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Incentives for Conserving Local Livestock Breeds: The Case of the Ashanti Dwarf Pig of Ghana

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Abstract: The Ashanti Dwarf Pig (ADP) of Ghana is a local pig breed with relatively good adaptive traits and tolerance to endemic diseases. However, under-utilization by farmers due to its comparatively low productivity has led to a reduction in its popularity compared to exotic genotypes. A study was undertaken to document conservation options and incentives to encourage sustainable use and conservation of the ADP. Views of stakeholders made up of pig farmers, researchers and policy makers were sampled using a pretested questionnaire. Incentives proposed to motivate local pig farmers include provision of subsidized/free feed (75%), housing materials (62%), capital (57%), means of transport (57%) and breeding stock (52%). A major challenge of researchers is lack of funding (80%) to undertake improvement and conservation programmes for the ADP. The most suitable conservation option proposed was *in situ* in the short term and *ex situ in vitro* in the long term. The adoption and funding of a conservation scheme for the ADP by the Ministry of Food and Agriculture and stakeholders as well as provision of some incentives to farmers were recommended.

Key words: Adaptation, breed, gene bank, livestock diversity, stakeholders, suitable, conservation

INTRODUCTION

Livestock serves as a source of food and provides, essential non-food products such as fibre, transport, agricultural draught power, manure and fuel, savings, insurance and sociocultural roles among others (ILRI., 2006; Thornton, 2010; Koehler-Rollefson and Meyer, 2014; AU., 2014; AU-IBAR., 2015a; FAO, 2015). Livestock diversity, provides the basis for breeders to improve their animals for adaptation to changing climates, ecosystems and market demands. In harsh environments where crops fail, livestock keeping is often the main livelihood option available (Halimani *et al*., 2010; FAO, 2011). In Ghana, livestock provides animal protein to enhance the nutritional status of the people, offers employment opportunities for wealth creation, especially in marginalized areas (MoFA., 2016). The Ashanti Dwarf Pig (ADP) also known as ashanti black forest pig is a breed with relatively good adaptive traits, tolerant to most endemic diseases, survives under harsh conditions such as heat stress and is also able to handle fibrous feeds much better than exotic breeds (AU-IBAR., 2015b; Osei-Amponsah *et al*., 2017). However, their numbers keep falling yearly due to the indiscriminate crossbreeding (Ayizanga *et al*., 2016). In addition, the extent and rate of this decline is difficult to ascertain and this hinders decision-making regarding their sustainable use and conservation. Extinction of the ADP however will mean loss of valuable genes (FAO, 2007; AU-IBAR., 2015b) needed for the development of more productive and resilient pig breeds to feed the ever-increasing human population (FAO., 2018). There is thus an urgent need to conserve local breeds of pigs in their production environments (Adjei *et al*., 2015; Karnuah *et al*., 2018) by encouraging local farmers to keep them. Conservation and sustenance of the ADP depends on knowledge and the value stakeholders attach to the breed. The objective of this study was to document and propose sustainable incentives for farmers and conservation options for the local ADP of Ghana.

MATERIALS AND METHODS

The climate and vegetational zones of Ghana has been described by SRID. Briefly the climate is tropical, the Eastern coastal belt is warm and comparatively dry, the South West corner is hot and humid and the North is hot and dry. Sampling was done to cover all the agroecological zones of Ghana (Fig. 1). Data was gathered on stakeholder's knowledge and perception on the ADP (Fig. 2) and their motivation for keeping the breed. Data was collected from local pig farmers, researchers and policy makers through purposive sampling and the use of a pretested questionnaire.

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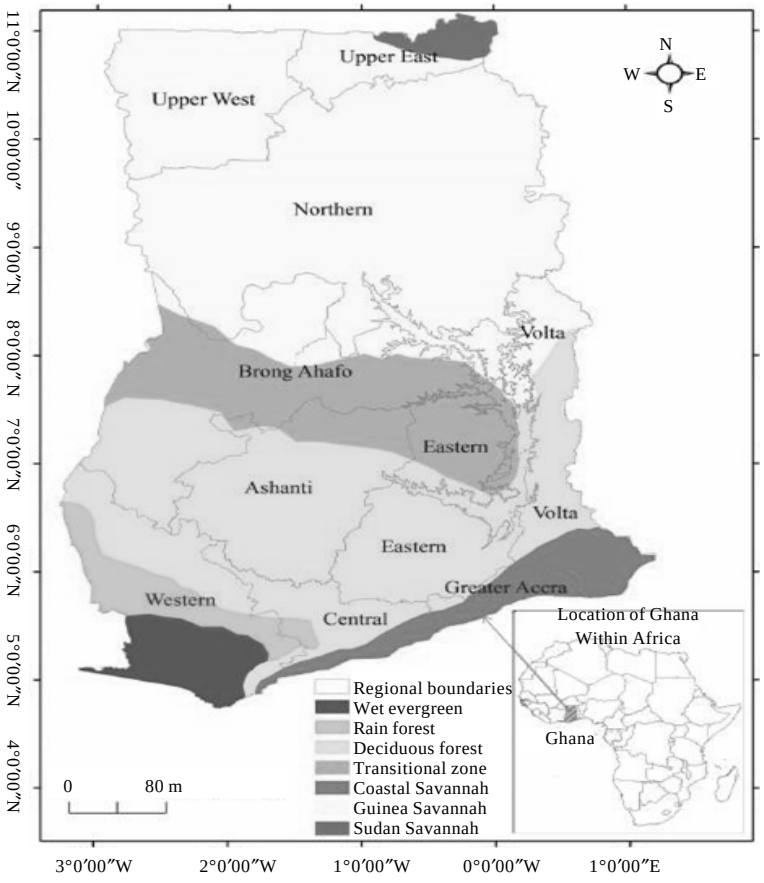

Fig. 1: Sampled ecological zones of Ghana

Fig. 2: The local Ashanti Dwarf of Ghana

Institutions involved included the Animal Production Directorate, Babile Pig Breeding Station, Animal Research Institute, Heifer Ghana and the Livestock and Poultry Research Centre (LIPREC) of the University of Ghana. Data analysis was done using the Statistical Analysis Systems (SAS) Software (SAS., 2012). Analysis carried out included categorical analysis of qualitative data using Chi-square and relative frequencies of various parameters summarised in tables and figures.

RESULTS AND DISCUSSION

A total of 115 local pig farmers provided information during the survey. The gender, age distribution and educational background of the farmers are as shown in Table 1. The results indicate that a relatively high proportion of male farmers had secondary or tertiary education compared to females. Farmers described the local ADP as resistant to most endemic diseases, hardy, heat tolerant and relatively easy to keep (Fig. 3). About half of the farmers who kept the ADP said they had access to veterinary services and drugs with just a third

Table 1: Demographic characteristics of local pig farmers by gender

Parameters	Gender of farmers: Female (%)	Male (%)	Total (%)	χ^2 values	p-values	df
Educational status						
None	66	14	35 (30)	26.2**	<0.0001	3
Basic	9	31	29 (25)			
Secondary	16	30	30 (26)			
Tertiary	9	22	21 (18)			
Total	28	72	115 (100)			
Age distribution (years)						
18-30	9	12	13 (11)	1.47^{NS}	0.689	3
31-50	60	54	64 (56)			
51-70	22	29	31 (27)			
70+	9	5	7 (6)			
Total	28	72	115 (100)			

*Significant value

Table 2: Husbandry practices of local pig farmers by educational status

Parameters	Farmer response: Yes (%)	No (%)	Total (%)	χ^2 values	p-values	df
Access to veterinary services						
None	32	68	22 (54)	11.0*	0.0119	3
Basic	38	62	8 (20)			
Secondary	86	14	7 (16)			
Tertiary	100	0	4 (10)			
Total	49	51	41 (100)			
Feed provision						
None	57	43	35 (30)	20.4**	0.0001	3
Basic	31	69	29 (25)			
Secondary	11	89	27 (24)			
Tertiary	10	90	20 (18)			
Total	31	69	111 (100)			
Structure for housing pigs						
None	86	14	35 (32)	15.5**	0.001	3
Basic	55	45	29 (26)			
Secondary	67	33	27 (24)			
Tertiary	35	65	20 (18)			
Total	64	36	111 (100)			

*Significant values, **Significant values

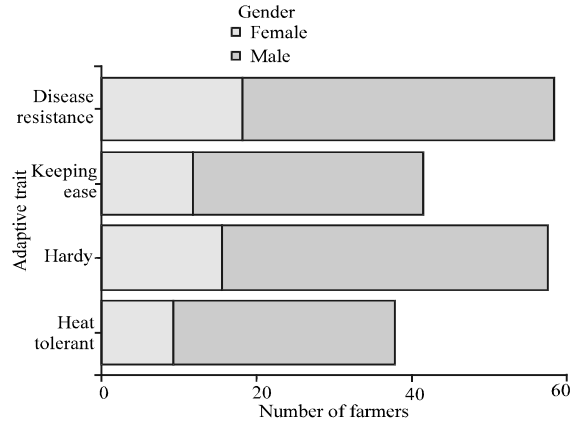

Fig. 3: Known adaptive of the ADP by gender of pig farmer

providing feed for their animals (Table 2). Feed provided by the farmers included fruits and vegetables (provided by 83% of farmers), maize bran (73%), waste from sorghum brewing/pito mash (63%), wheat bran (42%), fishmeal (39%). Although, most farmers (64%) provided some form of housing for the pigs, only 22% provided concrete building with aluminium roof, 41% provided mud houses with the others (37%) providing thatched structures with or without roofs. Most pig farmers (90%) keep other pig breeds such as large white (52%), landrace (28%) and crosses between the ADP and the exotic breeds (42%). Some farmers (54%) indicated that the ADP was more superior to the exotic with many (60%) indicating that it was expensive to keep the exotic breeds, although, others (40%) felt the exotics were more profitable to keep. Irrespective of age, farmers (83%) indicated that their stock numbers were reducing and agreed that the ADP should be conserved (Fig. 4). Generally, farmers complained there had been a decrease in their stock size from 2016-2017. Out of the total, 97 farmers could give an estimate of their stock sizes over the 2 years and 72 farmers (74%) had a reduction in stock size. The main reasons for disposal included sales (74%), diseases (31%) and self-consumption (36%).

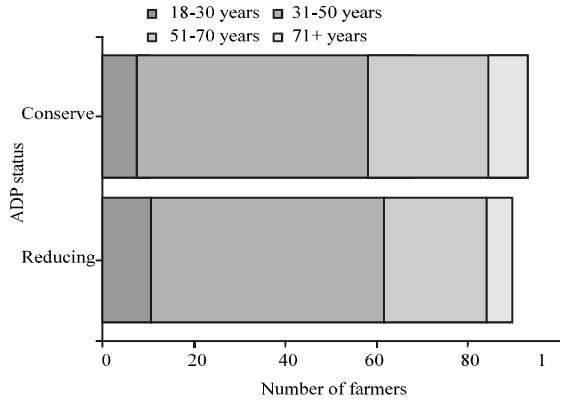

Fig. 4: Population trend of ADP and need for conservation by age of farmer

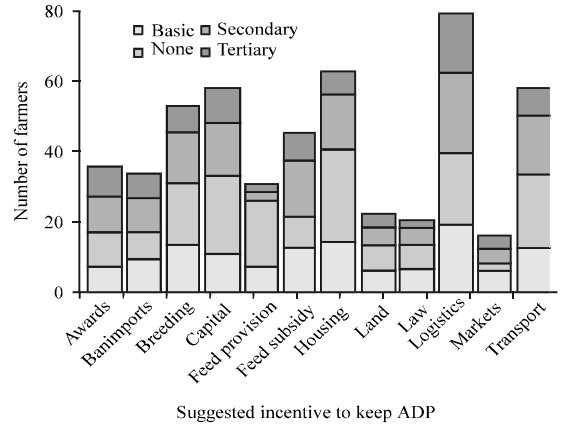

Fig. 5: Suggested incentives for keeping the ADP by educational status of pig farmer

Provision of farming logistics, direct monetary payment, provision of housing materials, means of transport, breeding/replacement stock and subsidized pig feed (47%) were the most popular incentive options suggested by farmers (Fig. 5). Others also indicated the need to ban pig imports, legislation to sell pigs by weight, grading of carcass, creation of niche markets and special awards for farmers who keep the ADP. Animal research scientists interviewed confirmed the hardiness, disease and heat tolerance as well as the ADP's ability to survive poor management. About (40%) of institutions indicated they have invested in the conservation of the ADP with the most popular conservation practice being used is *in situ* conservation (60%). In general it was agreed that the *in-situ* approach alone was not enough to conserve the breed. Thus, there is need for cryopreservation centres and gene banks as well as the opening of more open nucleus breeding stations. Researchers also called for funding for conservation programmes, appropriate legal framework to enforce conservation and improved and efficient farmer education. The animal production directorate indicated that it was their mandate to conserve the ADP. This they are doing through *ex situ*, *in vivo* conservation at the Babile Pig breeding station. Incentives provided by government is in the form of supplying breeding/replacement stock as well as free extension services to pig farmers and research institutional farms.

The predominance of male farmers may be attributed to the relative social superior leadership roles of males in livestock farming in the sampled areas. This was consistent with the findings of Chikwanha *et al.* (2007) and Abdul-Rahman *et al.* (2016). The ages of respondents showed 89% were between the productive ages of 18-60 years similar to findings of (MoFA., 2016) which indicate that livestock provides employment to a large section of the active Ghanaian population. A large proportion of pig farmers lack secondary and tertiary education which is negative to adoption of innovative and good animal husbandry practices This finding is in line with those reported by Fleischer *et al.* (1995), Rege and Gibson (2003), Koehler-Rollefson and Meyer (2014) and MoFA. (2016). The major perception of farmers regarding the ADP was its relative hardiness, disease and heat tolerance and general adaptability to poor management which make it the breed of choice of resource-poor farmers in line with findings by Adjei *et al.* (2015) and Ayizanga *et al.* (2016). The ADP play many significant roles such as a source of income, food and fertilizer from manure with some farmers indicating that their ownership of the ADP gave them a high social standing in their communities. This shows that conserving this breed has positive impacts on the broader context of sustaining rural communities and their existing economic foundations in agreement with earlier reports (FAO, 2007; Koehler-Rollefson and Meyer, 2014; FAO, 2015; MoFA., 2016; Tetteh and Osei-Amponsah, 2017).

Feed provided to the pigs included pito mash, maize bran, rice bran, fishmeal, fruits and vegetables, wheat bran and spent malt and could be because of the agro-processing factories that were present in most of the localities visited such as fruit processing factories, breweries and fish processing factories. The main forms of housing provided for pig's mud houses that ched structures and the few concrete buildings were dictated mainly by the economic situation of the farmer and availability of building materials in the sampled areas. Almost half of sampled farmers had access to veterinary services for their animals due to equal distribution of

farmers from both marginal and peri-urban areas where veterinary services are more available and accessible (Kohler-Rollefson, 2004). Majority of farmers were of the view that the ADP was rapidly reducing in numbers as reported for most local breeds by FAO (2007). Many respondents were keeping other breeds such as the large white, landrace and crosses between the ADP and other exotic breeds. This was not surprising as the government has in the past imported exotic pig breeds into the country culminating in indiscriminate crossbreeding as reported by Fleischer *et al.* (1995) and MoFA. (2016). However, majority conceded that the ADP performs better in terms of input-output basis compared to the exotics and even the crossbreds. This could be as result of the inability of farmers to provide optimum conditions for these exotics with reduced resistance to our local conditions as reported by Tetteh and Osei-Amponsah (2017).

The major forms of incentives suggested by farmers to encourage them to raise the ADP include financial support, housing materials, breeding and replacement stock. This was consistent with reports by Thies (2000), Almekinders (2001) and FAO (2015) which reported similar incentives as well as subsidized feed or free feed in specialized cases as reported by the environmental working group Anonymous (2013); Koehler-Rollefson and Meyer (2014). Other incentives include awards as suggested by Kohler-Rollefson (2004), ban on imports, pickups and tricycles, land, logistics, the creation of niche markets (Thies, 2000; Kohler-Rollefson, 2004; FAO, 2015) and legislation on the weighing of pigs before sale (Halimani *et al.,* 2010). Indeed, inception of an award scheme for ADP farmers as an incentive could help create awareness among industry players, especially consumers to the rising importance and safety of pork from our local pig.

With regards to the researchers, most of their institutions are government-owned, resulting in the conservation of our local Animal Genetic Resources (AnGR) being fragmented into many small nucleus farms on equally small budgets as well as specific mandates which limited them from diverting to other breeds such as the ADP. According to them, the main incentives that would encourage research into the ADP are funding, provision of infrastructure and logistics. The major conservation options proposed by researchers include community-based conservation and open nucleus breeding as they seemed easier to establish and maintain (Kohler-Rollefson, 2004; Gibson *et al.*, 2006; Vincent *et al.*, 2014; FAO, 2015). Open nucleus breeding may hold huge prospects for the immediate conservation of the breed as it is normally funded by government and NGOs and may thrive a lot mostly in its initial stage. NGOs that have been quite successful in AnGR conservation include World Conservation Union's South Africa Office (IUCN-SA) as reported by Mahlase and Fakir (2001) and the Programme National de Selection Ovine (PNSO) in Cote d' Ivoire (Yapi-Gnaore *et al.*, 2001). However, community-based conservation has been accepted as a more sustainable alternative (Vincent *et al.*, 2014), especially, one where market for the produce of the community was available.

CONCLUSION

Policy makers indicated lack of funds to support the conservation of local AnGR, however, researchers and farmers requested for an urgent need for government to consider AnGR conservation as a priority and create a budget line for it annually. In addition, other options including cryopreservation should be explored in the long term as proposed by Kohler-Rollefson (2004); Gibson *et al.* (2005) and FAO, 2015). To facilitate a quick and more sustainable establishment of these *ex situ in-vitro* options, establishment of West African regional gene bank for AnGR may be more economical for countries in the sub-region.

The ADP of Ghana is thus, a breed worth conserving and stakeholders need to support programmes on its conservation and sustainable use. Under-utilization of the breed by farmers has led to a decrease in the ADP's population.

RECOMMEDATIONS

Government should provide the identified incentives as part of sponsorship packages in future livestock programmes to motivate local pig farmers. It is recommended that MoFA in conjunction with research institutions, set up community-based conservation centres across the country, especially in the three Northern Regions and the coastal regions where keeping the ADP is still popular. In addition, arrangements for an AnGR cryopreservation centre in Ghana and eventually a gene bank should also be made to totally secure the future existence of the ADP. Finally, Ghana should support the creation of a sub-regional gene bank under the auspices of the Economic Community of West African States (ECOWAS).

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