Population trends and distribution of equines in India

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ABSTRACT

Donkeys, mules and horses are important animal genetic resources of India, used mainly for transportation in difficult areas. Present status of these species was evaluated in terms of their population trend and distribution. It is estimated that by 2027, the population of donkeys, mules and horses may decline to mere 1.36, 1.93 and 4.78 lakhs, respectively. Only eleven states in India have more than 5000 donkeys, whereas, only nine states have more than 5000 mules. Further, the populations of these species are now restricted to a few regions only. Fifty-two percent of the population of horses of the Karnataka state is now confined to the two districts of Belgaum and Bijapur. These results suggest that these species require immediate attention for their conservation and propagation.

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INTRODUCTION

Domestic equine species namely horses, donkeys and mules are reared in India since time immemorial. They are mainly employed for transportation and form an important genetic resource of India. Due to their lower cost and easier maintenance, donkeys are mainly reared by marginalized and poorer sections of the society. A donkey, although much smaller in size with less feed and fodder requirements, is able to generate 0.35 HP per hour, about half the power compared to that of bullock (Prasad et al. 1990; Varshney and Gupta 1994). Horses, which are marginally lighter than bollocks in weight, are able to generate about 1 HP per hour compared to that of 0.75 HP per hour of bullocks. Mules which are only about 70 percent in weight to that of bullocks can generate equivalent power to that of bullocks (Ramaswamy and Narsimhan 1984; Prasad et al. 1990). However, with the improvement of road network and increased mechanization, the population of horses and donkeys has shown a sharp decline during last fifty or sixty years. Only the population of mules has shown an increasing trend. This paper attempts to describe the present status of equines in India in terms of their population trend and distribution.

MATERIALS AND METHODS

Secondary data from livestock census and other literature were obtained (Livestock Census 2012, Varshney and Gupta, 1994; Behl et al. 2008; Behl et al. 2010) and state wise population densities were calculated for these species. The district wise and state wise census data for these species were grouped for population intervals to obtain the number of districts or states with specified minimum population. The regression equation for the population trend was developed (Gupta, 2011) using census data for these species from 1987 onwards and the population for the years 2017, 2022 and 2027 were predicted by modified method Singh et al. (1991) as that of

$$P_t=P_{t-1}+\{P_{t-1}(e^b-1)\}$$

Where,

P_t=Population estimated in the year t

P_{t-1}= Population in the previous point in the time series data

b= Slope in the regression equation Y=a+bX [where, Y and X are dependent (population) and independent (year in time series) variables and a=Y, when X=0]

RESULTS AND DISCUSSION

Donkeys

The donkey (Equus asinus asinus) is a sure-footed, docile and hard working animal that is mainly used for transportation. Because of its lower price and low cost of maintenance it has been traditionally associated with comparatively weaker sections of the society. Despite its usefulness, the donkey has remained a neglected species, underfed and often overlooked. With the improvement of road network and increased mechanization, their population has decreased drastically to 3.19 lakhs (Livestock Census 2012) showing a decline of 69.8 percent compared to their population in 1956 (Fig. 1). It has shown a drastic decline of 27.17 percent from the last census in 2007. Taking into consideration the trend since 1987, their population is estimated to fall to mere 1.8 lakhs in 2022 and 1.36 lakhs in 2027 (Table 1).

Rajasthan has the maximum population (81468) of donkeys possessing about 25.56 percent of the total donkey population of India followed by Uttar Pradesh with 17.77 percent, Gujarat with 12.18 percent and Maharashtra with 9.14 percent (Table 2). In terms of population density, among large states, Rajasthan has the highest density at 0.238 donkeys per sq. km followed by Uttar Pradesh (0.235), Bihar (0.227), Himachal Pradesh (0.132) and Maharashtra (0.095). Delhi with 1087 donkeys has the highest overall population density of 0.732 donkeys per sq. km (Table 2).

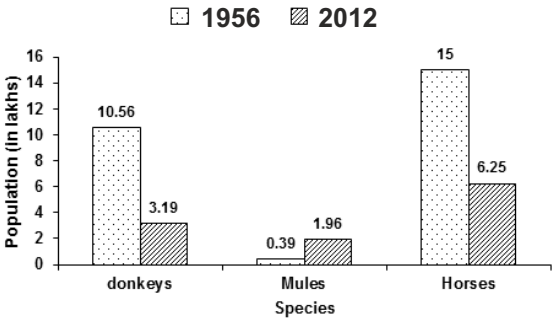

Figure 1: *A comparison of the population of donkeys, mules and horses in India based on Livestock census of 1956 and 2012.*

Only eleven states in India have more than 5000 donkeys (Table 5). Within these states, the donkey population is concentrated in some clusters only. For example, 91.96 percent of the donkey population of Andhra Pradesh in now confined to the districts of Kurnool and Ananthapur. Similarly 64.24 percent of the donkey population of Himachal Pradesh is confined to districts of Kinnour and Lahaul-Spiti. In Uttar Pradesh, donkey population is mainly confined

Table 1. Population trend of equines in India

Census Year	Donkeys		Mules		Horses	
	Total donkey population (in lakhs)	Percent change from previous census	Total mule population (in lakhs)	Percent change from previous census	Total horse population (in lakhs)	Percent change from previous census
1956	10.56	-	0.39	-	15.0	-
1961	10.96	3.65	0.53	35.9	13.0	-13.33
1966	10.54	-3.83	0.75	41.51	11.48	-11.69
1972	9.94	-5.69	0.75	0.0	8.65	-24.65
1977	9.78	-1.61	0.89	18.67	9.15	5.78
1982	10.24	4.70	1.31	47.19	9.0	-1.64
1987	9.60	-6.25	1.7	29.77	7.97	-11.44
1992	9.7	1.04	1.97	15.88	8.17	2.51
1997	8.82	-9.07	2.21	12.18	8.27	1.22
2003	6.5	-26.30	1.76	-20.36	7.51	-9.19
2007	4.38	-32.62	1.37	-22.16	6.12	-18.51
2012	3.19	-27.17	1.96	43.07	6.25	2.12
2017 (estimated)	2.4	-24.8	1.95	-0.47	5.72	-8.53
2022 (estimated)	1.8	-24.8	1.94	-0.47	5.23	-8.53
2027 (estimated)	1.36	-24.8	1.93	-0.47	4.78	-8.53

(Source: Livestock Census, 2012)

Table 2: Total population and population density of donkeys in the states of India as per 2012 livestock census

S. N.	State*	Total donkey population	Percent of total population of India	Density per square km
1.	Rajasthan	81468	25.56	0.238
2.	Uttar Pradesh	56643	17.77	0.235
3.	Gujarat	38834	12.18	0.198
4.	Maharashtra	29135	9.14	0.095
5.	Bihar	21377	6.71	0.227
6.	Jammu and Kashmir	17425	5.41	0.078
7.	Karnataka	16312	5.12	0.085
8.	Madhya Pradesh	14916	4.68	0.048
9.	Andhra Pradesh	10517	3.30	0.065
10.	Tamilnadu	9183	2.89	0.071
11.	Himachal Pradesh	7349	2.31	0.132
12.	Punjab	2909	0.91	0.058
13.	Telangana	2909	0.91	0.026
14.	Haryana	2903	0.91	0.066
15.	Uttarakhand	1509	0.47	0.028
16.	Delhi	1087	0.34	0.732
17.	Assam	1049	0.33	0.013
18.	Chhattisgarh	680	0.21	0.052
19.	West Bengal	609	0.19	0.007
20.	Odisha	523	0.16	0.003
21.	Meghalaya	522	0.15	0.023
22.	Kerala	504	0.16	0.013
23.	Jharkhand	381	0.12	0.005
24.	Manipur	126	0.04	0.006
25.	Arunachal Pradesh	39	0.01	0.0005
26.	Nagaland	39	0.01	0.002
	Total	318787		0.097

**States of Goa, Mizoram, Sikkim and Tripura do not have any donkey population. (Source: Livestock Census, 2012)*

Table 3: Total population and population density of mules in the states of India as per 2012 livestock census

S. N.	State*	Total mule population	Percent of total population of India	Density per square km
1.	Uttar Pradesh	42660	21.72	0.177
2.	Jammu and Kashmir	36508	18.59	0.164
3.	Uttarakhand	26897	13.7	0.503
4.	Bihar	25064	12.76	0.266
5.	Himachal Pradesh	23315	11.87	0.419
6.	Haryana	9009	4.59	0.204
7.	Madhya Pradesh	6989	3.56	0.023
8.	Odisha	5663	2.884	0.036
9.	Punjab	5164	2.63	0.103
10.	Jharkhand	3890	1.98	0.049
11.	Rajasthan	3375	1.72	0.01
12.	Maharashtra	2005	1.02	0.0065
13.	Chhattisgarh	1617	0.824	0.012
14.	Nagaland	1117	0.569	0.067
15.	Karnataka	762	0.388	0.004
16.	Telangana	539	0.27	0.005
17.	Manipur	336	0.171	0.015
18.	Arunachal Pradesh	334	0.17	0.004
19.	Kerala	233	0.119	0.006
20.	Andhra Pradesh	204	0.104	0.001
21.	Gujarat	159	0.0008	0.081
22.	Delhi	136	0.069	0.092
23.	Meghalaya	178	0.091	0.008
24.	West Bengal	113	0.057	0.001
25.	Assam	92	0.047	0.001
26.	Tamilnadu	2	0.001	-
	Total	196378		0.0597

**The mule population of Goa, Mizoram, Sikkim, Tamilnadu and Tripura is <10. (Source: Livestock Census, 2012)*

Table 4: Total population and population density of horses in the states of India as per 2012 census*

S. N.	State	Total horse population	Percent of total population of India	Density per square km
1.	Uttar Pradesh	151848	24.306	0.630
2.	Jammu and Kashmir	144493	23.129	0.650
3.	Bihar	48845	7.818	0.519
4.	Rajasthan	37776	6.047	0.110
5.	Maharashtra	37287	5.968	0.121
6.	Haryana	36655	5.867	0.829
7.	Punjab	32860	5.26	0.652
8.	Madhya Pradesh	18803	3.01	0.061
9.	Gujarat	18264	2.923	0.093
10.	Uttarakhand	16358	2.618	0.306
11.	Himachal Pradesh	15081	2.414	0.271
12.	Assam	14153	2.265	0.180
13.	Karnataka	12976	2.077	0.068
14.	Jharkhand	5706	0.913	0.072
15.	Tamilnadu	5303	0.849	0.041
16.	West Bengal	4408	0.706	0.05
17.	Arunachal Pradesh	4027	0.645	0.048
18.	Odisha	3397	0.544	0.022
19.	Telangana	3288	0.526	0.029
20.	Chhattisgarh	2963	0.474	0.022
21.	Delhi	2694	0.431	1.815
22.	Meghalaya	2314	0.37	0.103
23.	Andhra Pradesh	1898	0.304	0.012
24.	Manipur	1101	0.176	0.049
25.	Nagaland	473	0.076	0.029
26.	Kerala	218	0.035	0.006
	Total	624732		0.19

**The horse population of Goa and Tripura is <30. (Source: Livestock Census, 2012)*

Table 5: States of India with more than 5000 donkeys and districts with more than 3000 donkeys*

State	Population	Clusters of districts with sizable donkey population (Total population in the Cluster)	Districts in the state with about 3000 donkeys or more (population)
Rajasthan	81468	Barmer, Jaisalmer, Jodhpur, Pali, Bikaner, Churu, Hanumangarh, Ganganagar, Jalor, Jhunjhunoo, Nagaur, Sikar, Sirohi (60609)	Barmer (17495), Bikaner (8712),Jaisalmer (5846), Churu (5063),Ganganagar (4609), Jodhpur (4176), Hanumangarh (3370), Jalor (3334)
Uttar Pradesh	56643	Cluster I: Agra, Mathura, Aligarh, Bulandshahr, Etah, Farrukhabad, Firozabad, GoutamBudh Nagar, Mahamaya Nagar (20338) Cluster II: Azamgarh, Ballia, Deoria, Ghazipur, Mau, Chandauli (14653)	Agra (6991), Ballia (4884), Ghazipur (3973), Mathura (3159)
Gujarat	38834	Ahmedabad, Banaskantha, Mehsana, Kheda, Panchmahal, Vadodara, Katchchh, Sabarkantha, Dahod, Anand, Patan (31669)	Kheda (6682), Anand (4982), Vadodara (3300), Katchchh (3276), Sabarkantha (3159),
Maharashtra	29135	Ahmednagar, Pune, Bid, Latur, Nanded, Satara, Jalgaon, Sangali, Sholapur, Buldana (20548)	Nanded (6624)
Bihar	21377	Bhojpur, Buxor, Kaimur, Rohtas (10089)	Kaimur (3443), Buxar (3088),
Jammu & Kashmir	17245	Kargil, Leh (10940)	Kargil (5273), Leh (5072)
Karnataka	16312	Chitradurga, Tumkur (9286)	Tumkur (5072), Chitradurga ((4212)
Madhya Pradesh	14916	Nil	Nil
Andhra Pradesh	10517	Kurnool, Anathapur (9666)	Anathpur (6312), Kurnool (3354)
Tamilnadu	9183	Vellore, Krishnagiri (2691)	Nil
Himachal Pradesh	7349	Kinnaur, Lahaul&Spiti (4721)	Kinnaur (2918)

**Source: Livestock Census, 2012*

Table 6: States of India with more than 5000 mules and districts with more than 2000 mules*

S. N.	State	Population	Clusters of districts with sizable mule population (Total population in the Cluster)	Districts in the state with about 2000 mules or more (population)
1.	Uttar Pradesh	42660	Cluster I – Aligarh, Bulandshehr, Mathura, Agra, MahamayaNagar (8794) Cluster II – Ballia, Ghazipur, Varanasi, Mirzapur (4887)	AmbedkarNagar (2756), Mahamaya Nagar (2433), Aligarh (2085)
2.	J & K	36508	Kathua, Rajouri, Reasi, Udhampur, Doda, Kishtwar, Jammu (30007)	Doda (6649),Reasi (6377), Rajouri (5843), Kishtwar (5046), Kathua (2606), Udhampur (2072)
3.	Uttarakhand	26897	Cluster I – Almora, Bageshwar, Nainital, Pithoragarh (7726) Cluster II – Chamoli, Dehradun, Garhwal, Rudraprayag, TehriGarhwal, Uttarkashi (18261)	TehriGarhwal (5885),Pithoragarh (2750), Rudraprayag (2606), Bageshwar (1959)
4.	Bihar	25064	Cluster I – Supaul, Araria, Kishanganj (6596) Cluster II – Gaya, Aurangabad (2078) Cluster III – Motihari, Saran, Siwan (11834)	Saran (8218),Kishanganj (3082),Araria (2531), Motihari (2006)
5.	HP	23315	Chamba, Kangra, Mandi (14600)	Chamba (5418), Mandi (5114), Kangra (4068), Shimla (2786)
6.	Haryana	9009	Nil	Nil
7.	Madhya Pradesh	6989	Nil	Dhar (2050)
8.	Odisha	5663	Sundargarh, Kendujhargarh, Mayurbhanj (4310)	Nil
9.	Punjab	5164	Nil	Nil

**Source: Livestock Census, 2012*

to two regions. Region comprising nine districts of South-Western Uttar Pradesh (Table 5) holds about 35.91 percent of donkey population of Uttar Pradesh. Similarly, region comprising six districts of Eastern Uttar Pradesh (Table 5) bordering Bihar holds about 25.87 percent of the donkey population of the state. In Rajasthan, which has the maximum population of donkeys in India, 74.4 percent of the population is confined to the Western half of the state.

The Barmer district of Rajasthan with 17495 donkeys was the district with maximum donkey population in India having 21.47 percent of donkey population of Rajasthan and 5.49 percent of donkey population of India. Adjoining district of Bikaner with 8712 donkeys has second highest population of donkeys followed by Agra district of Uttar Pradesh (6991), Kheda district of Gujarat (6682) and Nanded district of Maharashtra (6624).

Only, twenty-seven districts in India have more than 3000 donkeys (Table 5). Rajasthan has eight districts with more than 3000 donkeys followed by Uttar Pradesh with six districts having more than 3000 donkeys.

Mules

Mules with the sure-footedness of donkeys and body conformity of horses are important transportation animals. Their population in 2012 was 1.96 lakhs showing an increase of 402.56 percent from their population in 1956 (Fig. 1). It has shown an increase of 43 percent from the last census in 2007. Taking into consideration their population trend from 1987 onwards, their population is estimated to remain at present levels (Table 1).

Uttar Pradesh with 42660 mules has the largest population of mules, which is 21.72 percent of the total mule population of the country followed by Jammu and Kashmir with 18.59%, Uttarakhand with 13.7% and Bihar with 12.76 percent (Table 3). In terms of population density, Uttarakhand, with 0.503 mules per square km, has the highest density of mules followed by Himachal Pradesh, Bihar and Haryana having 0.419, 0.266 and 0.204 mules per square km, respectively.

Only nine states in India have more than 5000 mules (table 6). Like donkeys most of the mule population is confined to specific regions or cluster of districts. For example, Jammu subdivision of the State of Jammu and Kashmir has 15.28 percent of the total mule population of the country (Table 6). Garhwal region of the Uttarakhand state (cluster II in

Table 7: States of India with more than 5000 horses and districts with more than 3000 horses*

S. N.	State	Population	Clusters of districts with sizable horse population (Total population in the Cluster)	Districts in the state with about 3000 horses or more (population)
1.	Uttar Pradesh	151848	Cluster I – Agra, Aligarh, Bulandshehr, Etah, Farrukhabad, Firozabad, GautamBudh Nagar, Mathura, Mahamaya Nagar, Kanshi Ram Nagar (24106) Cluster II – Rae Bareli, Amethi, Partapgarh, Allahabad, Kaushambhi, Banda (16481) Cluster III – Saharanpur, Shamli, Meerut, Muzaffarnagar, Baghpat, Ghaziabad, Hapur (20298) Cluster IV – Bijnour, JyotibaPhule Nagar, Bareilly, Badaun, Moradabad, Pilibhit, Rampur, Sambhal, Shahjahanpur Cluster V – Unnao, Kanpur Nagar, Sitapur, Hardoi, Lucknow, Barabanki, Bahraich, Shrawasti (17617)	Bareilley (9622), Badaun (9584), Bijnour (6006), Rae Bareli (5234), Aligarh (5185), Muzaffarnagar (5142), Sambhal (5010), Pilibhit (4958), Moradabad (4823), Shahjahanpur (4760), Saharanpur (4432), Agra (4406), Rampur (4308), Hardoi (4240), Bulandshahr (3850), Fatehpur (3834), Bahraich (3286), Pratapgarh (3268), Meerut (3051),
2.	J & K	144493	Cluster I – Anantnag, Badgam, Bandipora, Baramula, Ganderbal, Kulgam, Kupwara, Pulwama, Shupiyan Cluster II – Kargil, Leh (7719) Cluster III – Doda, Kishatwar, Udhampur, Ramban, Reasi, Punch, Rajouri, Jammu, Kathua, Samba(82102)	Rajouri (16066), Anantnag (13974), Reasi (12359), Jammu (10149), Kathua (10127), Punch (8805), Baramula (7639), Badgam (7433), Udhampur (6364), Ganderbal (6133), Kupwara (6024), Doda (5968), Leh (5066), Kishatwar (4987), Bandipore (4858), Samba (4161), Shupiyan (3598), Ramban (3116)
3.	Bihar	48845	Cluster I – Araria, Kishenganj, Katihar, Khagria, Madhepura, Madhubani, Purnea, Saharasa, Begusarai, Supual (24085) Cluster II – Aurangabad, Bhojpur, Buxar, Rohtas, Saran (7002) Cluster III – Munger, Nalanda, Patna, Bhagalpur, akhisarai (7405) Cluster IV – Motihari, PashchimChamparan (5057)	Araria (5035), Begusarai (4021), Kishanganj (3300), Khagaria (3284), Saharsa (2701), Pashchim Champaran (2593), Saran (2155)
4.	Rajasthan	37776	Nil	Bikaner (3047)
5.	Maharashtra	37287	Ahmednagar, Aurangabad, Dhule, Jalgaon, Mumbai, Thane, Nashik, Pune, Satara, Solapur, Sangli, Kolhapur (30752)	Nashik (5957), Pune (5413), Dhule (4055), Ahmadnagar (3789)
6.	Haryana	36655	Ambala, Yamuna Nagar, Kurukshetra, Karnal, Kaithal, Jind, Panipat, Sonipat (24904)	Ambala (11539), Karnal (2961)
7.	Punjab	32860	Cluster I – Amritsar, Tarantarn, Gurdaspur, Hoshiarpur, Jalandhar (13259) Cluster II – Firozepur, Patiala, Sangrur, Barnala, Muktsar, Moga, Ludhiana, Bathinda, Mansa, Faridkot (17212)	Gurdaspur (4834), Ludhiana (3116),Amritsar (3060)
8.	MP	18803	Mandsaur, Ratlam, Ujjain, Dhar, Indore (5088)	Nil
9.	Gujarat	18264	Ahmedabad, Mehsana, Katchchh, Bnaskantha, Amreli, Bhavnagar, Junagarh, Rajkot, Surender Nagar (12304)	Nil
10.	Uttarakhand	16358	Nil	Nil
11.	HP	15081	Chamba, Kangra, Mandi, Kullu (9798)	Kangra (3781)
12.	Assam	14153	Nil	Nil
13.	Karnataka	12976	Belgaum, Bijapur (6749)	Belgaum (4898)

**Source: Livestock Census, 2012*

Uttarakhand) has about 18000 mules which is 9.3 percent of the total mule population of the country. Similarly, the districts of Chamba, Kangra and Mandi have 7.43 percent of the total mule population of the country.

Saran district in Bihar, with 8218 mules which is 32.79 percent of the total mule population of the state and 4.18 percent of the total mule population of the country, has the largest population of the mules in India (Table 6).Doda district of Jammu and Kashmir is ranked second with 6649 mules which forms 3.39 percent of the total mule population of the country.

Horses

Besides transportation, horses are also used for

riding. Unlike donkeys, horses are generally looked after well by their owners. Horses, with their population at 6.25 lakhs (census2012), though, have registered a marginal increase of 2.12 percent during 2007 to 2012, but their overall population declined by 58.33 percent during 1956-2012 (Fig. 1). Based on the trend of their population from 1987 onwards, the population of horses is estimated to decrease to 5.23 lakhs in 2022 and 4.78 lakhs in 2027 (Table 1).

Uttar Pradesh with 151848 horses has maximum population of horses, having about 24.31 percent of total horse population of India followed by Jammu and Kashmir with 23.13 percent, Bihar with 7.82 percent and Rajasthan with 6.05 percent horse population of the country (Table 4). In terms of population density, among large States, Haryana with 0.829 horse per square km has the highest density of horses followed by Punjab (0.652), Jammu and Kashmir (0.65) and Uttar Pradesh (0.63). Delhi with 2694 horses has the highest overall density of 1.82 horses per square km among the small States.

Only thirteen states in India have more than 10000 horses (Table 7). Although, unlike donkeys and mules, horse population is more spread out, still some clusters of districts or regions hold majority of the population. For example, 52 percent of the population of horses of the Karnataka state is confined to the two districts of Belgaum and Bijapur. Similarly, 49.31 percent of the horse population of Bihar is localized in North Eastern region of Bihar (Table 7).

Rajouri district of Jammu and Kashmir with 2.57 percent of the total horse population of the country has the largest horse population (16066) followed by Anatnag (13974) of the same State (Table 7). Only 24 districts in the country have more than 5000 horses which includes 12 districts of Jammu and Kashmir followed by seven of Uttar Pradesh.

CONCLUSION

The above analysis has clearly shown that the population of donkeys and horses has shown a sharp decline compared to their population status in 1950s. Although, the population of mules has shown an increasing trend, their total population is only 1.96 lakhs. Further, these three equine species are localized to certain regions only, showing great regional imbalances. These facts suggest that special interventions are required for the conservation and propagation of these important animal genetic resources of our country.

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