ALLAHABAD YOKE
- A SUCCESS STORY

All INDIA COORDINATED RESEARCH PROJECT ON INCREASED UTILIZATION OF ANIMAL ENERGY WITH ENHANCED SYSTEM EFFICIENCY
Central Institute of Agricultural Engineering
Nabibagh, Berasia Road, Bhopal – 462 038
Madhya Pradesh, India

Extension Bulletin No. CIAE / UAE / 2013 / 91

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Year	:	2013
Published by	:	**Coordinating Cell** **AICRP on Increased Utilization of Animal Energy with Enhanced System Efficiency** Central Institute of Agricultural Engineering, Nabi Bagh, Berasia Road, Bhopal – 462 038, India
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Introduction:

The power of the draught animals is transmitted to the implements through a rigid yoke or flexible straps/ropes. The rigid yoke is tied to the horn or the animal head and placed on the neck withers. Yoke is an important component of animal implement system and plays a vital role in transfer of power generated through muscles of draught animals. The animals use their neck, shoulder or breast through yoke to pull the implement or cart.

There are many traditional designs of yokes in use for bullocks, but generally farmers use local yokes fabricated by local artisans. The yokes used in different parts of the country are similar in design and other features, except variations in dimensions of yoke, material of fabrication (type of wood) and shape of yoke to suit geometry of bullock's neck and hump. Artisans in villages fabricate the yoke and there is no standard process adopted by these artisans for its fabrication. Due to crude design of local yoke, it rubs against the neck and hump of bullocks in a very small area of contact, causing intense pain. Further, it has also been observed that local yokes used by the farmers, frequently tilts along its lower edge causing deep and painful impressions at neck and upper portion of hump.

It was observed, that, during the work, local yoke tilts along their lower edge and the loose contact with hump and neck causes reduction in contact area and frequent transfer of force along the edge. This in turn, results in increased vertical load on the neck. Transfer of force with reduced contact area increases pressure on animals. In view of the above, use of properly designed yoke becomes very important to obtain optimum work output from animals and is closely associated with comfort and pulling ability of animals during work. All these observations were recorded for quite a long time and consistent efforts made to reduce such detrimental effects on animals by continuously working to improve the yoke. The resulted in design of an improved yoke named as **Allahabad yoke.**

Evolution of technology:

The idea for development of an improved yoke to suit the natural curves available between bullock's neck and hump came up after observing, that the local yokes got tilted during work and their contact with the bullocks neck and hump got reduced. These yokes do not utilize properly the natural curve available in between neck and hump of the animal during work. Considering this aspect, it was decided to develop a yoke, which can fit well with the natural contours of bullocks hump and neck and can have a perfect contact with the bullock's neck and hump. Under these considerations, the curvature between neck and hump of both the bullocks (left and right) were obtained. This has been shown in Fig 1 and 2. The average curvature between neck and hump was determined and this was adopted for design of the yoke. To take care of these curves, a slope of 16^0 was provided in that part of the yoke which rests on hump and 18^0 slope was provided on that part of yoke which rests on the neck. A reverse slope of 45^0 was provided at the top edge of the yoke. Thus design of first prototype of yoke was completed with three slopes as mentioned.

During the trials of first prototype of the developed yoke, it was observed that yoke slips upward along the hump due to impact of muscle movement on the yoke. This movement was considered undesirable and further modifications were made in the design. In the second prototype of the yoke, the 16^0 slope was changed to 11^0 to take care of upward slippage of yoke along the hump. The testing of final prototype was carried out at the University farm. It was seen that due to the above modification, the upward slipping of yoke was not observed.

Salient features of Allahabad yoke

The Allahabad yoke designed and developed at SHIATS has three slopes at the surfaces which come in contact with the hump and neck of bullocks so as to negotiate in a better way with the natural curve available between hump and neck of bullocks during work. It has a slope of 11^0 in vertical direction, in that part of yoke, which rests on hump. A slope of 18^0 degree has been provided in that part of yoke, which rests on neck. A reverse slope of 45^0 has been provided at the top edge of the yoke, which rest on

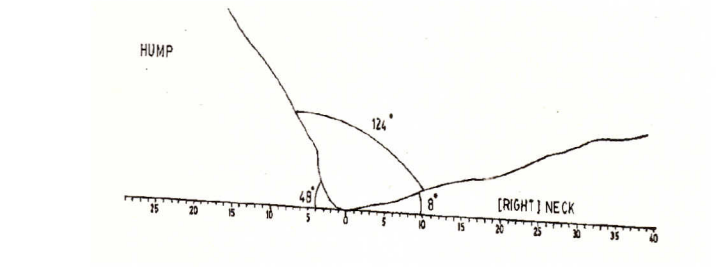


Fig 1. Average slope of hump and neck of right bullocks found in Allahabad region

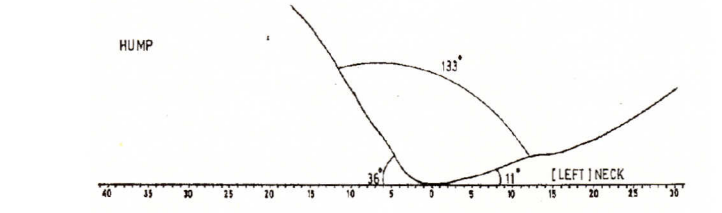


Fig 2. Average slopes of hump and neck of left bullocks found in Allahabad region.

upper portion of hump. The three slopes provided in the yoke reduce tilting of the yoke along the neck, reduces rubbing action along the neck and hump, thus providing extra comfort and increased pulling ability. The yoke is made of Lasoda wood, which is locally available. The Lasoda wood used for fabrication of Allahabad yoke is light in weight, it has less fiber and has a very smooth surface. In addition it posseses enough tension and compressive strength to overcome heavy pulling force. The Allahabad yoke is available in two sizes to accommodate the bullocks of different body size. The specifications of yoke are given in Table 1. The yoke is shown in Fig 3. The design drawings are shown in Fig 4. The yoke is very light in weight and its weight is less than local yoke, which results in less vertical load on the neck of bullocks. Due to its design, it fits well with the neck and hump of bullock and is very comfortable to bullocks.

Fig 3.Allahabad Yoke

Table 1. Brief specifications of Allahabad Yoke.

S. No	Parameter	Details	
1	Overall Length, mm	Small size	1250
		Large size	1440
2	Cross section, mm	125x75	
3	Length of curvature, mm	300	
4	Height of curvature, mm	125	
5	Weight, kg	Small size	4.30
		Large size	4.75
6	Cost, Rs	750.00	
7	Material of construction	Lasoda wood.	

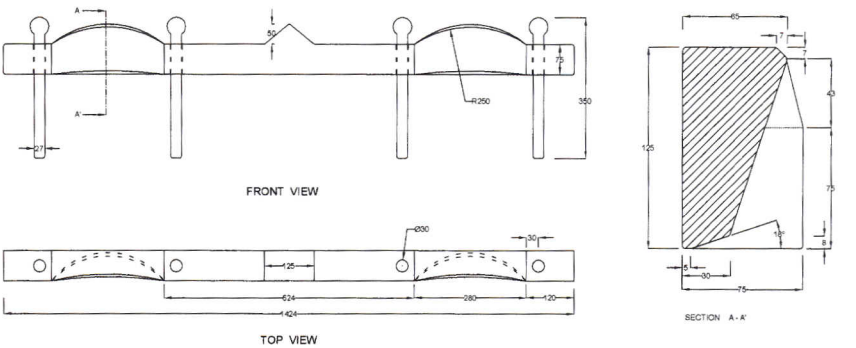


Fig 4. Design details of Allahabad yoke developed at SHIATS.

Performance Evaluation of Allahabad yoke

The performance evaluation of Allahabad yoke was carried out using CIAE animal loading car on a test track. The testing of yoke was carried out at different draft loads. The study revealed that the yoke had 38% more contact with neck and hump of bullock as compared to the Nagpuri yoke, which resulted in reduced pressure and increased comfort to animals during the work. In Allahabad yoke, the frequency of tilting of yoke along its edge was also less as

Fig 5. Allahabad yoke in use.

compared to local yoke and Nagpuri yoke. Local yoke and Nagpuri yoke had a continuous rubbing action on neck and hump, which was not observed in case of Allahabad yoke. The Allahabad yoke had contact with hump and neck for longer duration of work (89%) as against 67% in case of Nagpuri yoke.

Above features of Allahabad yoke has resulted in increased comfort of animals during work. Allahabad yoke gave better performance in comparison to Nagpuri yoke as under:

Increase in area of contact	:	38%
Reduction in pressure	:	28.5%
Increase in speed of operation	:	7.4%
Increase in contact period	:	32.8%

Popularization of the Allahabad yoke:

After completion of design and testing of Allahabad yoke, Front Line Demonstrations of the yoke was carried out with a view to building up awareness among farmers as regards the improved technology. Under this programme the working of yokes was demonstrated to the farmers and yokes were distributed among group of farmers for long term use. Feedback of the farmers was obtained. This programme was conducted during 1998-2000 in five villages with 32 farmers. The important feedback obtained were as follows:

(i) Farmers suggested fabrication of yoke in two different sizes to suit small and large size of bullocks.

(ii) Although the farmers were interested to purchase the yoke, however they showed hesitation in purchasing it due to the higher cost as compared to the local yoke. Therefore a process was evolved with the intervention of the Centre by which the farmer purchased the wood himself and got the yoke fabricated though local village artisan who was trained by the Centre. The fabication charges for fabrication of this yoke was fixed by the Centre.

(iii) Farmers found the yoke useful, comfortable to bullocks during work. All the farmers observed reduction in injury, increase in comfort.

The yoke was displayed through a number of farmers fair regularly

throughout the country. The Centre also developed linkages with several KVK's, NGO's and other organizations. Some of the KVKs with whom linkages were developed were KVK Basti, KVK Etawah, KVK Awagarh and KVK Varanasi. The Centre also developed linkages with Indian Cattle Resource Development Foundation, New Delhi.

Training of local artisans for mass adoption:

Due to the awareness crteated as regards the benefits of the Allahabad yoke, there was a demand for the yoke from many regions of the country. Initially the Allahabad yoke was fabricated and sold by the Centre. However with increase in demand, it was not possible for the Centre to fabricate and supply the yokes. For easy availability of yoke, it was decided to train local artisans. Total 22 local artisans have been trained so far. For precise fabrication of yoke, templates were provided to these local artisans. The names of 12 of the artisans is given in Table 2. Besides local artisans trained by the Centre, KVK Awagarh also trained a few local artsans. It was also found that many more artisans are fabricating the yoke at their own initiative to fulfill the demand of their area without any intervention of the Centre.

Commercialization of Allahabad Yoke:

After completion of the training, all the local artisans started fabricating the yokes on demand. There are at least twenty two local artisans who are fabricating the yoke on demand located in different blocks of Allahabad, district of Uttar Pradesh. Many of these artisans have passed on the technology to other artisans who have also started fabrication of the yokes. In Kaushambhi district, the local KVK demonstrated the yoke and at present two artisans in the district are fabricating the yoke. Similarly KVK Etah has trained one village artisan as regards fabrication of the Allahabad yoke. During a recent survey it was found that many more artisans are fabricating the yoke at their own initiative to fulfill the demand of their area without any intervention of the Centre.

Adoption of Allahabad yoke:

In Allahabad district, a sample survey of 8 villages showed that many farmers have adopted the Allahabad yoke even without any efforts of the Centre. Many of these farmers heard about the benefits of the yoke from

Table 2. Sample list of a few Village Artisans trained for fabrication of Allahabad yoke.

S. No	Name of local artisan	Address
1	Shri Prahlad Vishwakarma.	Village Dandi, Rewa Road, Allahabad.(U.P.)
2	Shri Suresh Vishwakarma.	.....do.....
3	Shri Gulab.	Chaka block, Rewa Road, Allahabad.(U.P.)
4	Shri Sri Chand.	Village Dadri, opp. Chaka block, Allahabad. (U.P.)
5	Shri Ram Sanehi.	Village Shimrapura, Allahabad. (U.P.)
6	Shri Ram Lal.	Deeha Bazar, Mirzapur road, Allahabad.(U.P.)
7	Shri Ashok.	Bari ka pura, Mirzapur road, Allahabad.(U.P.)
8	Shri Takhan.	Village Lasahi, Karma Bazar, Allahabad.(U.P.)
9	Shri Gulab Vishwakarma.	Village Dhuvian, Mirzapur road, Allahabad (UP)
10	Shri Raja Ram.	Village Khapatia, Jari bazar, Allahabad.(UP)
11	Shri Jeevan lal.	Awagarh district Etah,(UP)
12	Shri Ram Swaroop.	District Kaushambhi.(U.P.)

famers of other villages and they approached the local artisan to get them fabricated by the local artisans. The farmers themselves made efforts to contact artisans trained by the Centre. After getting one unit fabricated from these artisans, they have shown the unit to their local artisan in the village for fabrication. In this way it has multiplied. Later, when these artisans were located, the Centre gave training to these artisans also. Local artisans also reported that farmers from nearby districts ie Mirzapur, Rewa, Kaushambhi etc. got the yoke fabricated through them. Table 3 gives the name of few farmers who have purchased the Allahabad yoke. It is estimated that at least 1000 farmers have adopted the Allahabad yoke.

Table 3. Sample list of farmers who adopted the Allahabad Yoke.

Vill. Sanai ka pura
Sh. Vijay Kumar.
Sh. Ram Milan.
Sh. Ram Dayal.

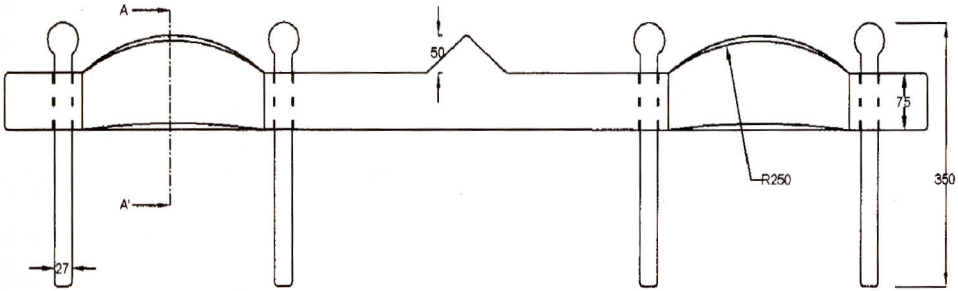
Vill. Dabhaon
Sh. Shiv Murat.
Sh. Anil.
Sh. Bhairo Lal.
Sh. Ram Sumer.
Sh. Deena Nath.
Sh. Krishbna Avatar

Vill. Dadari
Sh. Vijay Bahadur
Sh. Panna Lal
Sh. Roshan Lal
Sh. Sant Lal
Sh. Ram Awadh
Sh. Sangam Lal
Sh. Lal Bahadur
Sh. Bhagraon Das
Sh. Ram Jatan
Sh. Mazuriyadin

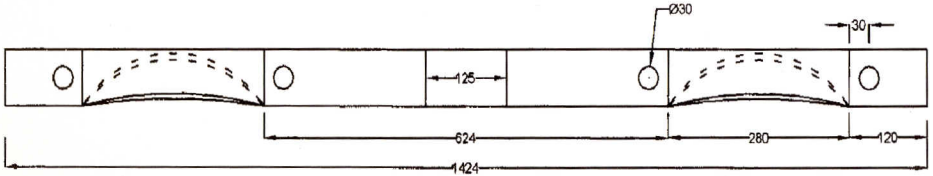
Vill. Semra pura
Sh.Lallo
Sh.Shivamoorat
Sh. Sunder Lal
Sh. Shanker Lal
Sh. Nankoo
Sh. Banwari

Vill. Deeha
Sh.Gulab Singh
Sh. Haribhan Yadav
Sh. Ram Pratap
Sh. Ram Bali
Sh. Prabhnath Yadav
Sh. Hinch Lal
Sh. Nebu Lal

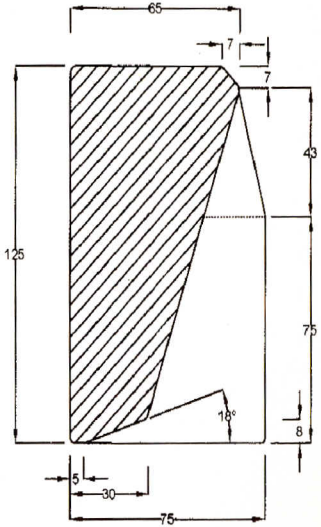
Design details of Allahabad yoke developed at SHIATS



FRONT VIEW



TOP VIEW



SECTION A-A'

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