end of the project, 37 piglets in Boane from the same herds that had been sampled initially and treated during the project were evaluated for ectoparasites and sampled for gastrointestinal parasites and ASF antibodies. For various reasons, mainly logistic, only 14 pigs were sampled in Angónia, and the results are therefore not presented, but little difference in the proportion of internal parasites was observed. In Boane, the percentage of pigs with lice had dropped to 25 %, but mange had increased to 42.5 %. The percentage of pigs infested was lower for all the nematodes (*A. suum* 24.3 %, *H. rubidus* 27 %, *Oesophagostomum* sp. 37.8 %, *Strongyloides* sp. 2.7 %, *T. suis* 2.7 %), and of coccidia slightly lower (56.8 %). The percentage of pigs with heavy infestations was also lower (*A. suum* 13.5 %, *H. rubidus* 0 %, *Oesophagostomum* sp. 2.7 %, *Strongyloides* sp. 0 %, *T. suis* 0 %, coccidia 2.7 %).

Antibodies to *T. solium* cysts were found in 1 pig in Boane district (2.1 %, $n = 48$) and 15 in Angónia district (17.9 %, $n = 84$).

Initially, none of the pigs from Boane district ($n = 48$) and 3 pigs from Angónia district (3.3 %, $n = 91$) had antibodies to ASF. Of the 14 pigs sampled at the end of the project in Angónia district, 2 (14.3 %) had antibodies, while all of the 37 pigs from Boane were negative.

DISCUSSION

At the start of the project, it was assumed that ASF and porcine cysticercosis were the most serious health problems likely to affect smallholder pigs in Mozambique.

Table 1: Percentage of pigs with gastrointestinal parasites obtained by faecal sampling in 2 districts in Mozambique at the start of the project ($n = 48$, Boane; $n = 87$ (Angónia)).

Parasite	District	No infested	% Infested	% Heavily infested ¹
<i>Ascaris suum</i>	Boane	17	35.4	18.75
	Angónia	20	22.9	10.34
<i>Hyostrongylus</i> sp.	Boane	25	52.1	14.6
	Angónia	57	65.5	16.1
<i>Oesophagostomum</i> sp.	Boane	33	68.8	20.8
	Angónia	22	25.2	0.0
<i>Strongyloides</i> sp.	Boane	10	20.8	2.1
	Angónia	21	24.1	1.1
<i>Trichiuris</i> sp.	Boane	5	10.4	4.2
	Angónia	2	2.3	0.0
<i>Moniezia</i> sp.	Boane	0	0.0	0.0
	Angónia	5	5.8	N/A
Coccidia	Boane	33	68.8	8.3
	Angónia	42	48.3	4.6

¹Heavy infestation: nematodes >1000 epg, coccidia >5000 oocysts pg.

Both of these diseases are best controlled by keeping pigs permanently confined⁶⁻⁸, but confining pigs not only places the responsibility of feeding the pigs on the owner, it also poses hygienic problems that, among other things, favour infestation with ecto- and endoparasites. The 2 districts were chosen with a view to comparing the health status of pigs in a completely traditional free-range system with pigs in a semi-urban situation where they are kept confined most of the time. Additionally, it was intended to compare endo- and ectoparasite burdens between treated and untreated pigs at the beginning and the end of the project, but this proved impossible because for ethical reasons it was necessary to treat all the pigs and also because of loss of pigs, mainly due to the ASF outbreaks in Angónia and 1 study site in Boane. However, sampling of piglets from the treated herds at the end of the project suggested that treatment may have been effective in reducing gastrointestinal parasite burdens in Boane, and a general improvement in pig health in that district was reported by extension officers and participating farmers, some of whom had instituted their own treatment programmes.

Outbreaks of ASF occurred in both districts during the life of the project. In Angónia, where the disease is endemic, outbreaks occur at frequent intervals⁹. Previous serological surveys showed that about 40 % of pigs sampled had antibodies to ASF⁹, indicating that ASF is endemic in the area, as it is in the adjacent Mchinje district of Malawi^{3,4}. The percentage of positive pigs was much lower in the present survey. This is likely due to a biased age selection, with the probability that most of the pigs sampled were between 6 and 8 months of age, too old for maternal antibodies and possibly born

after the last outbreak. An outbreak was reported to have occurred in July/August, about a month after the samples were taken. Reporting of outbreaks in Angónia is sporadic at best, but the local farmers regard the disease as seasonal, suggesting that it occurs at approximately annual intervals, probably because the farming system, which determines when the pigs are confined, is seasonal.

An outbreak of ASF also occurred in Boane from August to October 2004, after an absence of the disease from the provinces south of the Save River since 2001⁷. The effect on affected farmers was devastating, but emergency control measures immediately instituted by the provincial livestock services and supported by the project enabled farmers whose pigs were not yet infected to protect their herds. Subsequent investigation of the virus that included molecular characterisation indicated that it was probably introduced from Cabo Delgado province. This event proved that confining pigs will not protect them from ASF unless additional measures are taken to ensure that they do not come into contact with infected pork or other material contaminated with the virus.

The prevalence of cysticercosis determined for Angónia (17.9 %) corresponds almost exactly with the prevalence found for the Mbuli district in Tanzania by lingual examination of pigs, where the farming system is virtually identical⁶. That study showed that villages where latrines were used and/or pigs were kept confined had a much lower prevalence of cysticercosis⁶. In the present study, a questionnaire survey conducted among farmers showed that the percentage of households with latrines was 78.1 % in Boane and 97.5 % in Angónia (G Dias, unpubl. data, 2004/5), but it was generally admitted that latrines are not always

used, especially by the children. In Angónia the pigs certainly have access to human faeces over long periods when they are not confined at all, while in Boane the farmers who participated in the study rarely release their pigs intentionally, so that access is greatly reduced. It is also possible that pollution of the area with human faeces is lower in a peri-urban than a rural situation.

Apart from these 2 conditions, there was no evidence of diseases of any importance that affected the pigs, apart from ecto- and endoparasites. Pig lice were the most prevalent ectoparasites in both districts. No attempt was made to quantify the infestation, but some of the pigs were heavily infested. The most, perhaps only, serious ectoparasite found is the mange mite, *Sarcoptes scabiei* var. *suis*. Although only 25 % of the pigs sampled at Boane were infested, some of the infestations were heavy and clearly had an effect on the pigs. While the treatment applied during the project may have contributed to the lower prevalence of pig lice found at the end of the project, it apparently had no effect on the mange. This is not surprising, as it is well known that mange in pigs is not easy to eradicate and requires a targeted programme to break the life cycle of the mites in order to be really effective¹⁴. Mange was not found in any of the pigs in Angónia. A small number of pigs in Angónia had fleas, ticks and *Moniezia* sp., the last 2 probably picked up on pastures shared with cattle and goats.

The following helminth parasites have been reported to infect pigs in Mozambique: *Fasciola gigantica*, *Echinococcus granulosus*, *Taenia hydatigena*, *T. solium*, *A. suum*, *Ascarops strongylina*, *Choerostrongylus pudendotectus*, *Metastrongylus elongatus*, *Oesophagostomum dentatum*, *Physcephalus sexalatus*, *Seteria (Artinema) congolensis* and *Stephanurus dentatus*². From the parasites listed above, many of which are not gastrointestinal, eggs of only 2 species were found in the present study, namely *A. suum* and *Oesophagostomum* sp. However, eggs of other helminths not listed in the earlier publication² were found, which suggests the need for new surveys.

Worm burdens were similar in the 2 districts, with the exception of *Oesophagostomum* sp., which had a much higher prevalence in Boane. The prevalence of *H. rubidus* and *Strongyloides* sp. was slightly higher in Angónia, and that of *A. suum* was higher in Boane. The percentage of pigs with high egg counts was relatively low in both districts, but in particular in Angónia. The pattern agrees with that found for pigs in traditional

systems in Cameroon¹² and Burkina Faso¹¹. The prevalence of coccidia was higher in Boane, which is not surprising, considering that many of the pigs were kept under wet, unhygienic conditions highly favourable for coccidia. No anti-coccidial treatment was applied, but some of the participating farmers succeeded in improving their hygiene on the advice of the researchers, which it is hoped contributed to the lower proportion of infection found in Boane at the end of the project.

There is little doubt that, apart from ASF, which is devastating when it occurs because of the high mortality, nutrition is the most serious problem for the farmers, particularly when their pigs are confined. However, it is believed that by reducing the parasite burden of the pigs, farmers could achieve better productivity, since the pigs would be able to make better use of the food that is available. Improving hygiene of the pigs' environment can contribute significantly to reducing parasite burdens. However, once pigs are permanently or semi-permanently confined, it will be important to develop cost-effective strategies to treat mange, preferably by using a product that is effective against both mange mites and pig lice.

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