



Indian Journal of Hill Farming

December 2017, Volume 30, Issue 2, Page 215-219

Status of Draught Animal Power, Shelters and Equipment in North and West Districts- a Case study in Sikkim

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ARTICLE INFO

Article history:

Received 3 August 2016

Revision Received 15 January 2017

Accepted 23 March 2017

Key words:

Breeds, custom hiring, animal shelter, concentrate, harness, annual use

ABSTRACT

The farmers in north and west Sikkim had diversified agriculture (fruits, large cardamom, ginger, paddy, maize, wheat, black gram, mustard and finger millet *etc.*) utilizing different breeds of draught animals (bullocks) and traditional equipment as per the information collected from the farmers. The body weight of bullock varied 219.28-374 kg and purchase price of pair of bullocks was Rs. 23000 in west Sikkim. The average number of land holdings in identified villages were 321 including 230 of marginal and small farmers. The average area dependent on one pair of bullock in west district Sikkim was worked out as 8 ha. The average population of bullocks was found 168 number in the villages of west Sikkim. The average custom hiring was 25 days in a year. The size of animal shelter varied from 2.4x2.4x2 m to 14.7x3.75x2.15 m in general. The roofs (50%) of galvanized iron sheet were common in the bullock sheds which has no sloppy concrete flooring and open from all four sides. Very few (15%) compost pits and urine disposable channels were available in the selected villages of west Sikkim. The concentrate @ 1 kg/day-bullock was found to be fed. The traditional plough (weight: 12 kg) and harness (weight: 4 kg) were common which were available in unit price of Rs 800 and Rs.500 respectively. In the north district (Mangan), the labour engaged in North Sikkim district were 29.18% of total labour engaged in cultivation in all four districts of Sikkim state. The average annual use of bullocks and labour days engaged were 40 days and 69 days in Mangan district. In north district (Mangan) the area dependable on one pair of bullocks was 1.84 ha and draught animals were only 11.15% of total population in the state. The maximum bullocks (48%) was found in west district and minimum in north district (11.15%). The traditional implements were found maximum (63.51%) in the west district (Gyalshing) and minimum (9.34%) in the north district.

1. Introduction

In the country 433 million labourers (94%) are engaged in unorganized sector out of 459 million total available labourers. The labourers in agricultural sector constitute 269 million. The rural population constitute approximate 0.43 million out of total population (0.7 million) in the Sikkim state. The state has 11% cultivated area which is covered using animate power sources.

In Sikkim, there are 97714 farmers and 8365 agricultural labourers. The women agricultural workers constitute 40.36% of total agricultural workers in Sikkim. The equivalent power available as per the population of draught animals (43000 nos.) is 1.365 MW in Sikkim. By the use of draught animals power in agriculture there is saving of 2.04 million diesel costing Rs. 92.14 million/year. The draught animals provide dung of Rs 1.29 million per year (Anonymous, 2007). The objective of study was to conduct survey for draught animal power, animal shelter, nutritive feed use, custom hiring status,

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traditional equipment, unit operations, labour engaged, cropping pattern and improved equipment promotion through frontline demonstrations. In hilly region bullocks 200-300 kg body weight with improved pant hill yokes of *tun* and *haldu* wood showed 15-20% more field output. The improved cultivator (*Danala*) of 15 kg weight and improved puddler (*Damala*) provided work rate of 0.10 ha/day. Pant hill plough (weight: 5 kg) provided average draft of 50 kg and it covered 0.15 ha/day (Anon. 2010). The small and marginal farmers generally utilized bullocks for limited use for tillage, sowing, interculture and transport operations in Madhya Pradesh. The annual utilization was reported as 58 days/year and higher maintenance cost of Rs. 55/day in slack period (Anon, 2010). GBPUAT centre of AICRP on UAE, Pantnagar surveyed two hill districts (5 villages in each) namely Nainital and Champawat. It revealed that Nainital district villages have paddy thresher (22 no), sprayer (18 no) and Seed drill (5 no). In villages of champawat district paddy thresher (30 no), Sprayer (4 no) and Seed drill (1 no) were found in use. The Nainital district has 80.3% farmers with less than 1 ha and Champawat district showed 97.8% farmers with less than 1 ha. In Uttarakhand the hill bullocks were used for 20 hours per annum for tillage leading to uneconomic cost benefit ratio. In Tarai Bhabhar area, buffaloes and bullocks were used as draft animals (Anon, 2010). The long axis of the cattle barns set in the north-south direction showed the maximum benefit of the sun. The surface of the shed was laid with a gradient of 25 mm to 38 mm from manger to excreta channel. An overall floor space of 7 to 7.5 sq.m and air space of 25-28 cu m per adult bullock was found adequate. The gutter with gradient of 25 mm for every 30 m length and roof height of 2.45 m at the sides and 4.57 m at the ridge were sufficient to maintain sanitation standards and for providing necessary air space to the cattle. The central walk space has width of 1.52-1.82 m exclusive of gutters when animals face out, as per Indian Standard: 11942 (1982), the

length and width of the standing of cattle may vary from 1.5 to 1.7 m and 1.0 to 1.2 m respectively. The width of the central passage may be 1.8 m (Anon. 2010).

2. Materials and Methods

The livestock census data: 2007 of Sikkim, Animal Husbandry Deptt. was used as the base for draught animal population which gave districtwise status of draught animal power. Ten farmers in five villages in north and west district of Sikkim were selected having not too sloppy topography and dominated by animal based farming for draught animal power survey including animal shelter, feed and fodder. The farmers in north Sikkim district (Mangan) and west Sikkim district (Gyalshing) had diversified agriculture (fruits, large cardamom, ginger, paddy, maize, wheat, black gram, mustard and finger millet *etc.*). Farmers were in practice of utilizing different breeds of draught animals (bullocks) and traditional equipment, feeds and fodders and animal shelters (Anonymous, 2010). These information were filled in prescribed proforma issued from AICRP on Utilization of Animal Energy from the farmers. Village survey information included population of draught animals, traditional/improved equipment in use, major crops grown and rotations followed, total area, irrigated area, cultivable area, operational size of land holdings, electro-mechanical power sources of available and used, electricity and labour availability. In the farmer's survey, ten framers or actually as available were surveyed in each village collecting information on bullocks breed, annual use, price, body dimensions, type of feed and schedule, animal shed, labour engaged, crops grown and crop rotations, custom hiring equipment used and prevailing rate for hiring. The physiological parameters of bullocks (respiration rate, pulse rate, body temperature, physical distress symptoms and others) were measured. In west Sikkim district (Gyalshing), survey was conducted on draught animals (bullocks) and their utilization for agricultural operations as per the cropping system in the village.





Figure 1. Traditional Yoke used in Malbasi West Sikkim)



Figure 2. Measurement of bullock size in Malbasi (West Sikkim)



Figure 3. Measurement of pulse rate (North district)



Figure 4. Cardamom crop in North Sikkim



Figure 5. Crossbred bullock in West Sikkim



Figure 6. Organic cultivation of Pea in Gyalshing



Interaction with farmer at Rangong village, North Sikkim



Measurement of physical dimensions of Bullock during survey



Traditional animal shed with wooden flats at Rangong in North Sikkim



Traditional cultivation of maize at Rangong, North Sikkim

Table 1. Average values survey data of villages in West and North districts of Sikkim

Particulars	West district (Gyalshing)	North district (Mangan)
No. of land holding	321 (57.33 %)	35 (6.27%)
Cultivated area (ha)	312	67
Irrigated area (ha)	Complete rainfed	Complete rainfed
Major crops	Maize, mustard, paddy, <i>kodo</i> , ginger, cardamom, beans, potato, buckwheat	Maize, paddy, <i>kodo</i> , black gram, ginger, mustard
Major crop rotation	Maize-mustard, paddy-kodo, paddy-wheat, paddy- mustard	Maize-mustard, buckwheat-maize
Operational holdings		
Marginal	188	23
Small	42	10
Medium	19	2
Large	15	Nil
Population of bullocks, No.	168 (48%)	39 (11.15%)
Population of animal drawn implements, No.	510 (63.51%) (plough-456, Yoke-215, Dande-139)	75 (9.34%) (plough-20, Yoke-37, Dande-18)
Electricity availability	Yes	Yes
Labour availability in village, No.	114 (37.38%)	89 (29.18 %)
Custom hiring, days, days/year	23 (21.7%)	19 (17.92%)
Area dependable on one pair of bullocks, ha	8	1.84

Table 2. Data on information of farmers surveyed in West and North districts of Sikkim

Particulars	West district (Gyalshing)	North district (Mangan)
Annual use of bullocks pair, day	49	40
Labour days engaged Wages per day, Rs	108 106	69 125
Animal shed size (lxbxh), m	2.4-14.7x2.4-3.75x2-2.15	3-6.4x2.5-3.4x1.8-3
Type of animal shed	Fifty % G.I sheet roof and remaining of thatched or bamboo strip roof, 75% <i>kachcha</i> flooring	Concrete floor 30% and G.I sheet roof-1/3, three side open
Sikkim traditional plough	Weight - 11.25 kg Unit price - Rs 1038 Size -100 mm	Weight - 11.25 kg Unit price - Rs 850/- Size -100 mm
Traditional harness	Size -1.15 m, Weight -3.87 kg, Price - Rs.575	Size -1.15 m, Weight - 4.15 kg, Price - Rs.550
Manure preparation	Manually collection in pit for 3-4 months	Manually collection in heap nearby animal shelter for 3-4 month
Concentrate fed for work animals	1	1.43
Size of bullock:		
Body weight, kg	220-374	286.48
Length, m	1.10-1.4	1.25
Girth, m	1.5-1.85	1.55
Purchase price of bullock pair, Rs.	22875	23000

3. Results and Discussion

The analysis of farmers proforma in surveyed villages of west districts revealed that bullocks weight varied 219-374 kg having girth from 1.5-1.85 m. The size of animal shelter varied from 2.4x2.4x2 m to 14.7x3.75x2.15 m in general. Very few (15%) compost pits and urine disposable channels were available in the selected villages of west Sikkim. The custom hiring was 25 days in west Sikkim district. The average weight of traditional plough and harness were 11.25 kg and 3.87 kg respectively in west district. The average quantity of concentrate fed was 1 kg/day-bullock and average purchase price was worked out as Rs. 22875/-. The district showed average annual use of bullock pair as 49 days. In the north district (Mangan), the labour engaged in North Sikkim district were 29.18% of total labour engaged in cultivation in all four districts of Sikkim state. The land holdings were 6.27% of total land holding in the entire state (Table 1). The average labour wages were Rs 125/day. The animal shelters were ranged 3-6x2.5-3x1.8-3 m. The traditional harness had 4.15 kg weight and average size was 1.15 m. The concentrate of 1.43 kg were fed daily to bullocks. The average size (Girth x length) of bullock was 1.55 m x 1.25. The average body weight of bullock was 286.48 kg and unit price of pair of bullocks was Rs 23000 during working season. Thirty percent of animal shelter in Mangan district were having concrete flooring. The animal shelters were open from three sides and 1/3 of total shelters had roofs of galvanized iron sheet. The average annual use of bullocks and labour days engaged were 40 days and 69 days (Table 2). In north district (Mangan), the area dependable on one pair of bullocks was 1.84 ha and draught animals were only 11.15% of total population in the state. The maximum bullocks (48%) was found in west district and minimum in north district (11.15%). The traditional implements were found maximum (63.51%) in the west district (Gyalshing) and minimum (9.34%) in the north district. The need of improved equipment for different unit operations in terrace was reported during feedback especially for improved wing plough, peg type puddler, seed drill, cono weeder, pedal

operated wire loop thresher, potato digger and improved knife for large cardamom crop as indicated in Table 3. The study conducts that

- i. The maximum bullocks (48%) was found in west district and minimum in north district (11.15%) with average annual use of 49 days.
- ii. The body weight of a bullock varied (219.28-374 kg) and average area dependent on one pair of bullock was worked out as 8 ha in west Sikkim district.
- iii. The size of animal shelter varied from 2.4x2.4x2 m to 14.7x3.75x2.15 m in Gyalshing district.
- iv. The traditional implements were maximum (63.51%) in the west district (Gyalshing) and minimum (9.34%) in the north district.
- v. The north district (Mangan) had minimum (17.92%) custom hiring for 19 days.

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Table 3. Farm Mechanization gaps in North and West districts of Sikkim

	Traditional Equipment	Improved Equipment required by farmers as per feedback
North and West District	Traditional plough, Traditional harness, Traditional leveller (<i>Dande</i>), Traditional sickle, Manual cutter for chaffing, manual <i>kante</i> for interculture, Traditional Animal shelter and Traditional bin (mud), Manual cutter for harvesting cardamom, Manual <i>kudal</i> for digging root crops.	Animal drawn improved wedge plough, Animal drawn clod crusher-leveler-planker-puddler, Animal drawn improved 2/3 row cultivator, Animal drawn 2 row seed drill/zero till drill, Animal drawn two row maize planter, Manual wheel hoe, Manual sprouted rice seeder, Manual 4 row rice transplanter, Manual cono-weeder, Improved sickle, pedal/electric motor operated paddy drum thresher, pedal operated cleaner cum grader, Animal drawn ginger/turmeric digger/potato digger, manual improved cutter for cardamom, Manual fruit harvester, Improved metallic bin, Hand operated double screen grain cleaner, small multi-crop thresher and small dryer for large cardamom.