

Evaluation of draughtability in Hool buffalo of Birbhum (West Bengal)

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ABSTRACT

Hool buffaloes are native to dry arid region of the Birbhum district of West Bengal and used primarily for draught purpose. The most unique trait identified for this buffalo is extreme draughtability, disease resistance ability and its ability to rear on minimum input system. The buffaloes are observed to be extremely tolerant to drought and good tolerant to heat. They are able to work better in night pulling cart with average load carrying capacity of 39 quintal for a distance of 72 km. It was observed that Hool buffaloes were able to pull load continuously for 9 hrs hardly taking rest for 1-2 hours. Incidences of systemic diseases, blood protozoan diseases and parasitic infestations were less in Hool buffalo bullock compared to cattle bullock. Socioeconomic impact was observed to be large enough for the farmers rearing Hool buffaloes in the native tract.

Key words: Draughtability, buffalo, Birbhum

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INTRODUCTION

Livestock provides a large share of draught power. Since ancient times man has utilized animals like cattle, buffaloes, horses, elephants etc. for carrying out different types of work. At the turn of this century, more than 300 million cattle were employed as draught animals around the world (Wilson, 2003 and Conroy, 2007) and Oxen continue to be an important, yet overlooked draught power source (FAO, 2010). It offers the greater population of developing nations a means of sustenance in food production and inseparable part of agriculture. Draught animal power (DAP) is a classic example of large- scale application of appropriate technology concepts to millions of small and marginal farmers for cultivation and small-scale transportation. DAP is still relevant and useful due to the fact that it is suitable to the needs of the farmers with small land holding and the areas where mechanized implements cannot be put to use (Singh et al. 2007). The work bullocks not only contribute manure, conserve natural resources like fossil fuel, but also create employment opportunities and generate income particularly for the small scale farmers in India (Akila et al. 2011).

In India, the energy for ploughing two-thirds of the cultivated area comes from animal power and they haul up to 15 per cent of the total freight in the available 14 million animal drawn carts. Thus the stock of 60 million working cattle and buffaloes were used for various agricultural operations, saving fossil fuel worth Rs 60 billion, annually. With nearly 83 million land holding (more than 75% of the land holding) being less than 2 ha in size, the animal power

can play a very important role in Indian agriculture. At least 200 days of work was necessary to get the breakeven point considering the cost of maintenance and market hire rate for draught animals. The annual use of Draught Animal Power should be expanded through haulage and rotary mode of operation for agro processing and electricity generation and the new research findings should be communicated to the farmers through training. Indian agriculture is characterized by small and marginal farm holders with the population of more than 60 million bovine for draught power (Singh 2002). India has about 70 million draft animals (Shastry and Thomas, 2006). There was a decline of more than 20 million number of working animals at all-India level between 1972 and 2007.

In 1996-97, the contribution from animal power reduced to 14% while mechanical and electrical power increased to 79%. But in terms of area coverage, draught animals continue to dominate with more than 54.3% area cultivated by them and only 19.6% by tractor and power tiller (Singh 1999). With nearly 83 million land holding (more than 75% of the land holding) being less than 2 ha in size, the animal power can play a very important role in Indian agriculture (Rao and Dass, 2005).

The Birbhum district of West Bengal is situated 23°32'30" to 24°35'0" N attitude and 87°5'25" to 88°1'40" E longitude with the average temperature ranges from 15 to 40° C with scanty rainfall. The agro-climatic zone is dry arid and the soil texture is red laterite and due to water scarcity, limited agriculture is practiced only once in a year. Draught buffaloes form a major source of livelihood generation for the rural farmers. According to latest

Table 1. Population data of pure bred Hool buffalo in Birbhum district

Blocks of Birbhum district	Hool buffalo population
Dubrajpur	5416
Khoyrasole	3088
Rajnagar	1591
Suri-I	1345

Census, the pure bred Hool buffalo is present in the four blocks of Dubrajpur, Khoyrasole, Rajnagar and Suri-I with the population data being 11440 (18th Livestock Census).

Considering the importance of draught animal power in dry arid region of West Bengal, particularly in socioeconomically backyard region, in coal mine areas and in places of restricted agriculture, draught buffalo is very important. In the present study, the draught buffalo of Birbhum district were studied and analysed its draughtability traits.

MATERIALS AND METHODS

The present study was conducted on Hool buffalo (n =1311). The traits under consideration were the economically important traits as draughtability and disease resistance traits. Draughtability for Hool buffalo were measured by the standard protocol (Upadhyay and Madan, 1985) along with some other protocols developed. The traits under consideration are the physiological parameters as rectal temperature, respiration rate, pulse rate before and after work, draughtability score developed, draught power, average duration of work per day, draught tolerance and heat tolerance. Other drought parameters studied were distance travelled per day, average weight carrying capacity for a pair of bullock (tonnes), speed of travelling (km per hour), working period during agriculture (hr), working period other than during agriculture (hr), month of work round the year, working area ploughed per day, speed of ploughing, drought tolerance and heat tolerance.

Susceptibility to diseases and epidemiological study was conducted from the case studies in Veterinary hospital from the period of 2006 to 2011. The diseases were broadly classified as systemic infection, parasitic infestation, blood protozoan diseases, digestive or ruminal disturbances, nutritional deficiencies, wound, localized eye/ear infection. The parasitic infestation studied were sub-classified as Trematode (Amphistomiasis and Fascioliasis), Hydatid cyst

(Echinococcus granulosus), Lung worm (Dictyocaulus viviparous), Nasal granuloma (Schistosoma nasalis), Humpsore/Legsore (Stephanofilaria assamensis) and Ectoparasite (Ticks/mites) infestations.

RESULTS AND DISCUSSION

Scanty report are available on development of this breed. It is assumed that the utility of the animal as draught animal, topography of the area, evolution and selective breeding through several generation and has brought up the Hool buffalo through the process of domestication. Although, Hool buffalo is distributed in the entire Birbhum district, however, pure kind of animals are mainly available in Dubrajpur, Khoyrasole, Rajnagar and Suri-I blocks.. The block wise population data for Hool buffaloes is presented in Table 1. In other parts of the district, the animals are graded, due to extensive Grading up programme with Murrah germplasm as per the guidelines of National project on Cattle and Buffalo breeding.

Draughtability traits were mostly measured for castrated male buffaloes which were used for pulling cart containing load. In some restricted places, they were also used for ploughing land. Hool buffaloes being native to this place, they are well adapted to local dry arid agroclimatic conditions, their drought tolerance is excellent. As revealed from the physiological parameters, Hool buffaloes were observed to be more tolerant to work. They are persistent worker and can work for 9.5 hrs at night pulling cart (Table 2). Buffaloes are heavy animals than castrated cattle bullock, so they are some what slow worker compared to cattle.

Average weight carrying capacity (as a paired bullock's cart) was observed to be 39.4 quintal based upon weighing on weigh bridge present in the village. The actual working area ploughed per day was observed to be 1807.85 sq m (Table 2). During rainy season, Hool buffalo are used for ploughing paddy field. The ploughed area was measured in cultivation field for the data. As observed,

Table 2. Draught Performance (mostly power, ploughing to some extent) of Hool buffalo

Physiological parameter	Before work	after work
Rectal temperature(^o F)	99-100	101-102
Respiration (rate / min)	22.5	30
Pulse (rate/min)	43.25	56.25

Table 3. Draught parameters (transportation of cart, ploughing/threshing) of Hool buffalo

Attributes	Values
Distance travelled per day (km)	72.35± 0.57
Average weight carrying capacity for a pair of bullock (tonnes)	39.4± 0.67
Speed of travelling (km per hour)	9.05± 0.04
Working period during agriculture (hr)	8.12± 0.07
Working period other than during agriculture (hr)	9.5±0.04
Months of work round the year	12
Working area ploughed per day (m)	1807.85 ±13.483
Speed of ploughing (km per hour)	5.25 ± 0.025
Drought tolerance	Excellent
Heat tolerance	Good
Average duration of work per day during cart pulling at night	9.5 ± 0.04 hrs
Average duration of work per day during daytime for agriculture	8.12 ± 0.07 hrs

they were slow worker but persistent worker compared to cattle. Hool buffaloes were observed to work round the year, thus providing sustainable livelihood generation to rural farmers, mostly belonging to socioeconomically weaker section.

Hool buffaloes were observed to be good tolerant to drought, but not excellent tolerant to heat. So they were able to work better at night when temperature is on lower side. In this region, the farmers are mostly of socioeconomically poor background. One of their major occupation is transportation of coal from mines. Hool buffaloes were of extreme importance to transport load in cart. The other draught parameters are listed in Table 3.

So far, no buffaloes from India are reported to be draught buffalo. However, some draught cattle have been registered from different parts of the country, viz. Hallikar, Amritmahal, Khillari, Kangyam, Bargur, Umblachery, Pullikulam etc. Some reports are available for comparative performance of draughtability of cross bred cattle with that of indigenous cattle. Comparative studies on draft performance of Red Kandhari bullock with pneumatic and iron bullock cart had been done (Ingle et al., 2016), where they have estimated amount of load carried, speed of travelling, and horse power. The draught ability of Ongole bulls were evaluated by overall

draughtability method and horse power (hp) generation method (Vinoal et al. 2010). Singh (1999) have described draughtability of cattle through various parameters including fatigue score, range of fatigue parameter, effect of draught load on walking speed of a pair of oxen for indigenous cattle breeds. Draftability of Motu bullock of Orissa had been described (Ghosal et al., 2016). Draughtability of Hool buffalo was observed to be better to indigenous cattle.

Disease resistance ability of Hool buffalo

Epidemiological study for Hool buffalo was also conducted through a period of about six years. Buffaloes were observed to be more resistant to systemic diseases, compared to cattle (Table 4). Hool buffaloes were mostly resistant to most of the commonly occurring parasitic infestations (Table 5). None of the animals under present study was observed to have the infection of lung worm (*Dictyocaulus viviparus*) and nasal granuloma (*Schistosoma nasalis*). On the contrary, the prevalence of these two diseases were much abundant in cattle counterpart. However as regard to other endo parasitic infestations as amphistomiasis, fascioliasis, hydratid cyst, stephanophilariasis, Hool buffalo were reported to have lesser incidences compared to cattle counterpart.

Hool buffalo were also observed to be better resistant to

Table 4. Comparison of epidemiological data of cattle and buffalo bullocks

Species	Systemic infection	Wound (Fresh/ / ulcerated)	Total maggot parasitic infestation	Blood protozoan disease	Digestive/ ruminal disturbances	Nutritional deficiency (Vit A & others)	Localized eye/ear infection
Cattle bullock	29.18	9.96	41.77	0.59	6.15	7.34	2.34
Buffalo Bullock	13.38	16.97	21.42	0.24	2.42	15.15	4.48

(% out of total diseases)

Table 5. Parasitic incidences (in percentage) of cattle and buffalo bullocks

Species	Trematode	Lung worm	Hydatid cyst	Nasal granuloma	Humpsore/ Legsore	Ectoparasite (Ticks/mites)
Cattle Bullock	26.39	0.146	1.2	0.439	7.33	6.27
Buffalo Bullock	12.3	-	0.87	-	2.65	5.32

ectoparasites as ticks or mites. This buffalo breed is lesser known and resistance to ectoparasites are a blessing for the socioeconomically backward people to rear them with almost minimum input. DAD-IS, FAO have reported a buffalo breed, named as Thai from South East Asia, which is resistant or tolerant to Tick burden. Epidemiological study of Hool Buffalo revealed that they were mostly resistant against common diseases in comparison to cattle bullocks of the region. They were rather effected by wound since mostly used for draught purpose. They were affected by nutritional deficiencies. Four buffalo breeds reported to DAD-IS as having resistance or tolerance to specific diseases or parasites distributed world wide, out of which, one is resistant to ticks, another one is resistant to internal parasites or worms, and rest two are resistant to fascioliasis. Three buffalo breeds from South East Asia as Papua New Guinea buffalo, Kerbau-Kalang (fascioliasis), Kerbau Indonesia (fascioliasis) had been observed to be resistant or tolerant to internal parasites as Fascioliasis (Anon,2016). Similar studies on Hool buffalo revealed resistance to most systemic infection and against parasitic infestations.

Buffalo reared at dry arid region of the Birbhum district may emerge as a new breed with distinctly better draughtability and disease resistance, named as Hool buffalo. Pure bred Hool buffaloes are distributed in mainly four dry arid blocks as Dubrajpur, Khoyrasole, Rajnagar and Suri-I blocks. The major threat for these buffaloes is rapid declining of breeding stock due to unrestricted castration of males and slaughter of females, since milk yield is of least importance. Hool buffalo are extremely resistant to common diseases in comparison to cattle and can thrive well with full productivity in these agro climatic region. Hool buffalo has been the best choice for the farmers providing livelihood security to them. Since agriculture is very much restricted, a greater portion of farmers are engaged through unorganised coal mines. Their livelihood depends upon selling and transportation of coals. Hool buffaloes are a major source for them for carrying out such operations.

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