Original Research Article

CROSS SECTIONAL STUDY OF CURRENT STATUS OF EQUINE HUSBANDRY IN HARYANA, INDIA

ABSTRACT

The study was aimed to analyze current status of equine husbandry in Haryana, India. 303 randomly selected equine farmers were interviewed during January-March, 2022 in four districts viz; Hisar, Bhiwani, Jind and Rohtak. It was observed that 24.8 per cent equine farmers reported scarcity of veterinary services, 11.8 per cent reported reluctances of staff at veterinary hospitals, 29.7 per cent reported that veterinary doctors expressed lack of expertise in providing treatment to equines, 44.6 per cent reported hiring of private services and 10.5 per cent reported application of ITK for treatment of ailing equines. As far as loan and insurance are concerned, 67.6 per cent reported lack of loan facilities while 70.3 per cent reported inadequate insurance facilities for equines. As far as breeding is concerned, 49 per cent reported non-availability of a good stallion, 55.1 per cent reported lack of Artificial Insemination facilities and 44.6 per cent reported hiring of a stallion for breeding of mares. Majority of respondents (94.4 per cent) reported non-availability of pasture land; 95 per cent reported nutritional issues, 76.6 per cent reported metabolic health problems and 81.2 per cent reported purchase of additional feed/fodder in absence of open air grazing. Despite above situation, equine husbandry has potential to improve livelihood of equine keepers where a good number {38.6 per cent (moderate) + 41.6 per cent (high level} reported help of their family members and 67 per cent wanted training in equine rearing. A total of 42.8 per cent agreed that equine rearing is a profitable enterprise and 53.1 per cent wanted to continue with equine rearing. Finally it is concluded that equine rearing has immense potential as profitable enterprise and bright future in Haryana state.

Key words: welfare activities, equine, rearing, breeding, artificial insemination.

1. INTRODUCTION

Globally, livestock sector contributions directly for food security and livelihoods of almost one billion people. An increase in shifting toward consumption of animal source food has been seen in recent decades by the world food economy. An average yearly growth rate of 5.1% and 3.6% in meat and dairy sectors, respectively, has been noticed and livestock sector is becoming one of the fastest-growing sectors in agriculture. Due to Global increase in human population, animal-source foods have reached to a rapid increase, especially in developing countries [14].

Livestock sector is a source of wealth and power in India; approximately two-third families of farming communities are associated with this sector to earn their livelihood; this sector is one of the largest sectors and equines are considered as a walking bank and in India equine population is 1.4 per cent of world's equine population [2]. As per 20th livestock census, 16 per cent farm households, 14 per cent total rural households and approximately two-third rural communities depend on agriculture sector and livestock sector contributes 4.11 per cent of total GDP and 25.6 per cent of agriculture GDP and is source of employment to 8.8 per cent population in India [22].

The horses were domesticated as the human civilization started and they has played direct role in social and political development, no other species of domestic animals played as much role in human civilization as horses has played, history could be quite different without horses and these have been the central axel for rise and fall of empires and conquest of continents. The horses had played a great role in spread of European languages and culture in different continents. If it is compared, no other species of livestock has been used on so large scale in communications, transportation, war and peace, agriculture and sports, as horses have been used [5].

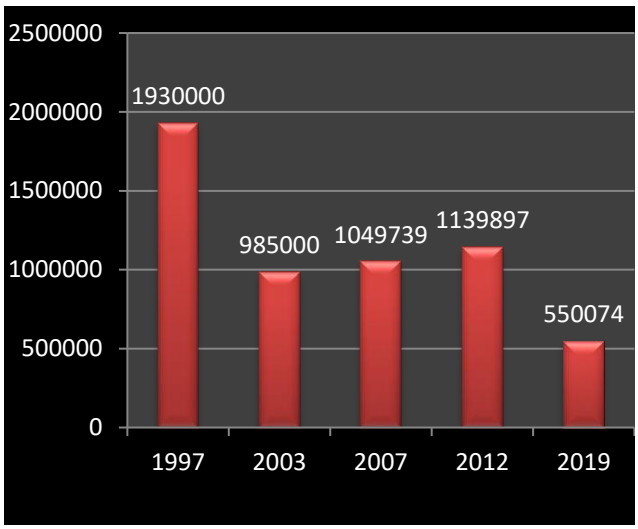
In India there are about 0.54 equine populations and it comprises donkeys, mules, ponies and horses; mainly it provides livelihood to rural, semi-urban households and in foot hills of Himalaya regions through transportation and draught activities whereas a small population of equines is utilized by state police, army, boarder security forces, racing industries and sports [11].

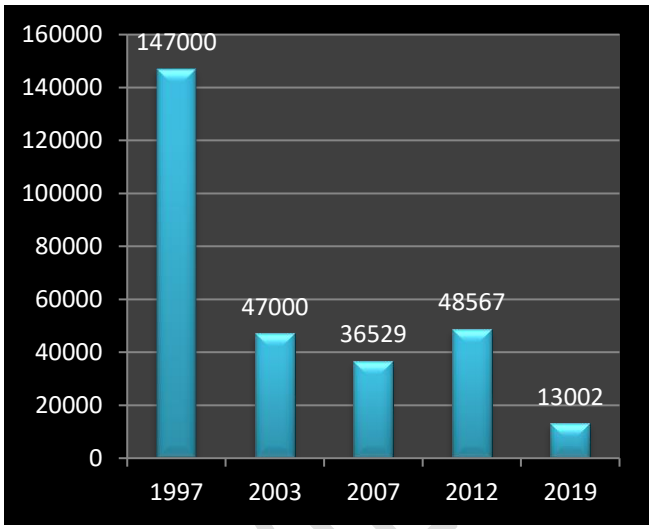
Equines contribution had been very significant for humanity in India, they are known for their intelligence, and common sense, decline in equine population had been mostly caused by

mechanization in India and globally as well [4]. Indian breed of horse and ponies are distinct in term of adaptation in different national agro-climatic conditions and they possess characteristics of sturdiness, endurance and resistant to diseases. There population is declining due to road network, mechanization and indiscriminate breeding with non-descript animals and only a few thousands true to breed horses of each breed are available [3].

Equines contribution had been acknowledged globally and they are known for speed, power, energy and their role was important in history of China [13]. Equines are essential parts in agriculture and transportation in urban and peri-urban area in developing countries [18]. Equines are used worldwide for transportation [19]. Equine sector globally affects livelihood of more than 600 million people in one or another way [17].

Equines (*Equids)* play very important role in rural area in India; they are the reliable source of production chain of several industries [23]. Equine sector is facing unprecedented challenges in Haryana; rapid decline in population, decrease in demand of work, increase of maintenance cost and migration of equine farmers to other profession. Recently COVID-19 pandemic has played a role of catalyst in this whole process [15].





In India **in Haryana**

Fig-1 **Fig-2**

Trend of equine population in Haryana and India *(Source: https://dahd.nic.in)*

Rapid declining trend has been observed in equine population in Haryana and on national level as well. In India, equine population was 1930000 in 1997, 985000 in 2003, 1049739 in 2007, 1139897 in 2012 and 550074 in 2019 [Fig-1]. In Haryana, equine population was 147000 in 1997, 47000 in 2003, 36529 in 2007, 48567 in 2012 and 13002 in 2019 [Fig-2].

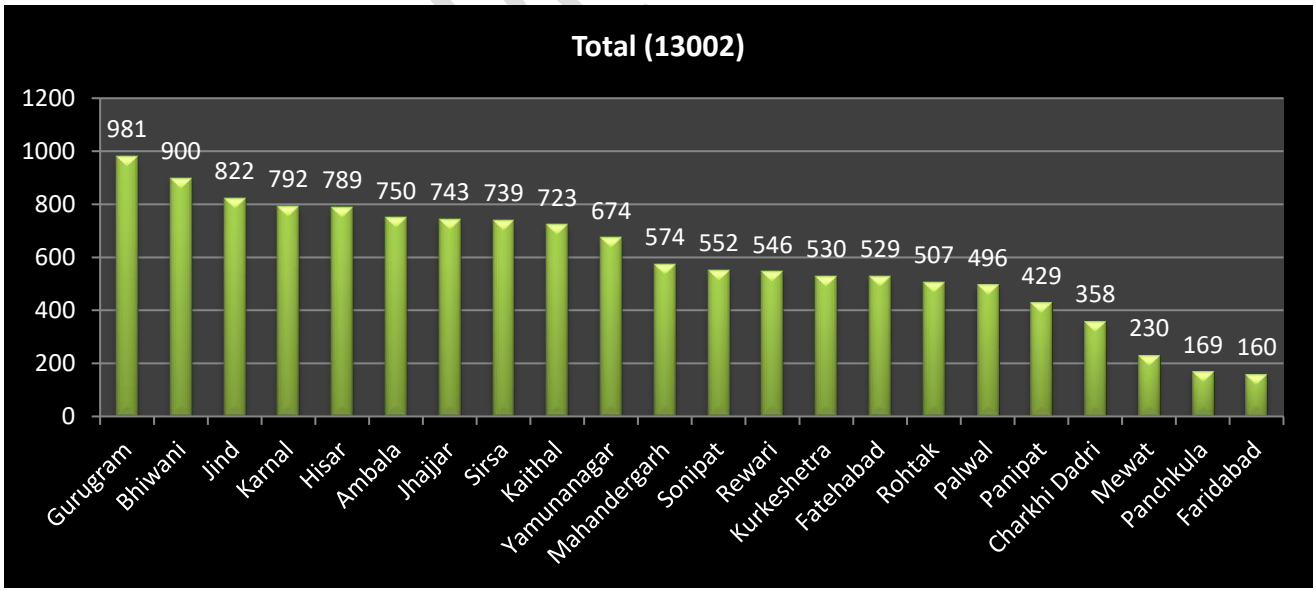


Fig-3 District wise equine population in Haryana (Source: *www.pashudhan.haryana.gov.in)*

As per the National Livestock Census-2019, Gurugram was at top position with total equine population-981, Bhiwani at 2nd position with equine population-900, Jind at 3rd position with

equine population-822, next Karnal with population-792, Hisar-789, Ambala-750, Jhajjar -743, Sirsa-739, Kaithal-723, Yamunanagar-674, Mahandergarh-574, Sonipat-552, Rewari-546, Kurkeshetra-530, Fatehabad-529, Rohtak-507, Palwal-496, Panipat-429, Charkhi Dadri-358, Mewat-230, Panchkula-169 and Faridabad-160 [Fig 3].

2. MATERIAL AND METHOD

The study was descriptive in nature and it was conducted in four districts of Haryana; Hisar, Bhiwani, Jind and Rohtak. Data were collected during January-March, 2022 by conducting interviews using structured interview schedule and selection of respondents was done by simple random sampling method at sampling site. Total 303 respondents took part in study and out of these 88, 77, 73 & 65 were from Hisar, Bhiwani, Jind and Rohtak district, respectively. After interviews all filled interview schedules were arranged district & category wise, examined thoroughly and missing digits were updated by contacting respondents through telephonic conversation. Editing, post coding and classification of the schedules was done and data were entered in Microsoft Office Excel Worksheet. Statistical analysis was performed by using IBM Special Package for Social Sciences version (SPSS).

3. RESULT AND DISCUSSION

3.1 Analysis of equine welfare activities in Haryana:

Equine farmers are facing causes and constraints in equine rearing due to scarcity of equine welfare activities and majority of equine farmers are landless and marginal farmers [15].

Table 1
Tabular presentation of responses on availability of equine welfare activities in Haryana

Variables	Responses	Frequency (per cent)				
		Hisar (n=88)	Bhiwani (n=77)	Jind (n=73)	Rohtak (n=65)	Overall (n=303)
Veterinary services	NA*	8 (9.1%)	47 (61(%)	17(23.3%)	3 (4.6%)	75 (24.8%)
	Available	25 (28.4%)	15 (19.5%)	20 (27.4%)	42 (64.6%)	102 (33.7%)
	Staff is reluctant	22 (25%)	6 (7.8%)	7 (9.6%)	1 (1.5%)	36 (11.9%)
	Lack of expertise	33 (37.5%)	9 (11.7%)	29 (39.7%)	19 (29.3%)	90 (29.7%)
loan facilities	Not aware	30(34.1%)	21(27.6%)	20 (27.4%)	8 (12.3%)	79 (26.1%)
	NA*	49 (55.7%)	51 (66.2%)	53 (72.6%)	52 (80%)	205(67.6%)
	Available	00 (0.0%)	00 (0.0%)	00 (0.0%)	00 (0.0%)	00 (0.0%)
	NR*	9 (10.2%)	05 (06.2%)	00 (0.0%)	5 (7.7%)	19 (6.3%)
Insurance facilities	Not aware	29 (33%)	20 (26%)	20 (27.4%)	11(16.9%)	80 (26.4%)
	NA	54 (61.3%)	54 (70.1%)	53 (72.6%)	52 (80%)	213(70.3%)
	Available	00 (0.0%)	00 (0.0%)	00 (0.0%)	00 (0.0%)	00 (0.0%)
	NR*	05 (5.7%)	03 (3.9%)	00 (0.0%)	2 (3.1%)	10 (3.3%)
Good quality stallion	Available	01 (1.2%)	02 (2.6%)	07 (9.6%)	00(0.0%)	10 (5%)
	NA*	53 (60.2%)	49 (63.6%)	21 (28.8%)	28 (43.1%)	151 (49%)
	NR*	34 (38.6%)	26 (33.8%)	45 (61.6%)	37 (56.9%)	142 (46%)
Artificial Insemination (AI) facilities	Available	01 (1.1%)	00 (0.0%)	00 (0.0%)	00(0.0%)	1 (0.3%)
	NA*	53 (62.5%)	55 (62.7%)	34 (46.5)	24 (36.9%)	173 (55.1%)
	NR*	32 (36.4%)	32 (36.3%)	38 (53.5%)	41 (63.1%)	129 (44.6%)
Pasture land	Available	4 (4.5%)	6 (7.8%)	1(1.4%)	6 (9.2%)	17 (5.6%)
	NA*	84 (95.5%)	71(92.2%)	72 (98.6%)	59 (90.8%)	286 (94.4%)

NR*- Not required, NA*- Not available

3.1.1 Veterinary services

In current study, it emerged out that veterinary services were inadequate for equines in Haryana. In overall 24.8 per cent reported scarcity of veterinary services, 11.8 per cent reported that staff of veterinary hospital is reluctant toward providing treatment to equines, 29.7 per cent reported that veterinary doctors expressed lack of expertise in equine health and 33.7 per cent were satisfied

[Tab-1]. This constraint existed globally and it was revealed out in a study that government veterinary clinics had scarcity of adequate facilities to handle clinical cases due to lack of adequate equipment in Ethiopia [6]. Equines are sensitive animals and treatment is needed on emergency level especially, if an equine is suffering from cough or colic [15].

3.1.2 Loan facilities

Overall, 26.1 per cent respondents reported that they are not aware of loan facilities, 67.6 per cent reported that whenever they approached authorities of Department of Animal Husbandry and Banking Sector; they were denied of loan facilities for equines [Tab-1]. This problem exists globally and it was observed that equine were ignored globally and they faced lack of money to expand equine business [1]. A capital is needed for equine farmers to expand their equine rearing business. While analyzing Economic Survey Haryana 2020-21, it was observed that no financial provision has been made for equine welfare activities in annual budget of Haryana.

3.1.3 Insurance facilities:

It was found that insurance facilities were inadequate for equines in Haryana. Overall 26.4 per cent reported that they were not aware of insurance facilities for equines, 70.3 per cent reported that whenever they approached insurance authorities and veterinary hospital; it was told that no insurance facilities were available for equines [Tab-1]. These facilities were needed and it was emphasized that insurance of livestock, including equines, was must to protect the horse owners against any livestock loss and it was also reported that equine owners were not adopting insurance of their horse due to one or another reason [10].

3.1.4 Good quality stallion:

A good quality stallion (a breed-able adult male horse/donkey) is required to breed horse and donkey mares. Overall 49% respondents reported that this facility was not available in Haryana [Tab-1].

3.1.5 AI facilities:

As far as AI facilities were concerned, in overall 55.1 per cent reported that these facilities were not available in Haryana [Tab-1]. Due to lack of these facilities, farmers had to bring their mares for breeding purposes to a long distance and this exercise involved a lot of time and money.

3.1.6 Pasture land

Pasture area is land demarcated specially for grazing of animals, especially for domestic animals and available for grazing of domestic livestock, where these can move freely *[25*]. Previously, common land (traditional name-Bani) was available in every village and it was utilized for pasture purpose [personal observation]. Now, due to urbanization and adoption of CLU (Change of Land Use) law in Haryana, common land is being utilized for another purpose and as a result pasture area is decreasing [24]. In overall majority of respondents (94.4 per cent) reported that no pasture land was available for grazing of their equines [Tab-1].

3.2 Analysis of routine problems faced in absence of welfare activities

Equines are generally reared by landless and marginalized farmers and livelihood of these farmers was dependent on earning from these animals [11]. Equine welfare activities are needed on every possible level for these marginalized farmers. It was found that respondents faced problems in equine rearing in absence of welfare activities in Haryana.

Table 2
Tabular presentation of responses on problems faced during equine rearing in absence of equine welfare activities in Haryana

Variables	Responses	Frequency (percentage)				
		Hisar (n=88)	Bhiwani (n=77)	Jind (n=73)	Rohtak (n=65)	Overall (n=303)
Hiring of private veterinary services	Yes	44 (50%)	48 (64.4%)	47 (64.4%)	12 (8.5%)	135 (44.6%)
	No	27 (30.7%)	26 (34.2%)	25 (34.2%)	51 (78.4%)	133 (43.9%)
	Use of ITK	14 (15.9%)	3 (1.4%)	1 (1.4%)	2 (3.1%)	32 (10.5%)
	NR	3 (3.4%)	00 (0.0%)	00 (0.0%)	00 (0.0%)	3 (1%)
Amount (INR) to pay for hiring of a stallion to breed mares	Up to 1100	03 (3.4%)	08 (10.4%)	03 (4.1%)	01 (1.5%)	15 (5%)
	1101 to 2100	18 (20.5%)	18 (23.4%)	10 (13.7%)	9 (7.8%)	55 (18.2%)
	2101 to 5100	21 (23.9%)	15 (19.5%)	4 (5.5%)	12 (9.5%)	49 (16.2%)
	➢ 5100	04 (4.5%)	06 (7.8%)	3 (4.1%)	03 (5.6%)	16 (5.3%)
	NA	42 (47.7%)	30 (39%)	53 (72.6%)	43 (75.6%)	168 (59.4%)
Not taking of equines for open air grazing	Yes	4 (4.5%)	4 (5.2%)	1 (1.4%)	6 (9.2%)	15 (5%)
	No	84 (95.5%)	73 (94.8%)	72 (98.6%)	59 (90.8%)	288 (95%)
Health issues observed	Yes	58 (65.9%)	54 (70.1%)	64 (87.7%)	56 (86.2%)	232 (76.6%)
	No	30 (34.1%)	23(29.9%)	9 (12.3%)	9 (13.8%)	71 (23.4%)

3.2.1 Hiring of veterinary services

In current study, it emerged out that in overall 44.6 per cent hired veterinary services on payment of high charges and 10.5 per cent applied ITK and traditional method for treatment of their ailing equines in absence of government veterinary services [Tab-2].

3.2.2 Amount (INR) paid for hiring of a stallion to breed mares

It came out that in overall 5 per cent respondents paid up to 1100, 18.2 per cent paid 1101 to 2100, 16.2 per cent paid 2101 to 5100, 5.3 per cent paid more than 5100 and 59.4 per cent didn't hire a stallion to breed their mares and mostly they were either mule farmers or maintaining their own stallion [Tab-2]. During study, it was observed that a large number of respondents hire a stallion which is easily available without considering true to breed characteristics and this phenomenon is affecting proper maintenance of true breed of indigenous horses [FGD]. It was

observed that due to the paucity of quality stallion, equine owners were dependent on the outside stallion for breeding of their mares [11].

3.2.3 Not taking of equines for open air grazing:

Open air grazing is a good and natural exercise for equines. Equines are selective grazer and they eat young and immature plants only [agronomy]. It emerged out that in overall majority of respondents (95 per cent) didn't take their equines for open air grazing due to scarcity of pasture land [Tab-2].

3.2.4 Health issues observed in absence of grazing:

While grazing equines move around in open air in a natural atmosphere and this grazing keeps their digestive system and metabolic activities prompt and meet natural exercise, behavior and nutritious requirements [23]. Due to absence of grazing equines were becoming prone to various metabolic disorders like; lameness, indigestion, colic and repeat-breeding and in overall majority of respondents (76.6 per cent) reported that their equines were becoming prone to health issues in absence of open air grazing [Tab-2].

3.3 Analysis of future prospective in equine rearing

Equine population was declining rapidly and COVID-19 pandemic had played a role of catalyst. This section is exclusively dedicated to analyze of feedback from respondents on various aspects of future prospective in equine husbandry.

Table 3

Tabular presentation of responses on future prospective in equine husbandry in Haryana

Variables	Responses	Frequency (Percentage)				
		Hisar (n=88)	Bhiwani (n=77)	Jind (n=73)	Rohtak (n=65)	Overall (n=303)
Extent of family members in equine rearing	Nil	21 (23.9%)	07 (9.1%)	19 (26.1%)	13 (20%)	60 (19.8%)
	Moderate level	35 (39.8%)	26 (33.8%)	22 (30.1%)	34 (52.3%)	117 (38.6%)
	High level	32 (36.3%)	44 (57.1%)	32 (43.8%)	18 (27.7%)	126 (41.6%)
Willingness to further expand equine husbandry	Yes	57 (64.4%)	62 (80.5%)	35 (47.9%)	34 (52.3%)	201 (66.3%)
	No	31 (35.6%)	15 (19.5%)	38 (52.1%)	31 (47.7%)	102 (33.7%)
	Can't say	08 (9.2%)	02 (2.4%)	04 (5.5%)	01 (1.5%)	15 (5%)
Preferred profession as a substitute in case of shifting from equine rearing	Dairy farming	01 (1.1%)	02 (2.6%)	00 (0.0%)	02 (3.1%)	05 (1.7%)
	Agriculture	07 (8%)	05 (6.5%)	00 (0.0%)	01 (1.5%)	13 (4.3%)
	Salaried job	10 (11.4%)	16 (20.8%)	04 (5.5%)	09 (13.8%)	39 (12.9%)
	Labour work	19 (21.6%)	11 (14.3%)	20 (27.4%)	17 (26.2%)	67 (22.1%)
	Yet not decided	06 (6.8%)	01 (1.3%)	07 (9.6%)	04 (6.2%)	18 (5.9%)
	Dairy farming	01 (1.1%)	02 (2.6%)	00 (0.0%)	02 (3.1%)	05 (1.7%)
	Don't want to migrate	45 (51.1%)	42 (54.5%)	42 (57.5%)	32 (49.2%)	161 (53.1%)

3.3.1 Extent of family members in equine rearing

Role of each family member is important for success of work undertaken by any one (www.economictimes.com). In current study, it revealed out that overall 38.6 per cent respondents got moderate level and 41.6 per cent respondents got high level extent of family members in equine rearing [Tab-3]. Current study agrees with study which was conducted in Rajasthan, India in which it was found that participation of female members was very important in equine rearing [pal y-2021].

3.3.2 Willingness to further expand equine husbandry business

In current study, it came out that maximum respondents were willing to further expand equine rearing business; overall 66.3 per cent respondents were still willing to expand equines rearing business and 33.7 per cent were not willing [Tab-3].

3.3.3 Preferred profession as a substitute in case of migration from equine rearing: It was observed that respondents were migrating from equine rearing to any other profession due to constraints being faced in equine rearing [16]. In current study, an attempt was made to visualize the situation of shifting from equine rearing in changed scenario. After careful analysis, it emerged

out that in overall 53.1 per cent still wanted to continue with their present occupation of equine rearing [Tab-3].

4. CONCLUSION

Big challenges for equine industry were; the rapid decline of equine population, heterogeneity term of per capita income, unequal work distribution, farm size, price of households and decline in demand of work for equines. Equine industry was adversely affected due to COVID-19 pandemic; there was a great reduction in demand of work for equines and reduction in equine rearing income. This situation further needs close monitoring including follow-up guidelines to explore long-term impacts of the pandemic on equine sector. Previously, equines were extensively used for transportation and agricultural operation. Now their demand was decreasing and automobiles were preferred. Hence, there is a dire need to promote equine husbandry based agro-entrepreneurship to generate employment opportunities at village level to minimize migration of people from rural to urban area to control population burden on urban area. Equine husbandry has the capacity to share employment burden of agriculture sector, slow down speed of industrial development, helpful in green revolution and pollution control through equine eco-tourism, transportation and agriculture operations. Welfare activities and current research in equine sector should be need based and focused on requirements of stakeholders. It is concluded that future of equine husbandry is still very bright.

ETHICAL STATEMENT:

Present study was survey-based and did not require any ethics committee approval.

REFERENCES:

1. Abaynew G, Haben F. Assessment of Socio-economic Importance and Major Constraints of Working Equines in and around Dabre Behran Town, Central Ethiopia. Veterinary Journal Open Journal. 2020; 5(2) 30-38. doi:10.17140/VMOJ-5-146.
2. Belakeri P, Satyanarayan K, Jagadeeswary V, Mohan K, Yathiraj S , Veeranna KC, and Rajeshwari YB. Socio-Economic Characteristics and Information Seeking Behavior of Livestock Farmers of Karnataka, India. International Journal of Science, Environment ISSN 2278-3687 (O) and Technology. 2016; Vol. 5, No 6, 4320 – 4327. www.ijset.net.

3. Behl R, Behl J, Gupta N and. Gupta SC. Genetic relationships of five Indian horse breeds using microsatellite markers. Animal (2007), 1: Page 483–488. doi: 10.1017/S1751731107694178.
4. Jose SK, Mani J, Ibrahim IF. Equine genetic diversity, population status and conservation measures in India. International Journal of Veterinary Sciences and Animal Husbandry. 2024; 9(5):85-88.
5. Kefena E, Dessie T, Han JL, Kurtu MY, Rosenbom S and Beja-Pereira A. Morphological diversities and ecozones of Ethiopian horse populations. Animal Genetic Resources (2012) 50. 1–12. Food and Agriculture Organization of the United Nations. doi:10.1017/S2078633612000021.
6. Kebede H, Melaku A and Kebede E. Constraints in animal health service delivery and sustainable improvement alternatives in North Gondar, Ethiopia. Onderstepoort J Vet. Research. 2014; 81 (1): 1-10.
7. Kirmani NR, Banday MT, Abdullah M, Akhand AH and Adil S. A study on socio-economic profile of Bakarwals using equines as pack animals for highland pasture migration. Indian Journal of Animal Production & Management. 2019; Vol. 35 (1-2): 23-27. https://www.researchgate.net/publication/3411037.
8. Mohamed YA, Mohamed SA, Mohamud AI, Mohamud AA, Jimale KA and Ibrahim SA. Assessment of Welfare and Health Conditions on Working Donkeys in Benadir Region, Somalia. 2021. DOI: 10.17582/journal.vsrr/2021.7.2.121.128.
9. Pal Y, Legha RA, Dader RK, Bala PA. Socio-Economic Status of Horse Owner's vis-à-vis, Horse Feeding and Management in Rajasthan, Veterinary world. 2013; 6(8), 470-475. DOI: 10.5455/VetWorld. 6, 470-475 .
10. Pal Y, Legha RA, Thakur YP, Gupta AK and Singh RK. Socio-Economic status of Spiti Horse Owners vis-a-vis Horse Management in Native Tract. Veterinary Practitioner, 2021; 12(1) 73-76.
11. Pal Y, Legha RA. Socio-Economic Status of Mule Producers and Management Practices of Mule Production in Rural Areas. Indian Journal of Animal Sciences 78 (11): 1281-84 **(2008).**

12. Pal, Y., Legha, R.A., Bhardwaj, A., Tripathi, B.N. (2020). Status and conservation of equine biodiversity in India. Indian J. Comp. Microbiol. Immunol. Infect. Dis., 41(2): 174-184.
13. Qingbin W, Yang Z. China"s Equine Industries in a Traditional Economy: Development, Trends, Challenges, and Opportunities. Sustainability **(2020)** 12125135.
14. Robinson TP, Wint GRW, Conchedda G, Van Boeckel TP, Ercoli V, Palamara E, et al. (2014) Mapping the Global Distribution of Livestock. PLoS ONE 9(5): e96084. https://doi.org/10.1371/journal.pone.0096084
15. Singh A, Kumar R, Kumar S and Pal Y. Socio-Economic Contribution of Donkey and Mule Rearing in Haryana (India). Asian Journal of Agricultural Extension, Economics and Sociology. **(2021(a).** 39 (9)**)** 198-203. DOI: 10.9734/ajaees/2021/v39i930657.
16. Singh A, Pal Y, Kumar R, Kumar S, Rani K, & Prasad J. **(2021 (b).** Working Equids: Their Conditions, Invisible Earning and Challenges- A Review. Asian Journal of Agricultural Extension, Economics & Sociology. 39(11) **(2021)**357-364. https://doi.org/10.9734/ajaees/2021/v39i113076.
17. Upjohn MM, Pfeiffer DU and Verheyen KL. Helping working Equid and their Owners in developing countries: Monitoring and evaluation of evidence-based interventions. Veterinary. Journal. **(2014)**. 199. 210–216. doi: 10.1016/j.tvjl.2013.09.065.
18. William SJ. Improving the Welfare of working equine animals in developing countries. Applied Animal Behavior Science 100 **(2006)** 148-151. doi www.sciencedirect.com
19. Zakarias T and Tasfaye S. The Welfare of Working Equines in Ethiopia. European Journal of Biological Sciences 11 (3) **(2019).** 82-90 Doi:10.5829/iodosi.ejbs.2019.82.90.
20. *20th Livestock Census,* Ministry of Electronics and Information Technology, Government of India site. Vikaspedia **(2020).**
21. https://en.wikipedia.org/wiki/Utility.
22. https://en.wikipedia.org/wiki/insurance.
23. www.thebrooke.org. Invisible Worker. October-**2015**.
24. *www.agronomy.org*
25. *www.wikipedia.org* › wiki › Pasture.