

Pig Production in Tanzania: a Critical Review

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Summary

Tanzania's 1.58 million pigs represent 3.7 per cent of the national population of quadruped meat-producing animals. Some 99.5 per cent of pigs are kept by small producers in units averaging 3.04 animals (range 2-48). About 18 per cent of households with livestock own pigs, 93.7 per cent of these having a herd of less than 19 and 69.2 per cent own 9 or fewer head. Scavenging is the main feed source. Maize bran is the principle supplement but some owners provide oilseed cakes and minerals. Domestic pigs are not indigenous to Tanzania and derive mainly from late 19th/early 20th century introductions. There have been few imports of breeding stock since 1961. Poor management, in-breeding, inadequate nutrition and rudimentary veterinary attention lead to low output from late ages at first farrowing, long inter-birth intervals, small litters, slow growth and high mortality. Government policy is not applied in practice. Animals are slaughtered in primitive private facilities or household compounds with little concern for welfare or hygiene, often with no official inspection. Pigs can make a greater contribution to society but public and private sectors must provide additional support with particular attention to management, nutrition, health, welfare and food safety to achieve this.

Résumé

La production porcine en Tanzanie: revue critique

Les 1,58 millions de porcs représentent 3,7% de la production de viande totale des quadrupèdes en Tanzanie. Quatre-vingt-dix-neuf pourcent des porcins sont élevés par des petits producteurs qui possèdent en moyenne 3,04 porcs (troupeaux allant de 2 à 48 têtes). Presque 18% des ménages qui élèvent des animaux possèdent des porcs. Quatre-vingt-treize virgule sept pourcent ont un troupeau de moins de 18 têtes et soixante-neuf virgule deux pourcent des fermes n'ont que 9 porcs ou moins. La divagation représente la principale source d'alimentation des animaux. Le son de maïs représente la principale source de complément alimentaire. Cependant, quelques éleveurs utilisent le tourteau d'oléagineux et des minéraux. Les porcs domestiques ne sont pas endémiques de Tanzanie mais descendent essentiellement de porcs introduits à la fin du 19^e, début du 20^e siècle. Il y a eu très peu d'importations de reproducteurs depuis 1961. La mauvaise gestion, la consanguinité, l'alimentation inadéquate et les soins vétérinaires rudimentaires conduisent à la très faible productivité pour un âge avancé à la première mise-bas; à un intervalle entre mises-bas élevé; un faible nombre de porcelets par portée; une vitesse de croissance faible et une forte mortalité. La réglementation nationale n'est pas appliquée dans les faits. Les animaux sont abattus dans des abattoirs particuliers primitifs à l'intérieur de la ferme avec peu de considération pour l'hygiène et le bien-être animal. Le plus souvent, aucune inspection sanitaire officielle n'est pratiquée. Les porcins peuvent contribuer davantage à la société mais pour cela, les secteurs public et privé doivent apporter plus d'attention aux techniques d'élevage, à la nutrition, à la santé, au bien-être animal et à l'hygiène alimentaire.

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Introduction

Tanzania's animal wealth at the end of 2008 included 21.38 million cattle, 15.1 million goats, 5.7 million sheep, 1.6 million pigs, 0.3 million donkeys and 43.2 million poultry (28) together with very small numbers of domestic buffalo (29) and one-humped camels (30). Almost all animals are kept in low input-low output mixed smallholder, agropastoral or pastoral systems.

Pigs are a minor meat-producing species in Tanzania's array of domestic livestock as they account for about 3.7 per cent of quadruped meat-producing animals. The species is kept by its owners to generate income, provide food for the household including (perhaps unusually) cooking fat, produce manure, as a store of wealth and for intangible functions not associated with economic factors or household food security (21).

Government's policy document of 2006 (27) affords pigs some attention but has had little impact. There is little public sector interest in pigs but limited support is provided by Christian missionary organizations and international Non-Governmental Organizations. In the latter case help is often directed women and particularly women-headed households and those suffering the effects or after-effects of HIV/AIDS.

There is a small but growing body of literature on pigs in Tanzania. This began in the 1970s with work on nutrition, mainly carried out at the Sokoine University of Agriculture, and on the possibilities of replacing feed cereals with cassava (2, 6, 7, 10, 11, 13, 14, 16, 26, 32). Other research has covered the local feed base for pig production (8, 9). There has been limited research on production systems (22, 25) and production (1, 14, 15, 18, 23). Most research, mainly by a small group of dedicated workers, has been on disease problems which is the subject of another review (31).

This paper provides an overview of pig production in Tanzania and its potential role as a contributor to increased rural incomes, to other aspects of social welfare and to improved food security. It is based on a comprehensive survey of the literature, on interviews and meetings with a broad range of stakeholders and on the personal experience and knowledge of the authors.

Populations

Numbers and distribution

National data provide an estimate of 1 581 396 pigs for Tanzania in 2008, this being an increase of more than 300 per cent from the 434 638 pig population in 1995 (28)**. At this stage they were equivalent, in numbers, to 3.62 per cent of the quadruped meat producing species. The national data indicate annual rates of numerical increase of 13.5 per cent in the period 1995-1999, 3.5 per cent in 1999-2003 and 10.2 per cent in 2003-2008; 10.2 per cent to give an annual increase for the whole 14-year period of 10.2 per cent.

More than 60 per cent of national pigs are reared in the Southern Highlands regions of Iringa, Mbeya and Ruvuma. Morogoro, Dodoma and Kilimanjaro Regions also have considerable numbers of pigs. These are followed by Manyara, Rukwa and Kagera Regions. There are relatively fewer to small numbers in the other mainland regions. There are very few pigs on the strongly Muslim offshore region of Zanzibar.

Overall pig densities are low. They are highest in the largely urban region of Dar es Salaam (27/km²) followed by Kilimanjaro Region (9/km²), then Mbeya (6/km²), Iringa (5/km²) and Ruvuma and Dodoma (3/km²). Other regions have densities of 2/km² or less (28).

Production systems and ownership patterns

Commercial pig production is limited to institutions and a very few private farmers. There were only 8316 pigs on large scale farms in 2008 (28), representing 0.53 per cent of all standing stock. The remaining 99.47 per cent of pigs were owned by 18 per cent of households that keep livestock (8, 9) or 11 per cent of all households. Average herds comprise 3.04±5.2 pigs in the range 2 to 48 head. Some 93.7 per cent of owning households have 19 or fewer pigs and 69.2 per cent of pigs are kept in the two groups with the least animals: the percentage of pigs owned rises to 84.4 for households owning 14 pigs or less.

Thus, only 15.6 per cent of pigs in the traditional sector are kept in units of 15 head or greater (Table 1).

**FAO data differ substantially from the national figures: their estimate is 350 000 pigs in 1995 and 485 000 in 2008, having risen from a total of 93 000 at Tanganyika's independence in 1961: it needs to be noted, however, that throughout the 50-year period FAO has used its own estimates and never made use of national data (<http://faostat.fao.org/site/573/DesktopDefault.aspx?PageID=573#ancor>).

Mean herd sizes appear larger than the national average in the Southern Highlands where they are 7.6 ± 4.4 for all ages combined and include 1.9 ± 0.78 (range 1-4) breeding sows (19, 20). Many pigs in urban areas are totally confined in rudimentary housing of local materials and with little consideration for hygiene or welfare (Figure 1) whereas in rural areas most pigs roam free or are tethered during the day and housed at night.

Urban and suburban areas are important areas for keeping livestock including pigs and numbers are increasing rapidly in these systems. In Dar es Salaam, for example, dairy cattle numbers increased by a factor of 4 in the 1980s, pig numbers increased 4.5 times, there was a 15-fold increase in goat numbers and poultry numbers more than tripled. In Morogoro town in 1999 there were more than 5300 improved dairy cattle, almost 2000 goats, some 260 sheep and almost 1000 pigs. At this time in Morogoro 4.7 per cent of all households and 12.3 per cent of households keeping livestock herded pigs either totally confined (required by a municipal by-law) or stalled at night and free roaming during the day; the average number of pigs kept was 10.5. In Mbeya, 17.2 per cent of all households and 22.2 per cent of households owning livestock kept an average of 4.6 pigs (5). As might be expected from the fewer numbers and lower density the number of households owning pigs in Dodoma Region is only 9 per cent (3).

In 300 randomly sampled households in 30 randomly selected villages in Mbulu District in Manyara Region, 49.3 per cent of households managed pigs in semi-confinement (that is, housed

at night and free-roaming during the day), 42.0 per cent in total confinement, 8.7 per cent allowed free roaming and 2.0 per cent herded them (8). Pig houses had raised slatted floors or earth or concrete floors. Pigs are usually free ranging or tethered in Mbeya Region (19, 20).

Men nominally own most pigs but women provide most of the labour associated with production, at least to the market and slaughter stage. Many farmers keep pigs on an opportunistic basis. In Iringa District, for example, 70.7 per cent of households with pigs kept only "growers" whereas 48.8 per cent had "adults" and only 21.9 per cent had piglets (14).

Pigs, except for those that are kept in total confinement, obtain most of their food from scavenging in fields, along roadsides and around the farm. This food comprises tree leaves and fruits, grasses, cereal stubbles and spilt grains as



Figure 1: Pigs in confinement in Ilala municipality, Dar es Salaam Region.

Table 1
Number of households owning and herd sizes of pigs in Tanzania, 2008.

Number of pigs in household	Households rearing pigs		Number of pigs		Mean number of pigs per household
	Number of households	Percentage of all owning households	Number	Percentage of total pig population	
4	437 951	84	771 324	48.8	1.8
4-5	51 708	110	323 173	20.4	6.2
10-14	20 918	4	240 315	15.2	11.5
19-19	7 023	1	111 892	7.1	15.9
20-24	2 115	0	44 821	2.8	21.2
25-29	730	0	19 562	1.2	26.8
30-39	971	0	31 146	2.0	32.1
40	817	0	39 164	2.5	47.9
Total/overall	521 872	100	1 582 396	100	3.0

well as insects and other small creatures. Maize bran is fed at some time by almost all pig keepers, about one third provide oil seed cakes and minorities provide minerals (13.9 per cent), salt (5.6 per cent) or blood meal (2.8 per cent). Other feeds (rice bran, green leaves, vegetables, potatoes, household waste and residues from home brewing) are provided irregularly when available (8, 9).

Population structure

At the national level the pig population comprises 17.6 per cent breeding males, 44.4 per cent breeding females, 8.5 per cent castrated males, 13.4 per cent young males and 16.1 per cent young females (28).

Genetic resources

Tanzania has no truly indigenous domestic pigs. Domestic swine were introduced at the end of the 19th and the beginning of the 20th centuries by Christian missionaries of German or Swiss origin. There has since been a long tradition of pig breeding at, for example, Peramiho mission at Songea in Rukwa Region (180 pigs in 2012) and Ndanda in Mtwara Region. It can be presumed that the early pigs of these missionaries were local to their areas of origin.

Pure bred Large White pigs from England were bred and reared at Kongwa Ranch in Dodoma region in the 1950s and 1960s but these have been allowed to die out (RTW, personal knowledge). Some European settlers in the Southern Highlands and parts of the northern area around Arusha also kept pure bred pigs up to the 1960s.

There has been little renewal of breeding stock in the 50 years since Independence although import "data" for the period in terms of both numbers and value are unreliable and often conflicting. There is anecdotal evidence (Regional Veterinary Officer, Songea, pers. comm.) that Large White, Landrace and Saddleback young boars were imported from Germany and Holland by Benedictine missionaries to Peramiho during the 1960s and 1970s. Records in the Import Section of the Ministry of Livestock show 22 pigs – including Landrace, Large White, Duroc and "Sussex cross" – were imported from Kiambu in Kenya in February 2009 by a private company based in Arusha. A further 54 pigs from Kenya were imported in October 2010 and a Tanzania-Danish private company with a land holding near Dar es Salaam imported five Large White and Duroc boars from Denmark in early 2012 (Figure 2).

The absence of systematic breeding, poor

husbandry practices, genetic drift and possible mutation have resulted in pigs in the smallholder sector of varied genotype and phenotype. In a Southern Highlands study 78 per cent of pigs had lop ears which may be indicative that they are of Landrace type. This type of pigs was significantly heavier and had a longer body than those with erect ears which may be representative of a Large White (Yorkshire) descent. White pigs (28 per cent) were more common than black and white (24 per cent) and solid black ones (20 per cent) with other colours and combinations of colours accounting for the remaining 28 per cent of the population (19, 20).

"Pure bred" animals are kept on some institutional farms, by mission stations (Benedictines at Peramiho and Ndanda and Anglicans in Tanga Diocese) and a very few progressive private companies and entrepreneur farmers. Mission stations continue to maintain high grade animals and try to limit in-breeding by exchanges amongst themselves of young breeding males. Less than 5 per cent of small farmers have access to pure bred or improved boars (20). Thus, in the small scale system there is little control of the reproductive process, females being bred by usually free roaming boars within a village group.

Policies

Tanzania's Livestock Sector Policy document (27) states it promotes pig production order to contribute to food security, improved nutrition and increased incomes while conserving the environment. More precisely Government intends to support and strengthen technical support services and use of appropriate technologies in pig production. It will also promote production of high quality animal feeds and encourage the use of locally available raw materials and feed additives. In the third place it will promote an inventory of pigs and undertake characterisation, evaluation and selection of pig breeds in order to increase productivity. Government will also encourage and promote the establishment of standard slaughtering facilities and marketing infrastructure in major pig production and consuming areas. Finally it will create awareness of and encourage farmers and dealers to group together to form pig producers' and traders' associations.

Production

Pork production increased from just over 2000 tonnes at Independence in 1961 to 9000 tonnes in 2002 and then to more than 12 000 tonnes in 2008 (4).



Figure 2: Duroc boar imported to Tanzania from Denmark by a private entrepreneur.

Physical performance

Small-scale subsistence farmers keep pigs as a backyard activity in mixed farming systems. Performance is generally low as a result of poor husbandry leading to small litter sizes, low birth weights, slow growth rates and heavy mortality (27). In one study in Mbeya Region, age at first farrowing was 13.8 ± 2.5 months, interval between successive farrowings 12.0 ± 2.2 months, total lifetime farrowings 6.4 ± 0.7 and litter size at birth 6.6 ± 1.2 which was reduced by weaning at 3.4 ± 0.4 months to 4.3 ± 0.9 (20). Farmers interviewed by the authors of this review reported intervals between farrowings of 6-10 months and litter sizes of 5 to 13 pigs born but it is likely that the better end of these statements are somewhat optimistic or rare occurrences. Abortions, stillbirths and congenital morphological deformities may be attributed to in-breeding as well as to disease challenge.

In the Southern Highlands average mature body weight for boars was 57 kg and for sows was 54 kg although there was a wide range from 30 kg to 64 kg. Overall mean birth weight was 0.9 kg and weaning weight 10.8 kg (19, 20). In experiments using fresh cassava roots and cassava root meal as the source of energy average growth ranged from 533 to 566 g/day on restricted feed and from 551 to 737 g/day for *ad-lib* fed pigs. There was no difference in daily weight gain and feed conversion efficiency between pigs fed cassava-based diets and commercial pig feed (2, 7, 11).

Marketing

Limited opportunities for marketing have been evoked as a reason for pig numbers to increase further (20). In 1996, for example, the pig population of the five districts of Morogoro Region was estimated at 11 454 but there were 4558



Figure 3: Shop sign for a specialist pork butcher in Morogoro municipality.

recorded sales valued at TSh 290.2 million (US\$ 232 700 at 2006 exchange rates) or an average of TSh 63 254 (US\$ 50.6) per head (24). There are sufficient pigs – and clearly adequate demand – in Morogoro and its surroundings to support a specialist butchery (Figure 3). In the year 2000 in Mbeya and Morogoro, 40.3 per cent of households keeping pigs did so for the sole purpose of sale, 31.3 per cent for sale and home use, 13.4 per cent primarily for sale, 13.4 per cent mostly for own use and only 1.5 per cent solely for home consumption (5).

The large demand for pigs in Dar es Salaam is partially filled by lorry shipments from the Mbeya Region (RTW pers. obs.). The very active urban market is mainly served, however, by individual owners and small dealers trading informally and moving animals to point of sale or slaughter by a variety of means. These include herding on foot and transport in handcarts and on the backs of bicycles. Most transport, which is rarely accompanied by the obligatory movement permit, is far from complying with the requirements of the Animal Welfare Act No 19 of 2008 (Figure 4).

Slaughter

There are no public pig slaughtering facilities in the country. There is some official pork inspection at private slaughter slabs in Dar es Salaam but this is not carried out systematically. None of the slaughterers and butchers of pigs is likely to have undergone the official health checks required by law for such people. No pig is slaughtered in conformity with the Animal Welfare Act which requires stunning before killing (except where for religious reasons they cannot be stunned, which clearly does not apply to pigs).

All of 24 privately owned Dar es Salaam pig



Figure 4: A pig on its way to market in the regional town of Sumbawanga.

slaughter slabs were “substandard, wrongly located, poorly designed and constructed and lacked most basic requirements for a slaughter house” and “because of inadequate slaughtering, disposal and cleaning facilities, the slaughter slabs were under unhygienic condition with questionable safety, soundness and wholesomeness of the pork produced” (21). Slaughter, dressing and meat handling at slabs in Morogoro “are done on the ground under unhygienic conditions and all slabs are dirty and have neither tap water nor drainage systems” (21). Slabs in Dar es Salaam are approved by the municipality and assigned a government employee to oversee operations and perform meat inspection but the efficiency of the inspection was doubtful as there are insufficient inspectors for the number of slabs (E. Mkupasi, pers. comm.). After the first early morning session no inspection is done for later arrivals as the inspectors have already left for other duties (S. Mwidunda, pers. comm.). At six privately owned slabs in Morogoro there was no official meat inspection at all (Silvester Mwidunda, pers.comm.).

A Dar es Salaam city by-law requires pigs to be slaughtered at authorized slabs (and thus, presumably, also inspected). A total of 23 212 pigs was slaughtered and inspected between January 2006 and September 2007 but this figure fails to take account of animals slaughtered at slabs but not inspected and the unknown but undoubtedly vast number slaughtered at home. The situation is similar throughout the country but where officialdom is failing the private sector occasionally shows some concern. Thus in Mbulu District cases of cysticercosis in slaughtered pigs are proportionately

less than in the living population, suggesting that pig traders conduct their own ante-mortem lingual examinations before purchasing in rural communities (21).

Discussion and conclusions

Pigs are a minor component of the livestock sector in Tanzania but there is potential for increasing their contribution to human welfare through increased income and improved availability of high quality protein in the family diet. This potential is underlined via the rapid recent increase in numbers and higher consumption of pig meat, especially in urban areas. Prospects are enhanced by the shorter life cycle, greater number of young produced per year and the possibility of producing high quality animal protein at a lower cost than meat produced by cattle and small ruminants. (Pig meat retailed in the informal market at about TSh 6000/kg (US\$ 3.75) in October 2012 or about the same price as red meat from cattle, goats and sheep at the same time. In the southwest of the UK in mid-October 2012, however, the wholesale price of pork was 152.93 pence/kg (US\$ 2.43) deadweight compared to 367.60 pence/ kg (US\$ 5.85) for new season lamb (thus only 41.6 per cent of the price) and 342.30 pence/kg (US\$ 5.45) for steers (44.6 per cent).)

There has been little structured research related to pigs other than on some aspects of disease. Constraints to increased output identified by farmers include absence of suitable feeds and a range of production diseases that are exacerbated by inadequate or total absence of animal health and general extension services (22). Government policy on swine production is theoretically positive (27) but practically negative as there is virtually no support for research into nutrition and health and none for the improvement of genetic resources. These problems are compounded by lack of marketing and slaughter infrastructure and some cultural and religious taboos restricting consumption of pig meat.

Pigs are afflicted by and suffer from a whole range of trade and production diseases and are a reservoir of several major zoonoses as well as notifiable diseases including swine fever and African swine fever that are of international importance (31). Education programmes on health and management have been shown to have significant financial benefits with Internal Rates of Return as high as 370 per cent (22). There are still, however, high risks to urban populations with increased transport of pigs from rural communities to large urban areas (9, 31).

Overall, improved knowledge coupled to changes in management, better nutrition, improved veterinary services and enforcement of sanitary conditions at slaughter would improve productivity, increase family incomes and safeguard people from the health risks associated with traditional pig production.

Some major conclusions can be drawn from this review. Pig production and especially small scale production could be an important source of increased income and improved food security for

rural households. The main production constraints to increased output are poor husbandry practices, inadequate nutrition and lack of extension services. Opportunities exist for genetic improvement and for some breeders to supply others with replacement stock. Finally, the market provides an opportunity to producers to supply a greater quantity of pork in the short term followed by better quality in the long term.

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