STUDIES ON CARTING PERFORMANCE OF RED KANDHARI BULLOCKS AT DIFFERENT PAYLOADS

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Abstract: The importance of livestock in India is based on their production both in terms of milk and draft. Bullocks are considered to be the major source of draft power in Indian villages performing various agricultural operations including carting. Marathwada region of Maharashtra state has one pride breed of cattle i.e. Red Kandhari. The present study was undertaken with objective to study draft generated, speed and Horse Power generated during carting by Red Kandhari bullocks at different pay loads. The pairing of bullocks was done at the time of their selection with minimum difference in age, body weight and body measurements. The observations of draft and speed were recorded at different payloads of 500, 750 and 1000 Kg gunny bags containing 50 Kg grains. The observations of pull exerted by bullocks in Kg were recorded during carting by using digital dynamometer of 200 Kg capacity which was joined at central beam of the bullock cart with the help of rope joining the yoke and the base of the cart. In the present study, the overall mean draft generated (Kg), speed covered (Km/hr) and horse power generated (HP) by Red Kandhari bullock pairs A and B during carting were found to be 55.43 ± 0.94 and 53.38 ± 0.86, 5.53 ± 0.07 and 5.60 ± 0.08 and 1.12 ± 0.09 and 1.09 ± 0.01, respectively for different payloads of 500, 750 and 1000 Kg.

Keywords- Carting, Draft, Dynamometer, Horse Power, Payload, Red Kandhari, Speed

Introduction: The importance of livestock in India is based on their production both in terms of milk and draft. Bullocks are considered to be the major source of draft power in Indian villages performing various agricultural operations including carting. With regards to transportation, 68 percent of goods are handled by bullock carts in India (Ramaswamy *et al.* 1982). Marathwada region of Maharashtra state has one pride breed of cattle i.e. Red Kandhari. The females of this breed are low yielders while males are heavier in body size, stout and compact and used for all the agricultural operations. Considering strengths of this breed as draught purpose breed, the present study was undertaken with objective to study draft generated, speed and Horse Power generated during carting by Red Kandhari bullocks at different pay loads. One common bullock cart of iron frame structure with 295 Kg weight and wheels was used on tar road for both the bullock pairs for carting.

Material and Method: The present study was undertaken on Red Kandhari Research and Instructional Farm, College of Veterinary and Animal Sciences, MAFSU, Parbhani. Two healthy bullock pairs of 5 to 7 years age, were selected for the present investigation. In selecting the animals, more emphasis was given on body weight, age and body measurements. The pairing of bullocks was done at the time of their selection with minimum difference in age, body weight and body measurements. All the experimental animals were housed in comfortable animal sheds under hygienic conditions with standard uniform feeding and managemental practices. One common bullock cart of iron frame structure and wheels was used on tar road for both the bullock pairs for carting. The weight of the bullock cart was 295 Kg and weight of cart man was 60 Kg. The observations of draft and speed were recorded at different payloads of 500, 750 and 1000 Kg gunny bags containing 50 Kg grains. The operation of carting was performed in the month of May for 05 consecutive days.

The observations of pull exerted by bullocks in Kg were recorded during each operation by using digital dynamometer of 200 Kg capacity. The dynamometer was joined at central beam of the bullock cart with the help of rope joining the yoke and the base of the bullock cart so as to record the draft pull during the carting operation. The draft exerted by the bullocks to pull the cart was depicted on dynamometer in terms of Kg. The observations were recorded every half an hour interval and 8 observations in four hours were considered for average draft required for each carting operation with different payload for that particular day of experiment.

The values of the draft corrected for Angle of Pull (Cos A) were computed according to the method described by Dubey *et al.* (2007) from equation 1 and 2.

$$\text{Cos A} = \frac{X}{Y} \text{ ---------- (1)}$$

Where,

X = Base line of the implement in cm

Y = Hypotenuse line of the implement in cm

The draft (D) was calculated by formula

$$D = P \times \text{Cos A} \text{ ----------(2)}$$

Where,

D = Draft in Kg

P = Average pull exerted in Kg as recorded by dynamometer.

The speed in Kmph was computed by following equation.

$$S = \frac{L \times 3.6}{T}$$

Where, S = Speed in Kilometer per Hour
L = Distance moved or travelled in meter.
T = Time required to cover the distance.
3.6 = Conversion factor for Kmph.

The horse power values were computed as per Maurya and Devdattam (1982) formula.

$$HP = \frac{D \times S}{75}$$

Where, HP = Horse Power
D = Draft developed in Kg
S = Speed in Meter per Second

Results and Discussion: The draft (Kg) generated, speed (Km/hr) and Horse Power (HP) generated for carting at different payloads by Red Kandhari bullock pairs A & B are presented in Table 1.

The overall mean draft (Kg) generated by Red Kandhari bullock pairs during carting operation for bullock pair A were 46.18, 55.95 and 64.17 for carting payloads of 500, 750 and 1000 Kg, respectively with an overall mean for all payloads as 55.43 ± 0.94. Similarly, for the bullock pair B overall mean draft (Kg) generated were 44.80, 51.90 and 63.44 for carting payloads of 500, 750 and 1000 Kg, respectively with an overall mean for payloads as 53.38 ± 0.86. These findings could suggest that Red Kandhari bullocks have more traction power for carting and hence they require less draft (Kg) for higher payloads.

The overall mean speed (Km/hr) during carting by Red Kandhari bullock pair A was 6.04, 5.46 and 5.08 for 500, 750 and 1000 Kg payloads, respectively with an overall mean of 5.53 ± 0.07. Similarly, for bullock pair B, the overall mean speed (Km/hr) was 6.22, 5.53 and 5.07 for carting payloads of 500, 750 and 1000 Kg, respectively with an overall mean for payloads as 5.60 ± 0.08. These findings are in close agreement with the findings quoted by Yawlikar (2001). This may lead to the conclusion that the increasing payloads and speed are inversely related to each other.

The overall mean Horse Power (HP) generated during carting by Red Kandhari bullock pair A was 1.03, 1.13 and 1.20 for 500, 750 and 1000 Kg payloads, respectively with an overall mean as 1.12 ± 0.09. Similarly the mean Horse Power generated by Red Kandhari bullock pair B was 1.03, 1.06 and 1.19 for 500, 750 and 1000 Kg payloads, respectively with an overall mean as 1.09 ± 0.01. These findings are comparatively higher than the findings reported by Yawlikar (2001) for Red Kandhari and Deoni bullock pairs.

Table I:- Carting draftability performance of Red Kandhari bullocks at different pay loads

Payloads/ Draftability Traits	L_1 (500 Kg)	L_2 (750 Kg)	L_3 (1000 Kg)	Mean ± SE
Draft (Kg)				
Pair A	46.18	55.95	64.17	55.43 ± 0.94
Pair B	44.80	51.90	63.44	53.38 ± 0.86
Speed (Km/hr)				
Pair A	6.04	5.46	5.08	5.53 ± 0.07
Pair B	6.22	5.53	5.07	5.60 ± 0.08
Horse Power (HP)				
Pair A	1.03	1.13	1.20	1.12 ± 0.09
Pair B	1.03	1.06	1.19	1.09 ± 0.01

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