

# Performance evaluation of untreated, untreated thick and treated hoof shoes for bullocks

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■ **ABSTRACT** : The performance evaluation of untreated, untreated thick and treated hoof shoes fixed to bullocks for carting work was carried out in Raichur region. The experiment on different types of hoof shoes fixed to the bullocks was carried out for 28 days to assess the wear and tear in terms of weight and thickness of hoof shoes. The weight loss of untreated hoof shoe was found to be 15.8 per cent. The average wear loss of treated hoof shoe was found to be 11.68 per cent. The wear loss in thickness of untreated thick hoof shoes was found to be 12.58 per cent. The wear loss in weight was found to be 14.53 per cent. The wear loss in thickness of treated hoof shoe was found to be 29.15 per cent. The total cost of untreated, untreated thick and treated hoof shoes including the labour charges were Rs. 95, Rs. 102 and Rs. 151 per pair, respectively. The total cost incurred in hoof shoeing in a year for untreated hoof shoes, untreated thick hoof shoes and treated hoof shoes were Rs. 1239, Rs. 1064 and Rs. 1081, respectively. The feedback information on use of different hoof shoes was collected and it revealed that due to the non-availability of sophisticated technology for hardening treatment on hoof shoes, bullock cart operators preferred to use untreated hoof shoes. The untreated thick hoof shoes were accepted as an alternate by the farmers as they can be locally fabricated and also there was a saving in cost and lesser number of shoeing.

■ **KEY WORDS** : Hoof shoes, Bullock, Carting, Wear loss

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The work performed by draft animals includes both field work as well as transport. It is estimated that there are 35 million animal drawn vehicles (ADV) in the third world. India alone has 15 million of these vehicles and two thirds of rural transportation in India is carried out by animal drawn vehicles (Anonymous, 2006).

The animals with hooves such as bullocks and buffaloes engaged in road transport work exclusively or in addition to crop production operation in agricultural fields there always exists the problem of wear and tear of the hooves leading to injures and bleeding. The problem is particularly severe for animals that are used as a source of transport in semi-urban and urban areas on murrum and asphalted roads. For animals engaged exclusively in field operations, the problem is not so severe and one hardly sees any fitting of hoof shoes in such areas. It is also noted that animals that are quite young and those that are rather old are more vulnerable to the problem of wear of hooves. The hoof shoeing technology plays an important role when the bullocks are engaged for

transportation purpose for carrying the goods. Smooth and efficient transportation is only possible when bullocks are shod properly. Shoeing prevents the hemorrhage in the hoof wall. The farmers normally use local hoof shoes for bullocks during the carting operation for transporting goods. The strength, durability and service life of hoof shoes mainly depends upon material of construction and road conditions. In different parts of the state, depending on the body weight of the animals and the amount of load they transport at a time, carrying capacity of the carts etc., there prevail different designs, shapes and thickness of hoof shoes. The working life of the hoof shoes also varies in different regions depending upon their original specifications, (particularly their thickness) the load pulled by the bullocks and the road conditions.

## ■ METHODOLOGY

A survey was carried out in Raichur region of Karnataka, to assess the use of traditional hoof shoes which are fixed

to bullocks. The data pertaining to age of bullock, weight of bullock, distance of travel per trip, number of trips in a day, weight of hoof shoe, replacement period were recorded. Ten bullock cart operators were selected for a representative survey out of a total of more than 300 bullock cart operators in APMC yard at Raichur. The operators were selected at random.

General information regarding the bullock powered transport sector was also collected regarding the number of transport sector bullocks in Raichur, in different age groups and the percentage of animals fixed with hoof shoes.

The locally available hoof shoes which were hardened at Pantnagar were used as treated hoof shoes for carrying out the experiment. The untreated, untreated thick and treated hoof shoes were fixed to the right and left legs of the bullocks selected for study in order to assess the performance of the hoof shoe in terms of wear and tear. The physical dimensions of hoof shoes were measured, marked and the same were fitted to the bullocks. The details of wear and tear in terms of thickness and weight were recorded and assessed for the period of 28 days. The data on hoof shoes were analysed for making the comparison between untreated, untreated thick and treated hoof shoes.

## ■ RESULTS AND DISCUSSION

The result of the representative survey of the bullocks used in the animal powered transportation sector of Raichur is given in Table 1. The data pertains to the body weight of

the animals, the average number of trips undertaken per day, the average distance traveled and the hoof shoe replacement interval.

General information regarding the bullock powered transport sector was gathered regarding the number of transport sector bullocks in Raichur, in different age groups and the percentage of animals fixed with hoof shoes and the same is presented in Table 2.

It is observed (Table 2) that 17.24 per cent bullocks used in the transport sector were in the age group of 5-6 years and 32.95 per cent bullocks belonged to the age group of 6-8 years. The survey work revealed that the training of the bullocks for transportation work starts at the age of 5 years and then the animals are ready to start regular work. As the age of animal increases, the need for hoof shoeing also increases.

### Performance of treated, untreated and untreated thick hoof shoes:

Performance of treated, untreated and untreated thick hoof shoes fixed to bullock for carting work in Raichur region is presented in Table 3. The thickness and weight of treated, untreated and untreated thick hoof shoes were measured and noted. The experimental period was fixed to 28 days.

It was observed that the average weight of untreated hoof shoe before use was found to be 43 g. At the end of experimental period the weight of untreated hoof shoe after

**Table 1: Survey on use of bullock carts for transportation at Raichur**

Sr. No.	Name of bullock cart user	Body weight of bullock (kg)	Distance of travel/trip (km)	No. of trips in a day	Life of traditional hoof shoe period (day)
1.	Rangappa	310	4-5	2-3	30-35
2.	Ramanna	325	5-6	3-4	25-30
3.	Anwar Khan	425	3-4	4-5	25-28
4.	Mahesh	290	5-6	4-5	26-28
5.	Ramachandra	315	2-3	2-4	26-32
6.	Chandrappa	385	4-5	5-6	25-35
7.	Mallesh	435	4-6	3-5	30-36
8.	Gopal	298	4-5	3-6	25-32
9.	Yankappa	285	2-5	4-8	30-32
10.	Tayappa	355	4-6	4-10	25-34

**Table 2 : Traditional hoof shoes used on bullocks of different age groups in Raichur**

Sr. No.	Age groups of bullocks (Year)	No. of bullocks	Bullock age group (%)	No. of animals fitted with traditional hoof shoes	Percentage of animals in each category
1.	5-6	45	17.24	18	40.00
2.	6-8	86	32.95	22	25.58
3.	8-10	78	29.88	23	29.49
4.	10 above	52	19.93	15	28.85
	Total	261	100.00	--	--

**Table 3 : Performance of untreated, untreated thick and treated hoof shoes fixed to the bullocks of Raichur region**

Sr. No.	Parameters	Bullock cart operators		
		Untreated hoof shoes	Untreated thick hoof shoes	Treated hoof shoes
		Av.	Av.	Av.
1.	<b>Av. weight of hoof shoes (g)</b>			
	Before use	43	53.62	46.55
	After use	36.2	45.82	41.13
	Per cent of weight loss	15.81	14.53	11.68
2.	<b>Av. thickness of hoof shoes (mm)</b>			
	Before use	5.25	5.39	3.5
	After use	3.25	4.70	2.5
	Per cent of wear loss	37.08	12.58	29.15
3.	Replacement interval period, days	28	35	51
4.	Cost of hoof shoeing, Rs.	95	102	151
5.	No. of shoeing in a year	13	10.43	7.16
6.	Per cent of hoof shoeing reduced with respect to traditional	--	25.0	44.92

use was found to be 36.2 g. The percentage of weight loss of untreated hoof shoe was 15.81 per cent. In case of untreated thick hoof shoes, the average initial weight and final weight after use were found to be 53.62 g and 45.82 g, respectively. The average per cent of wear loss of untreated hoof shoes was found to be 14.53 per cent. In case of treated hoof shoe, the average initial weight and final weight after use were found to be 46.55 g and 41.13 g, respectively. The average per cent wear loss of treated hoof shoe was found to be 11.68 per cent.

In case of untreated hoof shoe, the average thickness before use and after use was found to be 5.25 mm and 3.25 mm, respectively. The wear loss in thickness of untreated hoof shoe was found to be 37.08 per cent. In case of untreated thick hoof shoes, the average thickness before use and after use was 5.39 mm and 4.70 mm, respectively. The wear loss in thickness of untreated thick hoof shoes was found to be 12.58 per cent. The frequency of hoof shoeing of untreated thick hoof shoes was reduced to an extent of 25 per cent. In case of treated hoof shoes, the average thickness before use and after use were found to be 3.5 mm and 2.5 mm, respectively. The wear loss in thickness of treated hoof shoe was found to be 29.15 per cent. The life of treated hoof shoe

increased to an extent of 7.93 per cent over traditional untreated hoof shoe due to the hardening treatment with powder coating. The number of shoeings of untreated hoof shoes in a year was found to be 13.04 times when compared to 7.16 times for treated hoof shoes. The life of treated hoof shoes increased due to coating of powder by hardening process. The frequency of hoof shoeing of treated hoof shoe was reduced to an extent of 44.92 per cent. Due to this, the injury/pain which may occur to the hoof is reduced.

The economics of use of treated hoof shoe, untreated thick hoof shoe and untreated hoof shoes is presented in Table 4.

From Table 4, the data revealed that the total cost of untreated hoof shoe including the basic material and labour charges was found to be Rs. 95 per animal pair. The net cost of untreated thick hoof shoes was found to be Rs. 102 per bullock pair. The net cost of treated hoof shoe was found to be Rs. 151 per bullock pair. The effect of duration of work on the wear of untreated hoof shoe was very high and the shoes were replaced after 28 days of work. The frequency of shoeing in a year for untreated and treated hoof shoes were 13.04 times and 7.16 times, respectively. The cart operator is spending an amount of Rs. 1239 on bullock pair

**Table 4 : Economics of untreated, untreated thick and treated hoof shoes**

Sr. No.	Particulars	Untreated hoof shoe	Untreated thick hoof shoe	Treated hoof shoe
1	Cost of basic materials (mild steel) for hoof shoes	60	67	60
2	Cost of hardening, Rs.	--	--	56
3	Cost of hoof shoeing (labour charges), Rs.	35	35	35
4	Total net cost, Rs.	95	102	151
5	Replacement period, days	28	35	51
6	No. of shoeing per year	13.04	10.43	7.16
7	Net expenditure, Rs.	1239	1064	1081
8	Net saving, Rs.	--	175	158

every year for fixing of untreated hoof shoes. Due to the increased life period of the treated hoof shoes, the cart operator is spending an amount of Rs. 1081 on animal pair per year.

The feed back information on hardened hoof shoe were collected and interpreted. The bullock cart operators felt that the life period of treated hoof shoe is increased but the technology for treatment of hoof shoes with surface hardening in rural areas is not available. The sophisticated workshop facilities and the initial investment for blow torch and other accessories is costly. In village level, the technical training on hardening process is essential. The hardened hoof shoe has given better result in reducing the wear loss and also the net saving in cost was found to be Rs. 158 per year when compared to untreated hoof shoes. The untreated thick hoof shoes were found to be an alternative which can easily be fabricated locally and also the number of shoeings were 10.43 per year which is lesser than the traditional untreated hoof shoes. Also there was a net saving of Rs. 175.00 compared to local method.

#### Conclusion :

The conclusions drawn from the study were; the survey work on use of untreated hoof shoe in Raichur indicated that 17.24 per cent bullocks used in transport sector were in the age group of 5-6 years and 32.95 per cent bullocks belonged to the age group of 6-8 years. The experiment on untreated and treated hoof shoes fixed to the bullocks was carried out for 28 days to assess the wear and tear in terms of weight and thickness of hoof shoes. The average weight of untreated hoof shoe before use and after use were found to be 43 g and 36.2 g, respectively. The per cent of weight loss of untreated hoof shoe was found to be 15.8 per cent. In case of treated hoof shoes, the average weight of hoof shoe before and after use were found to be 46.55 g and 41.13 g, respectively. The average per cent wear loss of treated hoof shoe was found to be 11.68 per cent. In case of untreated hoof shoe, the average thickness before use and after use was found to be 5.25 mm and 3.25 mm, respectively. The per cent of wear loss in thickness of untreated hoof shoe was found to be 37.08 per cent. In case of untreated thick hoof shoes, the average thickness before and after use was

found to be 5.39 mm and 4.70 mm, respectively. The per cent of wear loss in thickness of untreated thick hoof shoes was found to be 12.58 per cent. In case of untreated thick hoof shoes, the average weight before and after use was found to be 53.62 g and 45.82 g, respectively. The per cent of wear loss in weight was found to be 14.53 per cent. The average thickness of treated hoof shoe before use and after use was found to be 3.5 mm and 2.5 mm, respectively. The per cent of wear loss in thickness of treated hoof shoe was found to be 29.15 per cent. The life period of treated hoof shoe increased by 7.93 per cent when compared to traditional untreated hoof shoe due to surface hardening treatment with powder coating. The number of shoeing in a year for untreated hoof shoe and treated hoof shoes was found to be 13.04 times and 7.16 times, respectively. The hardened treated hoof shoes has given better results in terms of reducing the loss in weight and thickness. The total cost of untreated, untreated thick and treated hoof shoes including the labour charges were Rs. 95, Rs. 102 and Rs. 151 per pair, respectively. The total cost incurred in hoof shoeing in a year for untreated hoof shoes, untreated thick hoof shoes and treated hoof shoes were Rs. 1239, Rs.1064 and Rs. 1081, respectively. The feed back information on use of treated hoof shoes was collected and it revealed that the life period of treated hoof shoes was increased but the technology involved in hardening by powder coating in village level was difficult and costly. Due to the non-availability of sophisticated technology for hardening treatment on hoof shoes, bullock cart operators preferred to use untreated hoof shoes. The untreated thick hoof shoes were accepted as an alternate by the farmers as they can be locally fabricated and also there was a saving in cost and lesser number of shoeing.

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