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Field Study on Draught Ability of Umblachery Bullocks in Cauvery Delta Zone of Tamil Nadu

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ABSTRACT: Livestock plays a inevitable role in agriculture and farm sectors all over the world. Due to mechanization the use of draught animals got reduced but still in areas like hilly regions and for small and marginal farmers the draught animals assists for their routine farm and agriculture operations. In spite of supporting the farmers in the agricultural operation it saves the fossil fuel as eco friendly. Among the 53 recognized breeds of cattle in India the research study on draught ability was very scanty. Hence this study was conducted to find out the draught ability of umblachery bullocks. Preliminary survey work was carried out in Thanjavur, Tiruvarur and Nagapattinam districts for identification of umblachery bullocks in farmer's field. A total of 24 pairs of umblachery bullocks with four different age groups were evaluated for draught performance in wet plough marshy land in the rice field. Overall the average Horse Power (HP) calculated was 0.147 ± 0.04 in umblachery cattle. Animals in higher age group have significant draught performance differences with medium and young animals.

Keywords: Draught Power, Umblachery cattle**,** Renewable energy, Horse Power, Mechanization.

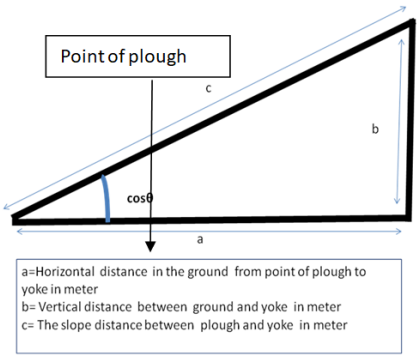
INTRODUCTION

As per the 20th livestock census in India the total cattle population was 192.49 millions in 2019 and showing an increased trend of 0.8% when compared with the previous livestock census. But there was a decline of 6 % in the total Indigenous (both descript and non-descript) Cattle population over the previous census report. Over the past decades the swiftness of decline of Indigenous Cattle population is in decreasing trend. It is mainly due to economic advantage of rearing the cattle primarily for milk. Singh (1999) and most of our Indigenous cattle breeds are having the genetic potential of draughting capacity and many cattle breeds in India are reared for utilization of this draughting power by the farmers for their routine farm and other allied agricultural based activities. Few live stocks are reared for meeting out their daily demand of milk. But overall the number of indigenous cattle used for agriculture operation is getting reduced in the recent past. It is mainly due to dominance of exotic cattle breeds for the production of more milk in turn due to negligence by the farmers it reduces the usage and importance of our indigenous cattle breeds (Taneja, 2011). But in hilly regions and for the marginal, landless small farmers the efficiency of using livestock resources cannot be replaced by mechanical power and they are solely depends on their livestock for routine agriculture operations (Singh *et al.,* 2007). It was expected that draught animal power continue to be remain as a major source of farm operations at least for the next 25 to 30 years (ICAR-Extension bullet in 2001) and oxen will be used as a draught source power (FAO, 2010; Omoding and Odogola 2002). The use of draught animals for agriculture operations in Sub Saharan Africa is in the increasing trend every year as per the report of Agriculture 21 (2007). Due to induction of mechanization in agriculture operations the mechanical and electrical power increased to 79% in the year 1996-97 and consecutively the contribution from animal power reduced to 14%. But overall the area coverage is still dominated by draught animals only (Singh, 1999). Even though there is a huge demand for mechanized tools in agricultural operations still two thirds of rural transports are coming from draught animals in India and hence animal traction plays a vital role in food security (Alex *et al.,* 2013). An average bullock is rated at 0.4-0.5 Horse Power (HP) generation and a 35 HP tractor can replace at least 70 bullocks. But at the same time draught animals replaces the agriculture machinery run on fossil-fuel should be taken into consideration (Dikshit and Birthal 2010). Basic research on draught animal power is very scanty and hence intensifying the basic research study on work animal is necessary to show the limelight on draught animals. Well-managed animal power is an excellent clean energy alternative for coal and natural gas yet it remains as a forgotten solution (Kousalya *et al.,* 2019). With this background it was an attempt to identify the Draught animal power of umblachery bullocks in

marshy wetland in Cauvery delta zone of Tamil Nadu. Umblachery cattle is one of the recognized draught type of cattle and the breeding tract of umblachery cattle is in the Cauvery delta region which is known as the rice granary of Tamil Nadu and the main activity of the farmers are rice or paddy cultivation. Umblachery breed is noted for its strength and sturdiness especially used in the marshy fields for wet ploughing. This breed is the outcome of selection for short stature, suitable for work in marshy rice fields of Cauvery deltaic region (Thangaraju *et al*., 2001). Umblachery bullocks are used for ploughing, carting and threshing. These bullocks are capable of doing work for 6 to 7 hours under hot sun or it can carry heavy load for a long distance. A pair of bullocks can able to pull a load of 2000 kg over a distance of 20 km in seven hours without rest (Sadana and Pundir 2010).

MATERIAL AND METHODS

A pair of 24 numbers of umblachery bullocks were selected from Thanjavur, Tiruvarur and Nagapattinam districts of Tamil Nadu, India with four different age groups *viz.,* less than 3 years 3 to 4 years, 4 to 5 years and 5 to 6 years. Almost same body weight group of healthy animals were chosen for this study.



Three parameters were calculated to arrive the draught ability *viz.,* Draft, Angle of pull and Speed (kilometer per hour)

(a) Draft. The methodology adopted for estimating the Values of the draft corrected for angle of pull (Cos **θ**) was calculated according to the method described by Dubey *et al*. (2007).

The methodology adopted for calculating various parameters for arriving the Horse Power is as follows

Draft calculation: Draft: Pull (in kilogram) × cos θ (Fig. 1).

(b) Angle of pull. The angle pull (Cos θ) was calculated from the values of height measured between ground level and central point of the yoke where yoke was placed and length (base) between forefront of the yoke was used and perpendicular point of height at ground. From these two values, the angle of pull was recorded which was explained below (Fig. 2 and 3)

(c) Speed (km/hr): The time taken to cover the distance of one starting point in the field to the end point of the field was recorded with the help of stopwatch.

Speed : Distance covered in meters (D)/Time taken in seconds(T) (from start point to end point)

Speed = D/T

(d) The values of the horse power were calculated as per Maurya and Devdattam (1982) formula.

Statistical analysis: Data on angle of pull draft, and speed was calculated in umblachery bullocks and from these values Horse Power was estimated. The mean comparison of Horse power estimated in different age groups were compared and analyzed with one way ANOVA using SPSS statistical package (version16.0)

RESULTS AND DISCUSSION

The estimated data and the calculated Horse power estimation in the field condition were presented in Table 1.

The average draft estimated in umblachery cattle in the present study was 28.40 ± 1.22 kgs. The obtained result was higher than the draft estimated in umblachery cattle with 27.5± 2.05 kgs (Kousalya *et al*., 2019). The average speed obtained in this study was 0.39 Meter per seconds. This was lesser in compared with the earlier report in Hariana bullocks 0.99 Meter per second (Devadattam and Maurya 1978) and 0.95±0.03 Meter per second in umblachery cattle (Kousalya *et al*., 2019). This may be due to the variation in the amount of distance covered by the animals chosen for the study in different ecological areas. Devi *et al*. (2017) reported that increased speed and horse power generated signifying the increased work efficiency of work bullocks. This may be due to the lesser body weight and short stature of umblachery bullocks when compared to Hariana bullocks.

The mean value of Horse Power generated in umblachery bullocks were 0.147HP. Which was approximately equivalent to 110watts. Since one HP is equivalent to 746watt. Ingle *et al.* (2016) reported that in Red kandhari breed of bullock pairs the horse power generated was 0.53 HP in road load condition. In ongole bullocks the HP generated was 0.57HP (Vinoo *et al.,* 2010). In kangeyam bullocks, Kumaravelu (1997) reported as 0.73HP. The less amount of Horse power estimated in umblachery cattle is due to the experiment or the study conducted in marshy land areas which was so hard to pull by the bullocks. This was supported by Bhattacharya and Singh (1987) reported that the DAP parameter is a complex trait which depends with soil type, external factors like draft, climate and moisture of the soil. Since in wet marshy land the Draught Animal Power (DAP) generated will be lower than the DAP study conducted in different environmental conditions. This was supported by Kousalya *et al.* (2017) reported that the heterogeneous environment in the study field will influence the difference of Horse Power Generation in draught animals. In comparison with the district level

Among all the age groups, highest horse power of 0.20 HP was estimated between 5 to 6years. Comparison between different age group was statistically analyzed by one way ANOVA and it was presented in Table 2. From the mean comparison it was observed that there is no significant difference between the age group of 3 to 4 years with 4-5 years and also there is a significant difference noticed between 3-4 years with 5-6 years.

This result was partly supported that there was no influence of age on speed or Horsepower as per Kousalya *et al*. (2019).

Fig. 1. Measurement of Draft – Pull in Kilograms in umblachery bullocks.

Fig. 2. Measuring vertical distance of the yoke with ground level for estimating the angle of pull.

Fig. 3. Measuring length between middle of the yoke with plough for estimating the angle of pull.

Table 1: The draft, speed pull gauge and Horse Power (HP) generated by umblachery bullocks during wet marshy land conditions.

Sr. No.	Age (years)	District	b value (metre)	c value (metre)	a value (metre) = square root of (c^2-b^2)	Cos θ=a/c	Pull Guage (kg)	Draft (D)	Speed (S) (in metre per second)	Horse power (HP)
1.	4-5	Thanjavur	0.81	1.12	0.77	0.69	37.50	25.74	0.38	0.1287
2.	4-5	Thanjavur	0.74	1.04	0.74	0.71	32.50	22.97	0.41	0.1241
3.	4-5	Tiruvarur	0.79	1.09	0.76	0.69	37.50	25.99	0.41	0.1414
4.	5-6	Tiruvarur	0.81	1.12	0.77	0.69	55.00	37.75	0.43	0.2174
5.	Less than 3	Thanjavur	0.91	1.22	0.81	0.66	35.00	23.15	0.33	0.1019
6.	4-5	Tiruvarur	0.91	1.24	0.84	0.68	38.50	26.10	0.44	0.1514
7.	Less than 3	Tiruvarur	0.91	1.22	0.81	0.66	40.00	26.46	0.19	0.0684
8.	Less than 3	Tiruvarur	0.88	1.19	0.79	0.67	32.50	21.73	0.35	0.1014
9.	4-5	Nagapattinam	0.84	1.09	0.70	0.64	45.00	28.85	0.31	0.1173
10.	5-6	Tiruvarur	0.74	1.04	0.74	0.71	50.00	35.34	0.44	0.2055
11.	3-4	Nagapattinam	0.74	1.04	0.74	0.71	37.50	26.51	0.51	0.1796
12.	5-6	Thanjavur	0.74	1.04	0.74	0.71	47.50	33.58	0.47	0.2100
13.	3-4	Nagapattinam	0.91	1.09	0.60	0.55	40.00	21.88	0.51	0.1482
14.	5-6	Nagapattinam	0.74	1.04	0.74	0.71	42.50	30.04	0.51	0.2035
15.	Less than 3	Nagapattinam	0.79	1.09	0.75	0.69	40.00	27.46	0.42	0.1526
16.	9-4	Tiruvarur	0.91	1.27	0.89	0.70	62.50	43.60	0.28	0.1610
17.	4-5	Nagapattinam	0.84	1.12	0.74	0.66	45.00	29.76	0.44	0.1730
18.	5-6	Thanjavur	0.74	1.04	0.74	0.71	50.00	35.34	0.39	0.1838
19.	5-6	Nagapattinam	0.91	1.22	0.81	0.66	50.00	33.07	0.44	0.1923
20.	Less than 3	Nagapattinam	0.88	1.19	0.79	0.67	52.50	35.10	0.23	0.1091
21.	3-4	Tiruvarur	0.81	1.14	0.80	0.70	37.50	26.37	0.31	0.1072
22.	3-4	Thanjavur	0.97	1.22	0.74	0.61	37.50	22.91	0.41	0.1246
23.	3-4	Thanjavur	0.91	1.27	0.88	0.69	27.50	19.08	0.55	0.1389
24.	Less than 3	Thanjavur	0.94	1.25	0.82	0.65	35.00	22.91	0.29	0.0891

Table 2: The mean Horse Power (HP) generated by umblachery bullocks under different age groups.

Sr. No.	Age (years)	Mean HP
1.	less than 2	0.103±0.02
2.	3 to 4	0.143±0.02
3.	4 to 5	0.139±0.02
4.	5 to 6	0.202±0.01

CONCLUSIONS

In modern era everyone is moving towards renewable source of energy and agriculture is not the exemption too. Livestock assist the farmers in all the farming operations and even after the inception of mechanization the contribution of draught animal power cannot be fully replaced. The total area coverage under farming system is more with DAP than the use of mechanized power. Implementation of cross breeding programme was one of the major cause for the declining nature of the indigenous cattle. The FAO consultation on draught animal (FAO, 1972) recommended that mass selection techniques can be used for draught characteristics and that selection be carried out within the environment in which the animals

are under work. Hence the urgent need to develop various parameters for evaluation of animals for draft power so that different breeds or livestock animals can be compared for the purpose of selection or for culling to go further in improvement of the indigenous animal numbers and its effective utilization for various activities. The horse power can be evaluated under carting in road with and without load will give a clear picture about the draught nature of this breed.

FUTURE SCOPE

The stock of 60 million working cattle and buffaloes were used for various agricultural operations, saving fossil fuel worth Rs 60 billion annually (GoI, 2007). Later on as per Sadana and Pundir (2010) the use of DAP saves the nation about 26 million tonnes of fossil fuel worth around Rs.180 million of foreign exchange. The draught animal renewable source of energy is one of the important thrust area in modern agriculture era. Hence new invention of farming tools for easing the agricultural operations to utilize the Draught Animal Power (DAP) may enhance the number of indigenous cattle population in India.

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Conflict of Interest. None.

REFERENCES

Agriculture 21 (2007). Draught Animals plough on. http://www.fao.org/AG/magazine/009spl.htm

Alex, R., Singh, U., Alyethodi, R. R. and Deb, R. (2013). A review on draught animal research in India: constraints and future thrust areas. *Adv. Anim. Vet. Sci., 1*(6), 178 – 182.

Bhattacharya, N. K. and Singh, K. (1987). Comparison of draftability of crossbred and indigenous cattle and variation in their physiological response during work. In: Utilisation and Economics of Draught Animal: eds. N.S.L. Srivastava and T. P. Ojha. CIAE publishing, India, 26-38.

Devadattam, D. S. K. and Maurya, N. L. (1978). Draftability of Hariana bullocks. *Indian J. Dairy Sci., 31*(2), 121-127.

Devi, M. K., Karthickeyan, S. M. K., Sivaselvam, S. N., Venkataramanan, R. and Tirumurugaan, K. G. (2017). Phenotypic and molecular genetic studies on draughtability in Umblachery breed of cattle. *J. Livestock Biodiversity, 7,* 1-7.

Dikshit, A. K. and Birthal, P. S. (2010). Environmental Value of Draught Animals: Saving of Fossil–fuel and Prevention of Greenhouse Gas Emission *Agr. Econ. Res. Rev., 23,* 227–232

Dubey, D. D., Meenu Dubey, Tiwari, S. P. and Rajagopal, S. (2007). Effect of different plane of nutrition on draughtability, energy balance, physiological and haematological attributes of non-descript bullocks. *Indian Journal of Animal Sciences, 77*(5), 417-419.

FAO (1972). The employment of draught animals in agriculture. Food and Agriculture Organisation of the United Nations (FAO), Rome, Italy.

FAO (2010). Draught Animal Power: An Overview. Agricultural Engineering Branch, Agricultural Support Systems Division. Available from http://www.fao.org/ag/AGS/agse/chapterPS1/ChapterPS1 - e.htm

GoI-Government of India (2007). Report of the Working Group on Animal Husbandry and Dairying for the XI Five-Year Plan 2007-12. Planning Commission, New Delhi

ICAR- Extension bullet in 2001 : Anonymous: Annual Reports of All India Coordinated Research Projects on increased Utilization of Animal Energy with enhanced system efficiency, Indian Council of Agricultural Research, New Delhi.

Ingle, V. S., Sidiqqui, M. S., Channa, G. R. and Kankarne, Y. G. (2016). Comparative studies on draft performance of Red Kandhari bullock with pneumatic and iron bullock car, *50*(2), 152-155.

Kousalya, D. M., Karthickeyan, S. M. K., Venkataramanan, R., Sivaselvam, S. N. and Tirumurugaan, K. G. (2017). Phenotypic and molecular genetic studies on draughtability in Umblachery breed of cattle. *Journal of livestock bio diversity, 7*(1), 1-7

Kousalya, D. M., Karthickeyan, S. M. K., Venkataramanan, R., Sivaselvam, S. N. and Tirumurugaan, K. G. (2019). Influence of Ageing and Regional Differences on Draught Performance of Umblachery Cattle. *Ind J Vet Sci and Biotech, 15*(2), 41-44.

Kumaravelu, N., Thomas, C. K. and Sreekumar, D. (1997). Farm work performance of Kangayam bullocks in two locations. *Indian Veterinary Journal, 74,* 951-954.

Maurya, N. L. and Devadattam, D. S. K. (1982). Work performance of crossbred bullocks. *Indian Journal of Dairy Science, 35*, 26-30.

Omoding, J. O. Y. and Odogola, W. R. (2002). Development of animal traction, conservation agriculture and rural transport in the context of modernising agriculture in Uganda: policy and strategy. International Workshop Report on Modernizing Agriculture Visions and Technologies for Animal Traction and Conservation Agriculture.

Sadana, D. K. and Pundir, R. K. (2010). Draught Animal Power OF Indigenous Cattle Breeds, The Indian Cow: April to June, 66-69

Singh, G. (1999). Characters and use of draught animal power in India. *Indian Journal of Animal Sciences, 69,* 621-627.

Singh, S. V., Upadhyay, R. C. and Parveen Kumar (2007). Effect of carting on physiological and pulmonary dynamics in Haryana bullocks during summer and winter season. *Indian Journal of Animal Science, 60,* 202-205.

Taneja, V. K. (2011). Report of the working group on animal husbandry & dairying 12th Five Year Plan (2012-17), Submitted to Planning Commission Government of India, New Delhi.5-18

Thangaraju, P., Nainar, A. M. and Rajendran R. (2001). Umblachery – A renowned draught cattle of tamilnadu. Proceedings of the Workshop on Indigenous Cattle and Their Role in the New Millennium, March 24-25, 2001, Erode, Tamilnadu, India, 13-19.

Vinoo, R., Rao, G. N., Ramesh Gupta, B. and Babu Rao, K. (2010). Estimation of Draught ability of Ongole bullocks by different methods. *Tamilnadu J. Vet. & Anim. Sci., 6*, 24-30.

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