Non Conventional Livestock for Better Livelihood: Prospects of Domestic Cavy in Mixed Production Systems of Tanzania

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Abstract: *Similar to majority of Sub-Saharan African countries, Tanzania depends largely on small and large ruminants, poultry and seafood to meet its animal protein needs. While most of the non-conventional protein sources are hunted, domestication of some of the species is equally promoted because hunting harvests cannot provide sustainable and affordable meats. Meanwhile, there have been growing demands for white meats, especially among the middle and high income population classes, exacerbated by changes in eating and living habits. Recent reports have identified domestic cavy (*Cavia porcellus L.*) as a right delicacy. This small pseudo ruminant that is also referred to as guinea pig or as Pimbi or Simbilisi in Kiswahili, is adopted in rural and urban households in Tanzania. This paper highlights on prospects of production of cavies focusing on the mixed production systems of Central Tanzania, where identified farmers keep a few cavy families either in own pens in a compound or within living houses of owners. Results indicated that farmers have such major reasons as keeping cavies for food (37%) or cash income (33%). Inadequate knowledge on improved husbandry practices was the most limiting constraint (38%) in the study sites where cavy keeping hinges on local knowledge and locally available feed resources. Therefore, innovative approaches and more attention from research and extension services are called for to improve production, consumption and marketing of cavies and other non-conventional meat sources as stipulated in the national livestock policy.*

Key words: cavies, protein, meat, extension, forages.

INTRODUCTION

Tanzania is among the few countries with countless sources of food whereby people depend largely on small and large ruminants, table birds, seafood and several insects for protein intake. The current National Livestock Policy (URT, 2006), recognizes the abundance of non-conventional meat sources and advocates the need for inventorization, characterization and evaluation of these sources for increased livestock productivity and improved livelihood. At the same time, the National Livestock Policy guarantees government support and commitment to strengthen technical services for production and encouraging utilization, processing and marketing of non-conventional meats. It has been shown in a wide context that non-conventional livestock species could provide enough meat, if not more than what is needed (NRC, 1991). Meanwhile, there are increasing needs for food and nutritional security due to growing human population and the consequent pressure on the depleting natural resources (Nielsen, 2004). However, health concerns for middle and high income social classes are pushing for demand of low fat animal protein sources. Cavies, rabbits and several insects are listed among non-conventional delicacies that would provide more convenient alternatives to this end (NRC, 1991; URT, 2006; Matojo and Yarro, 2013).

The domestic cavy (*Cavia porcellus* L) is a member of the rodents in the family Caviidae and subfamily Caviinae (Chauca de Zaldivar, 1995). Domestic cavies (or guinea pigs) are native to the Andean highland areas of South America and Philippines (Blench, 2000; Grégoire *et al.,* 2012) and are also raised in western, central and eastern African countries (Adu *et al.,* 2005). Records show that Peru is the country with the highest population of cavies worldwide where 22 million cavies are raised under family production systems producing 16,500 tons of meat annually (Grégoire *et al.,* 2012). Lammers *et al.* (2009) demonstrated the potentials of cavies to enable developing countries meet their animal proteins fast growing demands.

The cavies (also known as *Pimbi* or *Simbilisi* in Swahili) are kept in rural and peri-urban areas of Tanzania especially in southern highlands and in neighbouring regions (Nielsen, 2004; Mwalukasa, 2009). Despite variations in socio-cultural norms in cavy management, it is reported (Metre, 2011) that cavies are mostly cared for by women and youths and are sources of food, cash income and organic manure in eastern Africa countries. These animals are also kept as pets and are used in biological and medical training as well as in biological researches particularly in diagnosing diseases (Grégoire *et al.,* 2012; Daoud *et al.,* 2013; Dildeep *et al.,* 2013). In 1980s, several cavy families were also kept at the Livestock Production Research Institute (LPRI, now TALIRI Mpwapwa) for veterinary research purposes.

This paper highlights the management and production of cavies among agro-pastoral communities in Dodoma, central Tanzania. Broadly, the reported study aimed at investigating and promoting sustainable utilization of non-conventional meats in Tanzania. Specifically, it intended to (i) investigate production and management patterns of cavies in mixed production systems of central Tanzania (ii) determine the constraints and challenges in management of cavies in study areas (iii) and proposing sustainable steps and pathways for improving management and productivity of cavies.

MATERIALS AND METHODS

Cross-sectional and longitudinal surveys as well as participant observations were conducted between April and May 2015 in Kongwa (6°12'0"S 36°25'1"E6.200°S 36.417°E) and Mpwapwa (06°21'0"S 36°29'0"E) districts of Dodoma region, Central Tanzania. In Kongwa district, crop and livestock farmers from Mlali Iyegu, Mlali Bondeni, Kiwanja cha Ndege, Ibwaga, Sagara and Tubugwe villages were involved. Similarly, farmers from peri urban sub-villages (streets) of Kiboriani, Ng'hambo, Kota, Hazina and Vigh'awe in Mpwapwa district were involved. A snowball sampling technique (Laerd Dissertation, 2015) was employed to identify current and former cavy keepers where the sampling unit was the individual cavy keeper. Thirty one (31) respondents were contacted from where both quantitative and qualitative information were solicited using a checklist.

Participant observations and discussions were employed to notice cavy housing, number and size of cavy families, types of feeds and general attitudes towards cavy keeping and the accrued benefits. Descriptive statistics of data obtained and content analyses of information were done thematically to highlight reasons for cavies keeping and general husbandry practices. These included cavy housing and feeding, reasons for not keeping cavies at the moment of surveys, roles played by various members of household in cavies production, acquired benefits, production constraints faced, methods used to control/overcome production constraints and suggestions about the future of cavies at large including sustainability of cavy production, consumption and marketing strategies.

RESULTS

Out of 31 respondents involved in the study, 70% of them were males and 30% were females (Table 1).

During the interview it was revealed that most of cavy keepers had an initial stock of between one (1) and six (6) cavies. In addition, it was found that more than a half (53.3%) of the interviewed cavy keepers started with one (1) male and one (1) female; 20% had one (1) male and more than two (2) females; 13.3% had started with one (1) male and two (2) females (Table 1). The survey indicated that 51.6% (n = 31) were still keeping cavy while 48.4 % had stopped keeping these animals.

Table 1: Respondents on cavy keeping and number and sex initial cavy stock

Sex	Frequency	Percentage
Male	22	70.0
Female	9	30.0
Total	**31**	**100.0**
Sex of cavy started with		
1 M and 1 F	16	53.3
1 M and 2 F	4	13.3
1 F only	2	6.7
1 M and not more than 2 F	6	20.0
2 M and more than 3 F	3	6.7
Total	**31**	**100.0**
Still keeping	16	51.6
Stopped keeping	15	48.4
Total	**31**	**100.0**

Characteristics of Cavy Keepers and Keeping Status

The minimum, and the mean age for the interviewed respondents were 12 years, 78 years and 38.95 respectively (Table 2). The highest number of cavies reached among the interviewed respondents was 70 with mean and standard deviation of 25.26 and 20.30 respectively. Likewise, the current number of cavies possessed ranges from 1- 30 with average of 5.4 (Table 2).

Table 2: Age of Cavy Keepers and Keeping Status

Item	Minimum	Maximum	Mean	Std Deviation
Age of respondent	12.00	78.00	38.95	17.64
Number of cavies started with	1.00	6.00	2.77	1.22
The highest number of cavies reached	5.00	70.00	25.26	20.30
Current number possessed	1	30	5.40	8.18

Reasons for Keeping Cavy

Discussion with farmers revealed that they had different reasons for keeping cavy (Figure 1). Majority of respondents (70%) were keeping cavies as source of food and income while the rest had other social reasons including maintaining them for their children who were not at home but had initiated the activities. Others admitted that they had kept cavies for so long and did not want to lose the animals. Discussion with respondents revealed that the price of a cavy in the village ranged from Tshs. 2,000 – 3,000 which was almost the price of about half a kilogram of beef in some village markets in Dodoma region.

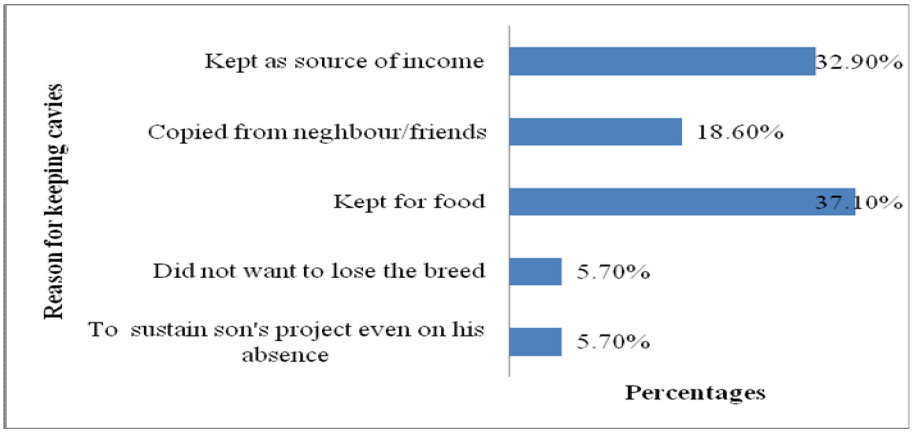

Figure 1: Reasons for Keeping Cavy

Reasons for not Keeping Cavies

The reasons for not keeping cavies included difficulties in obtaining feeds during dry season (5.7%), disturbances caused if kept in the same house with human other than their own sheds (11.4%) and presence of predators (17.1%) (Table 3).

Table 3: Reasons for not Keeping Cavies

Constraints faced	Count	Response
Difficult to get feeds during dry season	2	5.7
Disturbance if kept in the same house with human other than their own sheds	4	11.4
Predators	6	17.1
Grown up and decided to deal with other income generating activities	2	5.7
Busy with farm activities	8	22.9
No reliable/attractive markets	4	11.4
Went to school/moved from home to urban centres	1	2.9
Decided to slaughter all for meals at home	7	20.0
Husband died and no one was interested on cavy keeping	1	2.9
Total	**35***	**100.0**

*Multiple responsesTable 4 indicate source of cavies kept by farmers in the study area. Majority of respondent (66.7%) of the interviewed farmers bought cavies from friends and neighbours whereas 6.7% of the respondents got their initial stock through traditional batter system where they agreed to exchange cavy with other social items including chicken, dogs, firewood and sugarcane.

Table 4: Sources of Initial Cavy Stock

Source of initial stock	Frequency	Percentage
Bought from friends	12	40.0
Bought from neighbours	8	26.7
Given as a gift from grand parents	4	13.3
Bought from relatives in the village	4	13.3
Exchanged with other social items (chicken, firewood, dogs, sugar cane etc)	3	6.7
Total	**31**	**100.0**

Table 5 indicate significantly strong associations between the size of the current possessed stock (χ^2 =60.179, p ≤ 0. 021) and the means used to obtain the initial stock (χ^2 = 47.356, p ≤ 0. 039) implying that those who bought the initial stock were also affectionate of maintaining the animals.

Table 5: Association between size of current possessed stock and some independent variables

	Size of current possessed stock	
	χ^2	P-value
Number of cavies that a respondent started with	60.179	0. 021*
Means used to obtain the initial stock	47.356	0. 039*
Sex of initial parent stock	49.075	0. 027*

Note: * Significant at 5% level (P ≤ 0.05)

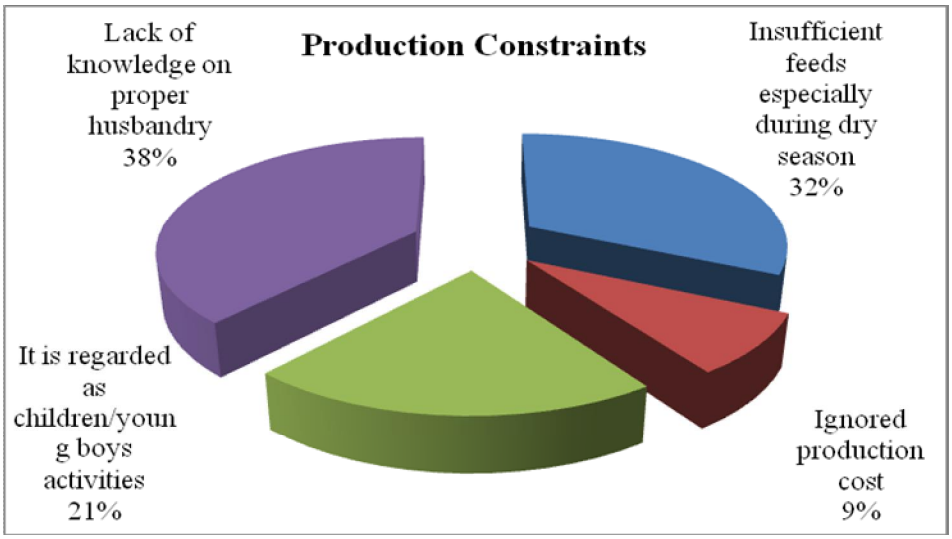

Figure 2: Production Constraints

Farmers Suggestion Regarding the Future of Cavies

Production Constraints

The study revealed some production constraints regarding the keeping of cavies in the study area including inadequate knowledge on proper cavy husbandry (38%); insufficient feed especially during dry season (32%); cavy keeping regarded as children activity so little attention has been paid by adult people (21%) and ignored production cost (9%) (Figure 2).

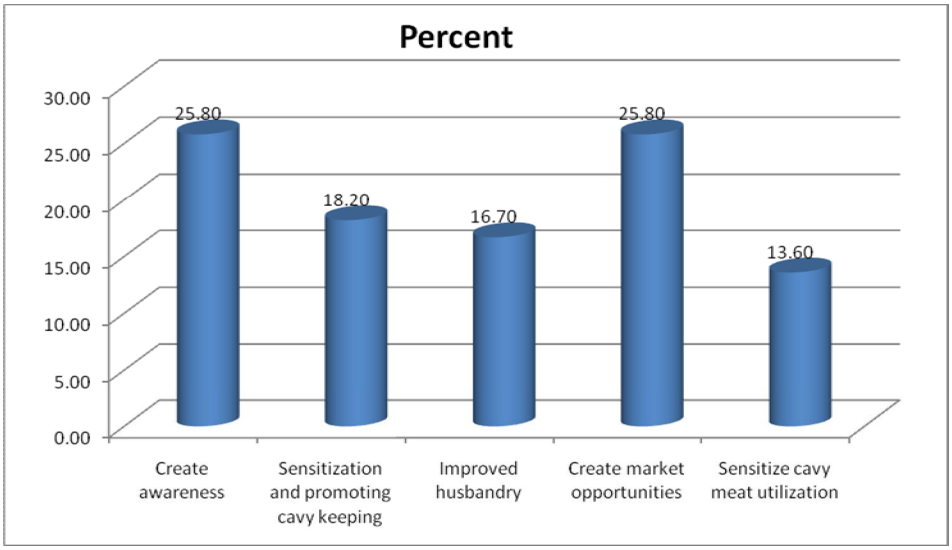

Figure 3: Farmer's Suggestions about the Future of Cavies

The interviewed farmers came up with valuable opinions regarding the future of cavies in respective areas whereby 25.8% respectively emphasized a need for awareness creation and the need for market creating and increasing marketing opportunities for cavies and cavy meat (Figure 3).

DISCUSSION

The population of domestic cavies in Tanzania is not known and this fact that calls for more studies and documentation. However, the number of cavies per household found in the study area was within ranges reported to be in Njombe region where 10-25 cavies are raised per household (Mwalukasa, 2009). Farmers in Central Tanzania indicated that many do not easily opt to slaughter a female cavy because they can conceive shortly after parturition. Provided they normally keep males and females together it is difficult for them to identify non pregnant females for slaughter especially in the early pregnancies. However, it is reported that at the age of two months a cavy can breed and it takes the mother 60 to 70 days to farrow where piglets suckle for three to four weeks (Nalugwa, 1999). There are other studies (Mwalukasa, 2009; Grégoire *et al*., 2012; Dildeep *et al*., 2013) that have established the gestation period of 68 days and have noted of existence of promising protocols for estrus synchronization

The financial gains reported from keeping cavies of Tshs. 2,000 – 3,000 per cavy indicates that a household that could raise 50 - 75 cavies per year would fetch Tshs 100,000 – 225,000 per year (or US $ 100 – 150, assuming 1 US $ = Ths. 2000). Similar findings (Nalugwa, 1999) indicated that in Kilifi district of the coastal region of Kenya, each cavy could worth 60 – 120 Kenya Shillings (or US $ 0.6 – 1.2, assuming 1 US $ = KES100), enabling youngsters to be able to pay school fees. Generally, this is a substantial amount and qualifies farmers' needs for more sensitization and practice for improved husbandry of cavies, meat consumption and general marketing channels for cavies and other non conventional animal sources. Farmer

sensitization on financial and nutritional benefits of cavies could alleviate problems and challenges encountered in cavy keeping in the study areas. Therefore, public and private institutions promoting agricultural investment and productivity need to equally support initiatives towards improving household incomes from a small stock.

The Tanzania's National Livestock Policy (2006) recognizes the need for emphasis in non conventional livestock including small stock (rabbits, cavies) and poultry (ducks, guinea fowl) as they significantly contribute livelihood of many rural and urban communities. Related finding conducted in West Africa (Nuwanyakpa *et al.,* 1997) that analysed prospects of guinea pig production under smallholder conditions.

The basal diet for cavies in the study sites were green forages including *Commelina africana* and C. *benghalensis* and *Launea* spp that are normally sourced in fields and rangelands. Green leaves of crops such as maize (*Zea mays*), sweet potatoes (*Ipomoea batatas*) and other vegetables are also collected and fed. These findings are similar to that of Adu *et al*. (2005) who reported that cultivated pastures such as Lucerne (*Medicago sativa*) and *Pueraria phaseoloides* are suitable forages to eat for protein.

However, it was reported that there are difficulties in obtaining feeds for cavies that is compounded by a long dry spell of up to eight months. In order to have a more sustainable feed resource base for cavies and other livestock farmers in the study areas are advised to establish feed gardens with recommended pastures and forages types.

Meanwhile, local knowledge of farmers in keeping cavies indicated their understanding that there are no major diseases affecting cavies provided that cleanliness and proper feeding are adhered to. However, infectious diseases such as *salmonellosis* and pneumonia, bacterial conjunctivitis and dermatitis due to fungal attack can erupt where proper housing and hygiene are compromised. There are also likelihoods of ecto- and endo-parasite infections in cavy management. Generally, proper and adequate feeding and attention to improved husbandry can strongly decrease cavy susceptibility to diseases and parasites.

It was earlier observed that the numbers and sex of initial stock that the farmers own have influence on ultimate cavy numbers owned and disposed. This means that stakeholders who want to support communities in cavy keeping have to bear such factors in mind. Where necessary, farmers should also have a hand in these ventures where they could partially or wholly contribute in obtaining the animals or putting up proper housing structures. Similarly, at least few cavies comprising of both family couple have to be there in order to sustain several cavy families in a long run.

CONCLUSION AND RECOMMENDATIONS

In mixed production systems of Tanzania, keeping of livestock such as domestic cavies depend heavily on local knowledge in feeding and general husbandry practices. Cavies are sources of food and household incomes and are potential capital for other household investments. However, there are avenues for improved cavy productivity if the current local knowledge and systems are explored and conventional scientific approaches are utilized.

Therefore, more attention from research and extension services are called for in order to improve production, processing techniques, consumption and marketing of cavies products and other non-conventional meat sources as already stipulated in the National Livestock

Policy (URT,2006). Likewise, financial and intellectual investments in cavy breeding, sustainable production systems, product promotion and marketing are also inevitable.

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