



Original Research

Management and Breeding Activities of Goat Farming in the Kilinochchi District of Sri Lanka

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Abstract

A total of 291 goat farmers from four veterinary divisions of Kilinochchi district of Sri Lanka were interviewed using a structured questionnaire to characterize the goat farms with respect to socioeconomic status, breed distribution, production, reproduction and constraints for goat farming. Agriculture was the main occupation of goat farmers (65%). Over 70% of the farmers kept goats for meat and manure purpose. Women's contribution for goat farming was around 35%. The average herd size of Karachchi, Kandawalai, Poonakary and Pachchilaippalli veterinary divisions were 5.64 ± 4.06 , 7.35 ± 7.72 , 6.56 ± 6.62 and 6.86 ± 6.18 , respectively. Goat breeds found in the study area were crosses (57.01%), local (41.77%) and exotic (1.22%). Nearly 76% of the farmers adopted intensive system of management. Majority (88%) of the farmers adapted natural service. Overall age at first kidding ranged from 12 to 15.36 months. The major constraints limiting goat production in the study area were no demand for goat milk, lack of grazing land, lack of fodder and high cost of concentrates. Addressing constraints mentioned by the farmers will improve overall productivity of the goats and contribute for poverty alleviation in the farming communities.

Key words: Crosses, Exotic, Kilinochchi, Local, Management System, Production

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Introduction

Goat farming in Sri Lanka is concentrated in dry and intermediate zones of the country where about 72% of goat population is distributed (Department of Animal Production and Health, 2012). Goat population in the year 2012 was 392,620 (Department of Census and Statistics, 2014). Goats are popular with small holders because of their efficient conversion of feed in to edible and high quality meat, milk and hide, Solaiman (2007). The domestic annual mutton production in 2012 was 1600 MT with the per capita availability of mutton products of 0.1kg per annum. In the same year Sri Lanka imported 338364 kg of



mutton products with the cost of Rs.200, 292, 747.00 (Department of Animal Production and Health, 2014). Growth of goat industry in Sri Lanka has a great potential to reduce the money spent on importation of mutton products. After the complete displacement of human population which led to loss of all the belongings including livestock due to civil disturbances in 2009 and the recommencement of resettlement since January 2010, no study was done in the Kilinochchi district regarding goat production. Current study characterizes the goat farming in the Kilinochchi district which will help to uplift the living standard of the farming community in the district.

Materials and Methods

The Study Area

Present study was conducted in four veterinary divisions of Kilinochchi district viz. Karachchi, Kandawalai, Poonakary and Pachchilaippalli. The latitude and longitude of Kilinochchi district are 9.3807°N and 80.8770°E, respectively. The average annual rainfall and monthly temperature range of the district were 1520.57 mm and 25°- 30°C, respectively (District Planning Secretariat, 2013).



Plate 1: Map of Kilinochchi district

Sampling Procedure

Out of the total of 724 farmers 291 farmers were selected using table of random numbers. Number of farmers selected from the veterinary divisions Karachchi, Kandawalai, Poonakary and Pachchilaippalli were 123, 49, 71 and 48, respectively.

Data Collection

Pre tested structured questionnaire was used to collect information from the selected farmers on background information and socio economic status of the farmer and different aspects of goat farming viz. breeds,

management systems, breeding, herd size, production and reproduction. Personal interview was conducted with each farmer to gather information. Assistance of community animators (instructors) of the respective veterinary divisions were sought to locate the goat farms.

Data Analysis

The information collected via questionnaire was fed on MS Excel 2007 spread sheet. Data were analyzed using descriptive statistics with SAS 9.1.3 (©2002-2003).

Results and Discussion

Background Information of the Farmers

Table 1: Demographic information of the goat farmers in the study area (%)

Descriptors	Veterinary Divisions				
	Karachchi	Kandawalai	Poonakary	Pachchilaippalli	Overall
Gender					
Male	73.98	65.31	66.2	35.42	64.6
Female	26.02	34.69	33.8	64.25	35.4
Civil status					
Single	0.81	2.04	4.24	0	1.72
Married	99.19	97.96	95.77	100	98.28
Age (years)					
≤18	0	0	0	0	0
19-40	30.08	42.86	42.25	31.25	35.39
41-65	52.03	48.98	49.3	60.42	52.24
>65	17.89	8.16	8.45	8.33	12.37
Education					
Illiterate	2.44	0	1.41	0	1.37
Up to Primary	22.76	36.73	23.76	12.5	23.71
Up to Middle	65.85	55.1	64.97	83.33	66.67
Up to high school	8.13	8.17	8.45	4.17	7.56
Above high school	0.82	0	1.41	0	0.69
Experience					
1-10	51.22	42.86	40.85	47.92	46.73
11-20	19.51	18.37	28.17	20.83	21.64
21-30	11.38	18.37	12.68	16.67	13.75
31-40	10.57	10.2	11.27	6.25	9.97
>40	7.32	10.2	7.03	8.33	7.91
Main Source of Income					
Crop farming	47.15	42.86	52.11	18.75	40.22
Livestock farming	21.14	32.65	21.13	50	31.27
Government job	6.5	2.04	4.23	4.17	4.24
Other	25.21	22.45	22.53	27.08	24.32

Around 65% of the goat farmers were males. Ninety eight percent of the goat farmers were married. Majority of the goat farmers were under the age group of '19-40' and '41-65' years. The literacy rate of respondents in the study area was 98%. Majority (47%) of the farmers were with the experience 1-10 years



while more than 40 years were around 8%. 31% of the goat farmers main source of income was livestock farming (Table1).

Family Background of the Goat Farmers

Among the respondents 14% had women headed families. This percentage was equally distributed among the veterinary divisions. Comparatively higher percentages of farmers had the family size of 4-5 members. Family members of the respondents with above middle level education were 18%. Majority of the farmers (78%) had land holding size >1 and 1-2 acres. Four percentages of the farmers were landless (Table 2).

Table 2: Family background of the goat farmers in the study area (%)

Descriptors	Veterinary Divisions				
	Karachchi	Kandawalai	Poonakary	Pachchilaippalli	Overall
Household Head					
Men headed	86.48	87.76	87.32	85.42	85.25
Women Headed	13.52	12.24	12.68	14.58	13.75
Family Size					
Up to 3	35.25	28.57	30	27.08	30.22
4-5	42.62	46.94	42.86	47.92	45.08
6-7	16.39	22.45	21.43	22.92	20.81
>7	5.74	2.04	5.71	2.08	3.89
Age of Family Members					
≥18	37.07	33.18	38.27	37.44	36.77
19-40	31.27	40.55	37.05	32.75	34.55
41-65	24.9	23.04	21.2	24.64	23.61
>65	6.76	3.23	3.48	5.21	5.07
Education Level					
Illiterate	1.78	2.46	2	0.49	1.73
Up to primary	22.77	29.56	20.33	18.72	22.63
Up to middle	58.03	50.74	59.33	67	58.63
Up to high school	15.64	16.26	14	10.34	14.45
Above high school	1.78	0.98	4.34	3.45	3.56
Land Holding Size (Acres)					
No land	6.5	2.04	4.23	0	4.12
<1	43.09	22.45	29.58	72.92	41.24
1-2	42.28	16.33	54.93	18.75	37.11
2-3	7.32	51.02	7.04	6.25	14.43
3-4	0.81	6.12	0	0	1.37
>4	0	2.04	4.22	2.08	1.73

The main reason for keeping goats was meat purpose (74%). Keeping goats for milk purpose was the least across the veterinary divisions (Table 3). Most of the farmers had crossbred populations (60%) except Poonakary where the indigenous goat population was little higher than in the other veterinary divisions (59%).

**Table 3:** Purpose of rearing, breed distribution, source of animals and source of capital by veterinary division (%)

Descriptors	Veterinary Divisions				
Purpose of Rearing	Karachchi	Kandawalai	Poonakary	Pachchilaippalli	Overall
1	4.88	6.12	5.63	6.25	5.5
12	0.81	6.12	0	0	1.37
13	70.73	63.27	76.06	87.5	73.54
123	23.58	24.49	18.31	6.25	19.59
Breed Distribution					
1	62.03	53.71	37.19	52.73	51.42
2	0	0	2.56	3.64	1.55
3	1.42	1.85	1.28	3.63	2.05
4	0.72	1.85	0	0	0.64
5	35.83	42.59	58.97	40	44.34
Source of Animals					
Local farm	43.9	53.06	70.42	39.58	51.22
Government and NGO	56.1	46.94	29.58	60.42	48.78
Source of Capital					
Own	95.93	87.86	95.77	93.75	94.16
Own and credit	4.07	12.24	4.23	6.25	5.84

Purpose 1-meat, 2-milk, 3-manure; 1- Jamnapari $\times$ Local, 2 - Saanen $\times$ Local, 3 - Saanen $\times$ Jamnapari, 4 - Saanen and 5 - Local

The sources for the goats were through purchase by the farmer (51%) and assistance through government and non- governmental organizations (49%). The main source of capital for goat farming was the farmer's own capital (94%). On average 6.60 ± 6.15 goats per farm was kept with buck: doe ratio of 1:2 or 1:3 (Table 4).

Table 4: Average herd composition of goats by veterinary division in the study area (Mean $\pm$ SD)

Veterinary Division	Kids		Young stock		Buck	Doe	Overall
	Male	Female	Male	Female			
Karachchi	0.30 $\pm$ 0.78	0.26 $\pm$ 0.67	0.56 $\pm$ 1.23	0.62 $\pm$ 1.04	0.69 $\pm$ 1.15	2.50 $\pm$ 2.10	5.64 $\pm$ 4.06
Kandawalai	0.17 $\pm$ 0.57	0.19 $\pm$ 0.73	0.89 $\pm$ 1.44	1.26 $\pm$ 2.42	1.17 $\pm$ 1.15	3.00 $\pm$ 2.94	7.35 $\pm$ 7.72
Poonakary	0.04 $\pm$ 0.19	0.03 $\pm$ 0.23	0.81 $\pm$ 1.70	1.29 $\pm$ 2.16	1.15 $\pm$ 1.20	2.86 $\pm$ 2.40	6.56 $\pm$ 6.62
Pachchilaippalli	0.29 $\pm$ 0.96	0.35 $\pm$ 0.82	0.73 $\pm$ 1.13	1.09 $\pm$ 1.42	0.67 $\pm$ 0.86	2.93 $\pm$ 2.08	6.86 $\pm$ 6.18
Overall	0.20 $\pm$ 0.87	0.21 $\pm$ 0.71	0.75 $\pm$ 1.43	1.07 $\pm$ 1.98	0.92 $\pm$ 1.07	2.82 $\pm$ 2.31	6.60 $\pm$ 6.15

Breeding

Majority of farmers adopted natural service to serve the goats. Mainly relied on own bucks to serve the females. Goats were integrated with crop mainly under intensive system of management (Table 5).

Table 5: Management systems and breeding by veterinary division (%)

Descriptors	Veterinary Divisions				
	Karachchi	Kandawalai	Poonakary	Pachchilaippalli	Overall
Breeding Methods					
Natural service	79.67	83.67	98.59	100	88.32
Artificial insemination	11.38	0	0	0	4.81
Both	8.95	16.33	1.41	0	6.87
Source of Buck (NS)					
Own	64.22	83.67	73.24	60.42	69.31
Neighbours	33.03	14.29	26.76	37.5	28.89
Stud Centre	1.83	2.04	0	2.08	1.44
Own and neighbours	0.92	0	0	0	0.36
Management System					
Extensive	4.07	0	19.72	14.58	8.93
Semi intensive	17.89	8.16	12.68	20.84	15.47
Intensive	78.04	91.84	67.61	64.58	75.6
Goat, Crop Integration					
Adopted	88.62	91.84	98.59	85.42	91.07
Not adopted	11.38	8.16	1.41	14.58	8.93

Productive and reproductive performances of different goat breeds are shown in Table 6. There were no remarkable differences for productive and reproductive traits among different goat breeds. Considerably higher percentages (39%) of animals were sold to neighbors (Table 7).

Table 6: Reproductive and lactation performance of goats by veterinary division (Mean±SD)

Veterinary Division	Breed	Age at first kidding (Months)	Kidding interval (Months)	Kids per Kidding	Lactation length (Months)	Lactation yield (liter/day)
Karachchi	Local	13.07±4.74	6.62±1.48	2.02±0.34	4.41±1.32	2.20±0.34
	Cross	12.35±4.07	6.39±2.27	1.99±0.28	3.55±1.47	0.67±0.46
	Exotic	15.00±4.24	6	2	4.00±1.41	0.38±0.18
Kandawalai	Local	12.96±3.35	6.43±1.47	2.00±0.30	4.13±1.58	1.8
	Cross	15.22±3.61	7.37±2.20	2.02±0.48	3.41±1.42	0.82±0.34
	Exotic	12	6	2	5	0
Poonakary	Local	10.55±2.71	6.43±1.39	2.23±0.48	4.68±1.22	1.67±1.30
	Cross	13.97±4.55	6.71±2.00	2.13±0.49	4.03±1.28	1.82±1.37
	Exotic	12	6	2	4.00±1.41	0.5
Pachchilaippalli	Local	11.67±3.26	7.33±2.24	2.10±0.62	4.71±1.55	0.38±0.18
	Cross	15.36±3.83	6.91±1.69	1.75±0.39	3.52±0.93	1.30±0.52
Overall	Local	12.06±3.21	6.70±1.84	2.09±0.39	4.48±1.48	1.51±0.19
	Cross	14.23±4.12	6.85±1.98	1.97±0.42	3.63±1.38	1.15±0.68
	Exotic	13.98±2.32	6	2	4.33±1.24	0.29±0.09

**Table 7:** Aspects of meat production (Mean±SD)

Descriptors	Veterinary Divisions				
	Karachchi	Kandawalai	Poonakary	Pachchilaippalli	Overall
Source of Sales (%)					
1	38.13	51.5	30.9	52	39.27
2	13.56	2.7	10.29	8	10.51
3	11.17	8.11	5.88	16	9.31
4	1.7	10.81	4.41	0	3.64
12	16.1	2.7	5.88	4	10.12
13	10.17	13.51	11.76	20	12.17
14	10.17	10.67	30.88	0	14.98

1 – Neighbors, 2 – Middlemen, 3 – Whole sale/Butcher shops, 4 – Others, 12 – (1&2), 13- (1&3), 14 – (1&4)

Health Issues

Overall mortality of kids, young stock and adults were 29%, 22.5% and 48.5%, respectively. Major goat diseases reported were pneumonia, joint ill, tetanus and cerebral spinal nematodiasis. As reported by the farmers around 44% of the animals were unattended during illness.

Constraints

Major constraints for goat farming were no demand for milk, high cost of drugs, diseases and lack of capital for goat housing etc. (Table 8).

Table 8: Constraints for goat farming in the Kilinochchi district by veterinary division (%)

Constraints	Karachchi	Kandawalai	Ponnakary	Pachchilaippalli
Lack of fodder	13.93	10.2	12.68	35.42
High cost of Concentrates	18	10.2	5.63	10.42
Lack of grazing land	15.57	26.53	19.72	50
Drinking water	2.46	36.73	21.13	6.25
Housing	26.23	22.45	25.35	2.08
Limited capital	13.93	20.41	18.31	8.33
High cost of Drugs	31.15	20.41	8.45	4.17
No demand for milk	98.36	100	100	100
Diseases	32.79	26.53	26.76	8.33

Discussion

It is important to have good understanding of a production system and the relative importance of the different constraints prior to initiating any genetic improvement programme (Baker and Gray, 2004). Moderate level of women participation with an exceptionally higher percentage in Pacillaipalli veterinary division revealed the possible contribution of women in goat production and family income generation. Current result is in agreement with findings of Takshala and Marapana (2011) in three districts of southern province of Sri Lanka who stated that women and children were primarily responsible for managing the goats in household whereas herding to grazing areas and marketing were the main responsibilities of men. Female participation is an indication of increase in female economic autonomy and bargaining power within



the household (Dossa *et al.*, 2008). Focusing more assistance on women farmers would improve impact on the poor (James De Vries, 2008).

Majority of the farmers (98%) with the civil status of married was an indication of possible family labour utilization and additional income generation through goat production as part time venture. A study of goat farming in Valikamam area of Jaffna district, Sri Lanka revealed a civil status of married goat farmers within the range of 85.37% to 100% (Kajani and Sinniah, 2013). The active age group of 41-65 indicates involvement of middle age group in the goat farming activity. Considerably less participation of youths in the current study is in agreement with the observation of the low participation in Botswana by Nsoso *et al.* (2004) and Monau *et al.* (2017). Attracting youths to involve in livestock production is a major challenge in Sri Lanka. The literacy rate of around 98% is a very positive attribute will have great impact on transfer of knowledge and training of farmers on various aspects of goat farming. Kosgey *et al.* (2006) stated that level of education will have impact on production methods, management ability, record keeping and accessing of market information. Training of farmers will empower them and enhance the potential success of breeding programmes which depend profoundly on record keeping (Kosgey and Okeyo, 2007).

The main sources of income to the goat farmers in the Kilinochchi district were crop (40%) and livestock farming (30%) except the Pachchilaippalli veterinary division where 50% of the farmers had livestock as primary activity. In the Pachchilaippalli veterinary division large extend of land with coconut cultivation which facilitate integrated farming could be the possible reason for higher percentage of farmers relying on livestock as primary source of income. The dependency of rural livelihoods on crop and livestock production is a common phenomenon in developing countries and is also seen as an opportunity for efficient use of resources (Kosgey and Okeyo, 2007). Around 12 to 15% of women headed families necessitate the need for women empowerment. Development projects focusing women empowerment will enhance the living standards of the family members. Majority of the farmers with more than three family members facilitates involvement of family members in goat production.

Goats were mainly reared for meat purpose (79%). A study conducted by Takshala and Marapana (2011) in Matara district and Kajani and Sinniah (2013) in the Valikamam area of the Jaffna district in Sri Lanka also reported that goats were mainly reared for meat purpose. The knowledge of the reasons for keeping small ruminants is a prerequisite for deriving operational breeding goals (Jainter *et al.*, 2001). Indeed, ignorance of this aspect has been a major constraint in the lack of success in genetic improvement programmes attempted in the tropics (Sölkner *et al.*, 1998; Rewe *et al.*, 2002; Kosgey *et al.*, 2006). Households owing Jamnapari crosses were predominant followed by indigenous, the higher percentages of Jamnapari crosses than indigenous goats attributed to the fact these animals were distributed to the farmers as part of the development programme of re-settlers to support their livelihoods. The major factors affecting the distribution of ruminant breeds can be classified as socio-economic and environmental. These are



ecology and feed availability, disease, animal traction, marketing systems and cultural preferences including religion (Blench, 1999). Majority of the farmers (94%) relied on their own capital for goat farming activities. Generally the income levels of the small holders are limited and this will have an impact on expenses related to goat production. For the poor a major related constraint is money to purchase goats. Credit for the purchase of goats is generally not available to the poor or they are charged exorbitant interest rates. In general, government services are biased against goat production in favour of large animals (Peacock, 2005) as cited by James De Vries, 2008 and credit is even more difficult for women to obtain (Oluka *et al.*, 2004). The overall average herd size of 6.60 ± 6.15 lied in between the herd size of 4.01 observed in the Uduvil veterinary range of Valikamam area (Kajani and Sinniah, 2013) and the average herd size of Delft goat in Jaffna 17.8 (Jasinthan and Silva, 2014).

The main source of stud goats were own buck and the neighbors' buck but in the Valikamam area of Jaffna district, the percentages of farmers used own buck ranged from 0-20%; in contrast to Kilinochchi district in Valikamam area more than 50% of the farmers relied on stud centre service for natural breeding (Kajani and Sinniah, 2013). The low percentage of dependence on own buck in the Valikamam area may due to expectation of genetically superior offspring and to reduce inbreeding. The predominance of uncontrolled breeding with small flock size will increase the level of inbreeding (Kosgey, 2004). Communal herding, which allows breeding females to mix with breeding males from other flocks can minimize the level of inbreeding (Jainter *et al.*, 2001). Within a flock the level of inbreeding could be minimized if the bucks could be rotated among the flocks but it has rarely been practiced by small holder farmers. About 76% of goat farmers adopted intensive management system. This may be due to the fear of damaging neighbor's crops by goats and incidences of theft. Absence of breed differences for performance traits may be due to inadequate management practices particularly feeding and treating all animals alike in the study area. This is in agreement with the previous observation that crossbreds are poorly adopted to the low input traditional production systems of the tropics (Mason and Buvanendran, 1982; Iniguez, 1998; Rewe *et al.*, 2002; Wollny *et al.*, 2002 and Ayalew *et al.*, 2003).

In the current study majority of the animals were mainly sold for neighbors, followed by middlemen and butchers. Due to the absence of organized marketing for goats in the Kilinochchi district farmers tended to sell the goats to the easily accessible sources. There is a necessity to explore the possibilities of organised marketing of animals so that farmers can -reap maximum benefit from sales (Budisatria, 2006). Adult goat mortality percentage was higher than kid mortality. Current results are contrary to the results reported by Thakshala and Marapana (2011) in the Southern province of Sri Lanka where 60 to 70% of kid mortality was reported. Current results are in line with the findings of Vijay Kumar *et al.* (2018) in Rajasthan where higher percentage of adult mortality than kid mortality was reported. Vijay Kumar *et al.* (2018) also mentioned that mortality patterns in herd depict a useful indicator for assessing the status of herd health and



management practices and their efficacy. Low kid mortality in the current study may be due to the higher percentage of intensive management system adopted by the farmers whereas the higher percentage of adult mortality attributable to higher percentage of farmers did not treat the animals during illness. The percentages of farmers (44%) did not use any medicine during illness of goats was higher than the values (22% to 36%) reported by Thakshala and Marapana (2011) in the southern province of Sri Lanka. Health care is an important problem to consider before genetic programmes can be seriously contemplated. Community-based animal health programmes may be one-way forward (Njoro, 2001). There is a necessity to take remedial measures to the major constraints reported by the farmers. Constraints listed have direct impact on the sustainability and the profitability of the farms. Markets for goat products, especially milk products are very poorly developed in most developing countries despite the fact that generally consumers are willing to pay a premium for goat's milk (James De Vries, 2008).

Conclusion

From the current study of goat farming, the following conclusions could be derived. The socio economic characteristics of the goat farmers and their family members are conducive for development of goat farming. The goat breed distribution includes Jamnapari crosses, Indigenous, Saanen and Saanen crosses. Less percentage indigenous goats are a positive sign for upgrading programme. Majority of the farmers adopted intensive farming system, which also indicates farmers' willingness to give more care to their animals. The productive and reproductive performance of different breeds of goats could be brought to the optimum level through appropriate breeding and management practices. Focusing more assistance on women farmers would improve impact on the poor. Due considerations should be given to the constraints listed by the goat farmers which are common to the developing countries.

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