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Phenotypic characteristics and general managemental practices for working donkey populations in South Western Bihar region of India

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India has rich and diverse animal genetic resources including equines in its different agro-climatic zones which are used for various purposes in earning livelihood. Among equines, donkeys which constitute about 33% of total Indian equine population play multifarious role in human life especially for the poorest of the poor section of society. Donkey population in India has decreased rapidly and remarkably over the last two decades from 0.65 million to 0.44 million (http://dahd.nic.in/dahd/statistics/animal-husbandrystatistics.aspx; retrieved on 11.02.2016). This decreasing trend might be due to their decreased working utility, as alternate economical sources of mechanization are available. However, as a draught animal "either as pack or cart animal", these are still quite useful for both plain and hilly regions of the country as this species has wonderful work stress bearing capabilities (Pal *et al.* 2012). In India, donkeys are unclassified, and termed as non-descript local donkeys with little information on their health and management (Gupta *et al*. 1998; 1999a; 1999b; 2005; 2007; Gupta *et al.* 2016). In Bihar state, donkey population is about 0.24×10^5 (Bihar-District wise livestock Census 2007) and these are mainly used at brick-kilns for shifting baked/unbaked bricks in and out of the furnace area as well as a companion animal with sheep herders. The study was carried out so as to document their physical, biometric indices, health and managemental issues for future betterment and proper management of the working equids.

Ninety eight adult non-descript local donkeys were selected from different brick-kilns situated around Patna (Danapur, Byavar, Maner) and other different areas of South–Western (SW) Bihar including Buxar, Balliya, Sonepur, Jahanabad, Gaya, Rajgir, Nalanda and Bhojpur so as to get a representative data of overall donkey population of South Western Bihar. Most of the donkeys were observed to be migratory as per the requirement of their owners. The physical characteristics and coat colour were recorded from all the surveyed donkeys and data were presented as percent or frequency. Fifteen different biometric indices were recorded for phenotypic characterization of these local donkeys, viz. height at wither (HW), body length (BL), heart girth (HG), face length (FL) and face width (FW), ear length (EL) and ear width (EW), hoof length (HoL) and hoof width (HoW), fore (FLL) and hind (HLL) leg length, height at knee (HK) and hock (HH), canon and pole were recorded.

Donkeys available in different areas of South-Western (SW) Bihar were small (75 cm to 90 cm) to medium (91 to 105 cm) in height with an average working age of adult donkeys as 5.24±2.12 years. Donkeys had well developed body with strong bone structure while neck and mane were short. Small hair were observed on most of the body parts with zebra marking on legs and stripe on back. Back of donkeys was straight and sloppy on sides. Eyes were black with prominent eyebrow ridges. Face was observed to be convex with large ears. Lips were loose as compared to horses. Tail was small to medium in size, thin and like tasseled end. Legs were thin but strong enough to carry about 60 to 80 kg load in the form of about 25 to 30 bricks during work at kilns. They were hardy and surefooted while moving on small and steep pavement of kilns. In cart, these were able to pull a load of about 400 to 700 kg on coal tar road. Almost similar type of characteristics were reported in donkeys of Rajasthan (Pal *et al.* 2013).

Body coat colour of donkey varied from dark grey (54.10%), light grey (36.11%), brown (5.56%) and other (4.17%). All colours were available throughout the SW Bihar. However, a typical and rare sand colour was also observed in a couple of donkeys near Rajgir. Pal *et al.* (2013) revealed that light and dark grey colours are the common among donkeys of Rajasthan. A dorsal stripe on the back, dark ear marking and white to pinkish muzzles were also observed in most of the donkeys. Pal *et al.* (2013) also observed similar coat colours and other features in donkeys of Rajasthan which indicate that on the basis of physical characteristics, donkeys from Rajasthan and SW Bihar are similar.

For phenotypic characterization, fifteen different biometric indices were recorded from 98 adult donkeys

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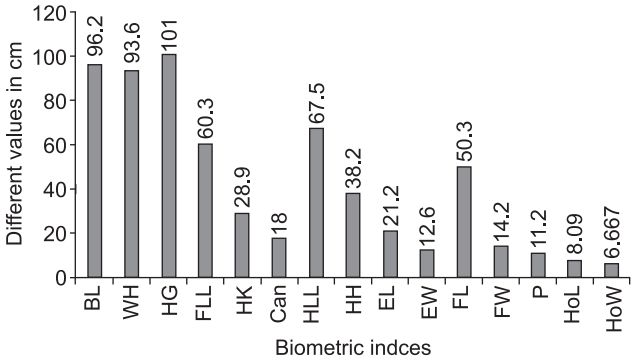

Fig 1. Average biometric indices of donkey population from SW Bihar region.

(Fig. 1). Average BL was 96.2±0.56 cm with a range from 84 to 111 cm. Donkeys falling in this range were observed to be present in all the areas in SW Bihar. Donkey height at wither ranged between 78 to 104 cm with an average of 93.6±0.64 cm. Height at withers reported in the present study was slightly less than that reported by Pal *et al.* (2013) but similar to Singh *et al.* (2007). Similarly, other biometric indices directly related to donkey length and breadth, ranged from 83–118 cm (HG); 50–83 cm (FLL); 23–38 cm (HK); 16–21 cm (canon); 52–78 cm (HLL) and 29–44 cm (HH). Heart girth observed in the present study was similar whereas FLL, KL, HLL and HH were lower in the present study as compared to earlier reports (Pal *et al*. 2013). Average length of donkey's convex face was 50.3±0.36 cm with a width of 14.2±0.21 cm. Ear length and width were 21.0±0.2 cm and 12.6±0.2 cm, respectively. Distance between ears roots (pole) was 11.2±0.17 cm. Face length, face width and pole were similar to earlier reported values (Pal *et al.* 2013). Hoof length and width varied from 7–10 and 5–8 cm, respectively. However, hoof length and hoof width was more in donkeys of Bihar as compared to donkeys of Rajasthan (Pal *et al.* (2013). This baseline information will be quite useful in registration of these donkeys as a separate breed.

Donkey consumes all types of grasses and bushes but prefers to graze on *doob (Cynodon dactylon)* grass available in grazing areas. Depending upon the nature of work and availability of green fodder, supplements were also given to donkeys by their keepers. At brick-kilns of Maner near Patna as well as at other places in SW Bihar, donkeys were let loose to graze after working hours. Similar practice was also reported for donkeys available in Rajasthan (Pal *et al.* 2013) indicating that poor equine owners do not have ample monetary resources for proper feeding of these donkeys and these animals are mostly dependent upon local grasses available near their working places. However, around Gaya, donkeys were fed chaffed rice straw, mixture of wheat bran and gram *churi* (250 g) as grain and *gur* (50 g) as supplement daily to each working donkey. In the present study, the donkeys were provided less amount of concentrate and *gur* (jaggery) as compared to donkeys of Rajasthan (Pal *et al.* 2013). The reason of high supply of concentrates and *gur* to donkeys in Rajasthan is that these are mainly used in carting and have to pull heavy loads. Ahmed *et al.* (2008) also reported that donkeys in Nigeria were maintained with little or no feed supplementation in the form of straw, household waste or grains. Water was provided to donkeys in bucket two to three times a day i.e., before work, in between work and after work. At some brick-kilns, even no water management (water trough) was seen. At one brick-kiln, one common trough was available for watering of donkeys, mules and ponies available there. Some of the equine owners were providing common salt at weekly interval to donkeys but mineral mixture was never offered. Similar findings about watering and common salt feeding were reported by Pal *et al.* (2013). In donkeys, a great loss of salt and minerals takes place through sweat when they work as pack or cart animals which necessitates their replenishment through supply of mineral mixture and common salt on daily basis to get optimum work from the donkeys. During grazing, both front or one front and one hind leg were tied with the help of small piece of rope, so as to restrict the movement of donkeys. However, it caused severe injuries in legs due to improper hobbles. For movement, donkeys whose both forelegs were tried had to jump with both forelegs during grazing. Such conditions are very pathetic and needs to be avoided by the donkey keepers. After brick-kilns season is over, donkey owners mostly don't use donkeys for any work.

Donkeys were generally available at brick-kilns at most of the places while some were also observed to carry load while accompanying animal herds. About 5 to 7% were available in open pasture land in villages also. However, donkeys were not available at all brick-kilns, as manual system of shifting bricks to and from kiln was also in operation. At some kilns (10–15%), near Maner (Patna), both mules and donkeys were available but number of mules was higher than donkeys. These equines were used as pack animal to carry raw bricks to kiln and for taking out *pucca* bricks from the kiln for stacking near kiln. At brick-kilns, donkey owners start working early in the morning at 4 AM to 6 AM and finished their work by 12 noon. Time period varied from area to area also. During summer season, donkeys were put to work early in the morning from 4 AM to 9 AM and in the evening between 4 PM to 7 PM while during winter season, these were used from 7 AM to 12 noon and 3–4 h in the evening also. Working during morning hours was a good practice observed during the study which saved the donkeys and their keepers from the harsh climatic stress. Each donkey carried about 25–30 bricks in each round for short distance of 100 to 500 meters and each donkey covers a distance of 4–20 km per day, with intermittent rest during loading and unloading. As the donkeys were carrying load for short distances, this much load could be put on them for such activity without much fatigue. At most of the places, donkey owners work for four to six months at the brick-kiln site and later carry sand and supply to the construction sites to earn the livelihood. The brick-kiln sites were having ample grazing area at some places. Some of the donkey owners live in urban areas

(Gaya) and daily go to brick-kilns for work.

Most of the donkeys at kilns and in country-side, were quite poor in their health. Small to large wounds were observed on brisket region, withers, spine, girth and hind quarter regions, and neck areas where brick carrying bags were tied. The harnesses used to carry this load were in bad shape which resulted large and deep wound on back, shoulder and legs where harnesses were tied. Proper harness is required to avoid wound. Most of the time, donkey owners put the donkey on work even if it had wound. Wounded equines need to be treated at Vet hospitals followed by adequate rest. Similar observations had also been reported for donkeys from Rajasthan (Pal *et al*. 2013). Physical cruelty, wounds and low-quality feeding material are the common problems of the donkey. Donkey keepers should give proper attention and care so that donkey could be utilized in a better way. They apply haldi (turmeric powder) and Kapoor (camphor) on wounds but this treatment was reported to be quite painful. They treat the donkeys adopting locally available material and knowledge. No incidence of colic was reported by the donkey owners. Though at most of the places, veterinary hospitals were available for treatment of animals including donkey but equine owners rarely got treated their equines from veterinary hospitals.

During winter, problem of influenza and urine in blood (haematuria) were common as reported by respondents. Vaccination of the equines as prophylactic measures is must but donkey owners were not sufficiently aware about the need of vaccination. Insurance of livestock including horses is must to protect the horse owners against livestock losses but donkey keepers were least bothered about the insurance of donkeys being the low cost animal. Similar observations were also reported from other states including Haryana, Uttar Pradesh and Uttrakhand (Pal and Legha 2008). However, deworming of donkeys was being done as curative measures only. Pal *et al.*(2011) also reported that deworming of horses was being done as curative measures in Spiti valley, whereas this is a common practice among the equine owners of Haryana, Uttar Pradesh and Uttrakhand (Pal and Legha 2008). Donkeys were regularly groomed before work only. Hoofs cleaning, shoeing and trimming of hoof as well as hair clipping were not common practices in almost all the regions in SW Bihar. Similar findings were reported by Pal *et al.* (2013) in donkeys of Rajasthan. However, regular trimming of hoof is a must to keep the hoof in shape which was lacking in all the donkeys studied.

Donkeys were observed to be reared by people belonging to the poorest section of the society including SC, ST, backward classes, Muslims etc. In Rajgir village, donkeys were reared mostly by Muslim community. Most of the donkey owners were very poor. At different places, each owner was maintaining two to four donkeys for use at brick-kilns for earning their livelihood. Depending upon the number of donkeys used at brick-kiln and family members involved in this work, earning of donkey owners varied from ₹ 350 to ₹ 500/donkey. During the brick-kiln season in Maner (Patna), each donkey carries 1000–1500 brick-kilns per day @ ₹ 350/-per thousand bricks. Economically, each owner earns about ₹ 450/day/donkey and spends about 75/animal/day. At some places, donkey owners work in group and earn about ₹ 800/day per donkey. Pal *et al.* (2013) reported average income per donkey per day of donkey owners as ₹ 75.0±1.89 and ₹ 187.2 ±7.74 in SE and NE Rajasthan, respectively. Donkey owners were observed to be migratory for 4 to 6 months from Jharkhand and other parts of Bihar.

Majority of donkey owners were not aware about the symptoms of estrus in jennies and their jennies were getting pregnant through the natural mating with accompanying male donkey during grazing. No proper breeding record was being maintained by donkey owners. However, during discussion, age at first mating was observed to be between 2–4 years.

Donkeys generally do not find any proper shelter at brick-kilns. Donkey keepers had erected temporary shelters of bricks for the donkeys at the site. These shelters were very small and with poor ventilation and cleanliness. Hardly any manger or water trough was available in these shelters. The floor of shelters was *kutcha* and uneven. Singh *et al*. (2007) reported that about 80% donkeys were kept in groups in an open bara (wooden enclosure) without roof and proper gate. Pal and Legha (2008) also observed that 44% of mule producers of Haryana, Uttrakhand and UP provide *kutcha* thatch shed to their equines.

SUMMARY

The study was planned to assess the physical, biometric indices, health and managemental issues of donkeys. Adult non-descript local donkeys (98) selected from different brick-kilns around Patna (Danapur, Byavar, Maner) as well as from other different areas of SW Bihar including Buxar, Balliya, Sonepur, Jahanabad, Gaya, Rajgir, Nalanda, Bhojpur etc were included in the study. Physical features along with 15 different biometric indices were recorded for phenotypic characterization of the breed. Predominant coat colour, average body length, height at wither, heart girth, fore leg length, height at knee, canon, hind leg length, height at hock were estimated. A dorsal stripe on the back, dark ear marking and white to pinkish muzzles were also observed in most of the donkeys. Donkeys were reared on grasses and bushes available. Around Gaya in Bihar, donkeys were fed chaffed rice straw, mixture of wheat bran and crushed gram (gram *churi*) as grain and *gur* as supplement daily. At brick-kilns, donkeys start working early in the morning at 4–6 AM and ends work by 12 noon and carry 25–30 bricks in each round. Wounds were observed on breast, withers, spine, girth and hind quarter regions due to overloading and improper harness. Problem of influenza and urine in blood were common in donkeys. Vaccination, insurance and use of disinfectants were not in practice with little knowledge about donkey breeding. For betterment of these donkeys, proper feeding along with replenishment of mineral and common salt on daily basis, health management, proper housing along with

indiscriminate use of wounded donkeys need utmost importance.

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