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Studies on socio-economic status of donkey owners and reproductive parameters of jennet in Marathwada region of Maharashtra, India

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Abstract
The present study was conducted in eight district of Marathwada region, Maharashtra, India. The eighty three donkey owners were selected using pre-tested semi-structured interview schedule and socio-economic variables of donkey owners ware studied. The parameters for the study consist of age at puberty (AP), age at first service (AFS), age at first estrus (AFE), estrus cycle duration (ECD), estrus duration (ED), age at first covering (AFC), age at first conception (AFCO), no. of services/conception (NS), age at first foaling (AFF), service period (SP), foaling interval (FI), gestation period (GP), lifetime no. of foaling (LNF) were 2.70±0.02 yrs., 2.79±0.02 yrs., 2.77±0.03 yrs., 6.86±0.084 days, 23.80±0.55days, 2.96±0.01 yrs, 5.9±0.07 yrs., 1.82±0.06, 4.44±0.01 yrs., 1.14±0.01 yrs., 2.25±0.01 yrs., 340.8±0.27 days and 5.98±0.07, respectively. At the end of the study it is concluded that the efforts are needed to improve socio-economic condition of the farmers along with systematically eliminating identified constraints. Hence sincere efforts should be made to increase awareness of the donkey owners for health care, Vaccination and regular medication and Scientific rearing practices.

Keywords: Conception, covering, donkey, foaling, gestation period, service

Introduction

The donkey has been used as a working animal for at least 5000 years. Out of more than 40 million donkeys in the world, about 96% are in underdeveloped countries, where they are used principally as pack animals or for draught work in transport or agriculture, the donkeys are the cheapest form of agricultural power (Rossel *et al.* 2008) [13].The contribution of donkeys has been enormous in Indian agriculture and carrying materials like transportation of agricultural produce, house hold materials and provision as well as materials for building constructions. Although, donkey supports the rural livelihood and low-income of poor farmer's families by providing sustainable income at minimal maintenance cost. Donkeys are neglected and rarely studied, due to their indiscriminate use without any proper feed, fodder and health status *etc.,* these animals are also assumed as beast of burden. (Rattan *et al.* 1998, Gupta *et al.* 2017) [12, 5]. The donkeys and mules are generally reared by other backward class (obc), schedule castes (sc), minority and landless farmers (Yash pal *et al*., 2013) [9]. Donkeys have very good draught power, immunity and stress bearing capabilities (Rattan *et al.* 1998, Gupta *et al.* 2017) [12, 5]. It is believed that donkey can thrive better under difficult environmental conditions such as high temperature, low rainfall and low quality feeds as a result of certain genetic and morphological changes occurred during its domestication (Pearson & Ouassat, 2000; Rossel *et al*., 2008) [10, 13]. Donkey are capable of thriving in hot climate (Pal *et al*. 2000, Pal *et al*. 2013) [8, 9] and can survive even in adverse conditions such as scarcity of feed (Gupta *et al.* 2017, Pal and Gupta 2000) [5, 8]. Compared to other equidae species, donkey contribute the major proportion of readily available transport needs of poor women and men living in hostile environments. (Swai and Bwanga, 2008) [15]. In developing countries like India though they are largely invisible in development policy and plans as well they often fail to find their place in agricultural and food security plans. They do appear in government statistics, but the information is often unreliable.

Their economic value is hard to articulate and they are not part of the export or trade debates like bovine and ovine animals. (Web link 1).

In Marathwada region of Maharashtra, the donkeys are traditionally reared by washer man community and pot makers. These animals are also used in brick kilns. The major utility of these animals is for carrying sand from the river bed and transportation of silted clay soil for preparation of bricks. An adult animal can lift upto 40-80 kgs of weight effortlessly hence they are also used for shipping of bricks, agricultural products and by-products, including grains, straw and roughes etc. Donkeys also find their place in the cultural heritage of Marathwada. There is traditional culture in 'Wida' village of 'Kaij' tehsil of Beed district, on occasion of holi, the newest son-in-law in the village gets a donkey ride and the tradition has been followed for over 90 years (Web link 2).

Hence the present experiment is planned to study the socio-economic status and sustainability of the donkey owners in the Marathwada region of Maharashtra, India.

Materials and Methods

The present study was conducted in eight district of Marathwada region, Maharashtra state, India. Study duration was from May to November 2022.The eighty three donkey owners were selected using pre-tested semi-structured interview schedule. The socio-economic variables for the study were age, gender, education, category, family size, heard size, land holding, annual income, donkey rearing experience, income source, breeding system, utility, average load carrying capacity, average working hours and daily distance covered during work were studied. The parameters for the study consist of age at puberty (AP), age at first service (AFS), age at first estrus (AFE), estrus cycle duration (ECD), estrus duration (ED), age at first covering (AFC), age at first conception (AFCO), no. of services/conception (NS), age at first foaling (AFF), service period (SP), foaling interval (FI), gestation period (GP), lifetime no. of foaling (LNF). The data collected for socio-economic and reproductive parameters was subjected for different statistical analysis. The statistical methods used for obtaining results and data analysis was done with the help of SPSS (2020) statistical package for social science versionV27 IBM Corporation Armonk, NY-USA for analysis of descriptive analysis, the data analysis tools from Microsoft excel.

Results and Discussion

Table 1: Socio-economic status of donkey owners individual information in Marathwada region.

Herd size	Small n=48	Medium n=32	Large n=3	Pooled N=83
Age (years) of donkey owner				
Young (20-28)	21(43.8%)	7(21.9%)	1(33.3%)	29(34.9%)
Middle (29-37)	21(43.8%)	18(56.2%)	2(66.7%)	41(49.4%)
Old (38-45)	6(12.5%)	7(21.9%)	0(0.0%)	13(15.7%)
Education of donkey owner				
Illiterate	3(6.2%)	1(3.1%)	0(0.0%)	4(4.8%)
Primary (1st-4th)	16(33.3%)	6(18.8%)	0(0.0%)	22(26.5%)
Middle school (5th-7th)	11(22.9%)	10(31.2%)	1(33.3%)	22(26.5%)
Secondary (8th-10th)	2(4.2%)	5(15.6%)	1(33.3%)	8(9.6%)
Higher secondary (11th-12th)	12(25.0%)	8(25.0%)	1(33.3%)	21(25.3%)
Diploma/Degree	4(8.3%)	2(6.2%)	0(0.0%)	6(7.2%)
Family size of donkey owner				
Small (3-4)	6(12.5%)	9(28.1%)	1(33.3%)	16(19.3%)
Medium (5-6)	26(54.2%)	17(53.1%)	2(66.7%)	45(54.2%)
Large (7-9)	16(33.3%)	6(18.8%)	0(0.0%)	22(26.5%)
Land Holding (Hectare) by donkey owner				
Landless	31(64.6%)	23(71.9%)	2(66.7%)	56(67.5%)
Marginal (<1)	5(10.4%)	1(3.1%)	1(33.3%)	7(8.4%)
Small (1-1.9)	8(16.7%)	4(12.5%)	0(0.0%)	12(14.5%)
Medium (2-3.9)	3(6.2%)	3(9.4%)	0(0.0%)	6(7.2%)
Semi-medium (4 - <10)	1(2.1%)	1(3.1%)	0(0.0%)	2(2.4%)
Annual Income (Rs) of donkey owner				
Low (42000-58667)	31(64.6%)	22(68.8%)	3(100.0%)	56(67.5%)
Medium (58668-75334)	6(12.5%)	4(12.5%)	0(0.0%)	10(12.0%)
High (75335-92000)	11(22.9%)	6(18.8%)	0(0.0%)	17(20.5%)
Income source of donkey owner				
Agricultural crop	14(29.2%)	11(34.4%)	1(33.3%)	26(31.3%)
Other animals	16(33.3%)	5(15.6%)	1(33.3%)	22(26.5%)
Wages	16(33.3%)	16(50.0%)	1(33.3%)	33(39.8%)
Service	0.0	0.0	0.0	0.0
Other	2(4.2%)	0(0.0%)	0(0.0%)	2(2.4%)
Donkey rearing experience (Years) by donkey owner				
Low (20-28)	8(16.7%)	2(6.2%)	1(33.3%)	11(13.3%)
Medium (29-37)	28(58.3%)	19(59.4%)	2(66.7%)	49(59.0%)
High (38-45)	12(25.0%)	11(34.4%)	0(0.0%)	23(27.7%)

Criteria for scoring and categorization for the selection of donkey owners is presented in the above tables. Based on the pre-tested semi-structured interview schedule criterias, eighty-three number of donkey owners were selected from forty villages of various districts of Marathwada region, Maharashtra, India.

For age it shows that nearly half (49.4%) of the donkey owners fell under middle age (29-37) followed by young (34.9%) and old age (15.7%) categories. The mean respondents was 30.90±0.64years.About education the

primary and middle school educated respondents were each (26.5%), followed by, higher secondary (25.3%), secondary school (9.6%), diploma/degree (7.2%) and illiterate (4.8%). Regarding family size the (54.2%) of the donkey owners having medium family size followed by (26.5%) large and (19.3%) small families in the study area, about herd size, majority (57.83%) of the respondents had small herd size, followed by medium (38.56%) and large (3.61%) herd size. Furthermore for land holding, majority (67.5%) respondents belonged to landless category, followed by small (14.5%), marginal (8.4%), medium (7.2%), and semi medium (2.4%) category. As well for annual income, majority (67.50%) of the respondents in the study area belonged to low income group, followed by high (20.5%) and medium (12%) income. Annual family income of respondents ranged between RS42000 to 92000.Regarding income source of respondents (39.8%) comes from wages, followed by agricultural crop (31.3%), other animal (26.5%) and other (2.4%). Service (salaried job) was not an income source of any donkey owner. For donkey

rearing experience are more than half (59%) had the medium experience, followed by high (27.7%) and low experience (13.3%).
The observations were supported to the study by Singh *et al.*, (2007) [14] and Swai *et al.*, (2008) [15] reported that average age of donkey owners was 40.36±1.60 and 43.9±12.5years, respectively. Education of the respondents are marginally very low due to lower social status of the donkey owners in the respective societies. Regarding family size the findings corroborate in their respective study areas. Pal *et al.*, (2013) [9] reported average heard size of donkeys 2.86 (range 1 to16). Gupta *et al.*, (2017) [5]. Majority of the donkey owners belonged to landless category. Singh *et al.*, (2007) [14] donkey owner earned Rs. 100 to Rs. 250 per day. Average income per donkey per day of Rs. 75.0±1.89 and Rs 187.2±7.74 in SE and NE Rajasthan, respectively. More than half (51.51%) donkey owners of South East Rajasthan kept other livestock, *viz.* cow, goat, buffalo, mule *etc*. along with the donkeys as a regular income source (Pal *et al.,* 2013) [9].

Table 2: Information of donkey rearing practices in Marathwada region

Herd size	Small n=48	Medium n=32	Large n=3	Pooled N=83
Breeding system of donkey				
Selective	5(10.4%)	6(18.8%)	1(33.3%)	12(14.5%)
Random	43(89.6%)	26(81.2%)	2(66.7%)	71(85.5%)
Utility of donkey				
For Bricks Carrying	10(20.8%)	5(15.6%)	0(0.0%)	15(18.1%)
For Sand Carrying	4(8.3%)	5(15.6%)	1(33.3%)	10(12.0%)
Transport of Goods	4(8.3%)	10(31.2%)	2(66.7%)	16(19.3%)
Agricultural work	28(58.3%)	8(25.0%)	0(0.0%)	36(43.4%)
Cloth washer	2(4.2%)	4(12.5%)	0(0.0%)	6(7.2%)
Average load carrying capacity of donkey				
Low (40-46)	4(8.3%)	3(9.4%)	0(0.0%)	7(8.4%)
Medium (47-53)	27(56.2%)	16(50.0%)	3(100.0%)	46(55.4%)
High (54-60)	17(35.4%)	13(40.6%)	0(0.0%)	30(36.1%)
Average working hours by donkeys				
Low (4-5)	19(39.6%)	8(25.0%)	0(0.0%)	27(32.5%)
Medium (6-7)	20(41.7%)	14(43.8%)	2(66.7%)	36(43.4%)
High (8-9)	9(18.8%)	10(31.2%)	1(33.3%)	20(24.1%)
Daily distance covered during work (Km) by donkeys				
Short (8-9)	15(31.2%)	8(25.0%)	1(33.3%)	24(28.9%)
Medium (10-12)	25(52.1%)	19(59.4%)	1(33.3%)	45(54.2%)
Long (13-16)	8(16.7%)	5(15.6%)	1(33.3%)	14(16.9%)

For systems of breeding the majority (85.5%) of the respondents used random breeding system and (14.5%) selective breeding system. Regarding utility (43.4%) donkey owners used donkeys for agriculture work, followed by transport of goods (19.3%), bricks carrying (18.1%), sand carrying (12.0%) and cloth washer (7.2%). About average load carrying capacity majority (55.4%) of the donkey had medium load carrying capacity, followed by high (36.1%) and low (8.4%). Average load carrying capacity of donkeys ranged between 40-60 kg. About average working hours the majority (43.4%) of donkey owners practiced medium working hours, followed by low (32.5%) and high (24.1%). Average working hours of donkeys ranged between 4 to 9 hours daily. In continuation for daily distance covered during work by donkey the majority of donkey (54.2%) covered medium daily distance, followed by short (28.9%) and long (16.9%), daily distance covered during work ranged between 8 to 16 km.
The results support the findings of Blench *et al.*, (2004) [2]

reported in north-central Nigeria donkeys usually breed freely in the bush. Papa *et al.,* (2012) [7]. and Gupta *et al.,* (2017) [5] found that donkeys contributed enormously in agriculture works, carrying materials with migratory herds of cattle, sheep and goats; and transportation of agricultural produce, house hold and construction material. Yilmaz (2012) [17] reported donkey can carry a maximum load of 80 kg and Pal *et al.,* (2013) [9] observed that donkey can carry 60 to 75 kg of load on their back in the plains. Average working hours are in agreement with the findings of (Yilmaz. 2012, Angara *et al.*, 2013 and Pal *et al.,* 2013) [17, 1, 9]. Studied results are in contrast with the findings of Yilmaz (2012) [17], found that a donkey could carry 60 kg over 40 km daily.
AP- age at puberty, AFS-age at first service, AFE- age at first estrus, ECD- estrus cycle duration, ED- estrus duration, AFC- age at first covering, AFCO- age at first conception, NS- no. of services/conception, AFF-age at first foaling, SP-service period, FI- foaling interval, GP-gestation period, LNF- lifetime no. of foaling

Table 3: Reproductive parameter of adult female donkey (jennet) in Marathwada region.

Sr. no	Parameter	Female n=202 Mean±SE
1	AP (yrs)	2.70±0.02
2	AFS (yrs)	2.79±0.02
3	AFE (yrs)	2.77±0.03
4	ECD (days)	6.86±0.08
5	ED (days)	23.80±0.55
6	AFC (yrs)	5.98±0.07
7	AFCO (yrs)	2.96±0.01
8	NS	1.82±0.06
9	AFF (yrs)	4.44±0.01
10	SP (yrs)	1.14±0.01
11	FI (yrs)	2.25±0.01
12	GP (days)	340.8±0.27
13	LNF	5.98±0.07

The present study has enabled identification of various parameters of reproductive characteristics of jennet. There are several advantages of recording reproductive parameters and these studies may contribute to the conservation of donkey breeds available in local areas. However, more studies on donkey reproductive systems are needed to widen the prospective application of reproductive findings in these species.

The average means and standard errors for reproductive parameter of adult female local donkeys in Marathwada region for AP, AFS, AFE, ECD, ED, AFC, AFCO, NS, AFF, SP, FI, GP, LNF were 2.70±0.02 yrs., 2.79±0.02 yrs., 2.77±0.03 yrs., 6.86±0.084 days, 23.80±0.55days, 2.96±0.01yrs, 5.9±0.07yrs., 1.82±0.06, 4.44±0.01 yrs., 1.14±0.01 yrs., 2.25±0.01 yrs., 340.8±0.27 days and 5.98±0.07, respectively.

The observations are in tune with Behl *et al.,* (2011) [3] worked on reproductive parameter in Spiti breed donkey reported that AP, AFS, ECD, ED, AFCO, NS, AFF, GP and LNF, were1.5-2 (yrs) in male 1.5-2.5 (yrs) in female, 2-2.5 (yrs), 24 (days), 4-10 (days), 2-3 (yrs), 2-3, 3-4 (yrs), 12-12.5 (months) and 12-14, respectively. Pal *et al*., (2013) [9] studied in Rajasthan i.e. AP, AFS, FI and LNF were 30-36 (months), 3 (yrs), 1.5 (yrs) and 8-10, respectively. Twerda *et al.,* (1997) [16] recorded AFF, FI, GP and LNF were 2-9 (yrs),1-3 (yrs), 11-14 (months) and 2-10, respectively. Fielding (1998) [4] observed AP, AFS, ECD, ED and GP were 2 (yrs), 2-4 (yrs), 24 (days), 8-10 (days) and 374 (days), respectively. Purdy *et al.,* (2010) [11] found that ECD, ED and AP were 21-28 (days), 5-10(days) and 8-12(months), respectively. Galister *et al*., (2010) [6] studied in Spanish Jennies GP and ECD were 362±15.3 (days) and 20 (days), respectively.

Conclusions
Present study revealed that the Most of the donkey rearing population belonged to landless or low land holders of other backward communities in the local societies, the respondents under study had medium to high level of experience in donkey rearing, efforts are needed to improve socio-economic condition of the farmers along systematically eliminating identified constraints. Hence sincere efforts should be made to increase awareness of the donkey owners for health care Vaccination, regular medication and Scientific rearing practices which currently leading to poor income. Mass media information and health camps should be organized for effective use of source of information. Moreover, proper policies and strategies are required to be formulated to enhance sustainability of donkey owner.

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