STATUS OF DRAUGHT ANIMAL POWER (DAP) AND DAP BASED TECHNOLOGY OF CHANDRAPUR, NASHIK, SATARA AND SOLAPUR DISTRICTS OF MAHARSHTRA

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Abstract

A techno-economic study was conducted to study the status of draft animal power (DAP) and DAP based technology in Chandrapur, Nashik, Satara and Solapaur districts of Maharashtra. The parameters of the study mainly consisted of availability of draught animal power, status of bullock operated farm implements and machinery and facility regarding animal shelter, urine and cow dung disposal. The study revealed that, draught animal power had been extensively used for crop production and transportation. The most common breads are Khilari, Dangi, Deoni and Deshi. Bullocks over three years of age are the main sources of draught animals for field operations. Average observed DAP of Chandrapur, Nashik, Satara & Solapur were 0.44, 0.27, 0.42 & 0.35 kW/ha respectively. It was concluded that, utilization of plough, harrow, seed-drill, cultivator and bullock cart were highest in Solapur 89.09 %, Satara 32.72 %, Nashik 32.30 %, Solapur 56.36 %, and Satara 56.36 % respectively. The methods for collection of urine & cow dung by hand were mostly used in Satara 70.90 %, by tool it was found highest in Nashik 56.15 %. Utilization of covered area of animal shelter was highest in Solapur 74.54 % and uncovered area of animal shelter was highest in Nashik 35.38 %. The use of tractor, power tiller was highest in Satara 48.18 %, Nashik 6.15 % respectively.

Keywords: *Draught Animal Power(DAP), Breads, Animal Shelter, Animal Drawn Implements, Machinery.*

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1. INTRODUCTION

India posses the most famous draught breeds in the world (Phaniraja, 2009). These are Nagori, Khilari, Helikar, Dangi, Deoni, Amrit Mahal, Kangayam, Malvi, Hariana, Gir, Angol, Tharparkar and Gaulao. The average DAP availability was estimated as 3.68 ha per pair which is considered far below the normal command area of 1.5-2.5 ha per pair (Anonymous, 1990). In Maharashtra, the crossbred cattle have increased by 12.9 % but indigenous cattle decreased by 13.4 % during the period between 16th and 17th census (Indian livestock census report, 2007). There is a decrease of 9.8 % in total cattle population during inter seasonal period.

The state of Maharashtra has a geographic area of 3, 07,713 sq.km. This is 9.4 % of the country's geographic area. The state has a forest cover of 47,482 sq.km. As per the 17th livestock census, the state of Maharashtra had 8.8 % of Cattle, 6.28 % of buffaloes, 5.03 % of sheep, 8.59 % of goats and 3.25 % of pig population of the country. The state has the sixth highest buffaloes' population in the country.

In any agricultural crop production system human, draught animals and engines or motors provide the motive power in various proportions for crop production, harvesting, transport and processing (Rijk, 1989; FAO, 2003; Pearson, 2005). Draught animal is a reliable and popular farm power resource in most developing countries. With the modernization of agriculture, the use of mechanical power in agriculture has increased but DAP continues to be used on Indian farms due to small land holdings and hill agriculture. More than 55 % of the total cultivated area is still being managed by using draught animals as against about 20 % by tractors.

The traditional farm tools and implement mainly relied on use of animate power (Singh, G. 1989). Improved farm tools, implement and machinery are used by animal and mechanical power. The traditional animal operated country plough although having low output (30-40 h/ha) and requiring higher number of tillage operations are still being used by farmers on small farms and in regions where economic status of the farmers is not sound. This paper present the finding of this study covering the details of availability of draught animal power, status of bullock operated farm implements and machinery and facility regarding animal shelter, urine and cow dung disposal.

2. MATERIALS AND METHODS

2.1 Study Area

Out of nine agro climatic zone of Maharashtra Chandrapur, Nashik, Satara and Solapur districts from moderate rainfall zone, transition zone-1, transition zone-2 and scarcity zone respectively were selected for study. A representative district having animal power close to animal power availability of agro climatic zone was selected; also origin of draft breeds of animal has given preference.

2.2 Selection of Sample

From selected district one village was selected away from city and main source of family was based on draught animal power. Random samples of 450 farmers from all four districts of Maharshtra were selected for study. From each tehsil one village was selected, from each village ten farmers were selected from different socio-economic status of the farmers such as marginal, small, medium farmers and also cover general, SC/ST, OBC categories etc.

2.3 The Design of Questionnaire

After development of an outline of research work an interview questionnaire was prepared in Marathi language to the villagers. While preparing the questionnaire the objectives of the study were kept in view. It was designed in two parts i.e. Part-A and Part-B (Appendix-I and II)

Part-A : It was designed to obtain information from respondents regarding their personal, social and economical characteristics which includes items like land holding, living conditions, source and extent of income, farm power, social participation and source of irrigation.

Part-B: It was intended to collect information regarding estimated population of draught animal breed wise, animal power, annual use of animals, feed and fodder fed to animals during different periods of the year during work and rest, housing system, yoke and harness used.

2.4 Pre-Testing of Questionnaire

Before conducting the interviews the questionnaire was perfected in consultation and guidance of experts in the field in order to increase the reliability and validity of the questionnaire.

2.5 Classification of Farmers

The farmers of the village under the study were grouped into classes according to different socio-economic groups such as marginal, small, medium farmers and also cover general, SC/ST, OBC categories etc.

2.6 Data Collection

The data was collected through personal interview of farmers. For data collection one village was selected from each tehsil and ten farmers from each village.

2.7 Analysis of Information

The information collected through interviews was transferred from the questionnaire to proforma of farmer's survey (Srivastava N.S.L. and Ojha T.P. 1987).
DAP and % use of implement was calculated by:
a) DAP (kW/ha) = (Total no. of Bullock × 0.5) ÷ (Total Net Sown Area)
b) Use of Implement (%) = (No. of farmer using implement × 100) ÷ Total No. of farmer.

3. RESULTS AND DISCUSSION

3.1 Status of Chandrapur District

The maximum net sown area was 1092.25 ha in Girgaon village of Sindevahi block and minimum about 605.50 ha in Bharanj village of Bhadravati block. The major crops grown were rice, soybean, tur and cotton. The total number of bullock maximum about 300 in Vishapur village of Ballarsha block and minimum about 40 in Bharanj village of Bhadravati block. The major implements were plough, harrow, puddler etc. The machinery like diesel engine and motor were also used. The detail is shown in table no.1

Table.1 Information about the villages selected in Chandrapur district.

Sr. No.	Name of Tahsil	Name of Village	Net Sown Area(ha)	Major Crops Grown	Total no. of Bullocks	Implements of Bullock Drawn				Machinery			
						P	H	C	S	PT	DE	T	E
1	Chimur	Veergaon	992.66	Soyabean, rice, cotton	230	210	206	103	208	00	06	09	52
2	Shindewahi	Girgaon	1092.25	Soyabean, rice, jowar	200	150	140	100	125	00	08	03	15
3	Bhadravati	Baranj	605.5	Rice, vegetable	40	38	35	35	24	00	03	01	02
4	Savli	Whaiyd	800	Soyabean, rice, jowar	100	40	30	20	10	00	14	02	55
5	Nagbhid	Tukum	1000	Soyabean, rice, jowar	200	150	135	127	115	00	04	12	75
6	Bhrampuri	Menda	752.30	Soyabean, rice, jowar	120	60	55	52	45	00	04	03	06
7	Chandrapur	Ghodpeth	900	Cotton, rice, jowar	150	130	120	125	110	00	08	02	35
8	Mul	Janala	1100	Soyabean, rice	230	100	90	100	85	00	15	15	130
9	Baalarsha	Vishapur	1000.25	Soyabean, rice, jowar	300	200	175	150	135	00	06	05	110
10	Warora	Parsoda	820.22	Soyabean, rice, bajara	250	185	145	135	125	00	05	01	30

3.2 Status of Nashik District

The maximum net sown area was 8467.30 ha in Pimpalgaon village of Niphad block and minimum about 305.89 ha in Sogras village of Chandwad block. The major crops grown were pomegranate, onion, grape and maize. The total number of bullock maximum about 1300 in Nampur village of Satana block and minimum about 140 in Matane village of Devala block. The major implements were plough, harrow, seed-drill, cultivator etc. The machinery like diesel engine, motor and tractor were also used. The detail is shown in table no.2

Table 2 Information about the villages selected in Nashik district.

Sr. No.	Name of Tahsil	Name of Village	Net Sown Area(ha)	Major Crops Grown	Total no. of Bullocks	Implements of Bullock Drawn				Machinery			
						P	H	C	S	PT	DE	T	E
1	Satana	Nampur	7048.46	Pomogranate,onion,jowar,wheat	1300	800	809	600	900	01	15	16	880
2	Nashik	Mahirvani	684.51	Groundnut, makka,jowar,mug	185	130	120	85	150	00	13	08	75
3	Trimbak	Anjneri	1250.5	Onion,groundnut, jowar, mug	501	155	150	100	120	00	75	15	125
4	Dindori	Khedgaon	3268	Pomogranate, makka,jowar	465	228	128	130	126	01	15	14	140
5	Nandgaon	Jalgaon	696.31	Grape, onion, wheat, mug,tur	348	228	125	135	148	00	05	04	145
6	Kalwan	Manur	782	Onion,jowr, makka , wheat	425	374	325	280	235	00	10	08	125
7	Igatpuri	Takhed	4348	Pomogranate,jowar, tur	538	435	320	414	220	02	25	14	356
8	Yewla	Rajapur	3176	Pomogranate, grape, wheat	887	515	320	230	110	00	12	12	320
9	Malegaon	Wadner	2876.36	Pomogranate, makka,tur	386	385	370	320	312	00	19	12	150
10	Sinnar	Padoli	315.46	Grape,makka,jowar, tur	248	230	220	118	160	00	12	05	148
11	Niphad	Pimplgaon	8467.30	Pomogranate, jowar, tur	550	400	445	370	350	01	35	16	500
12	Devala	Matane	325.65	Pomogranate, makka,jowar, tur	140	130	114	130	115	00	10	06	180
13	Chandwad	Sogras	305.89	Pomogranate, makka,jowar, tur	150	135	112	118	125	00	12	05	120

3.3 Status of Satara District

The maximum net sown area was 3215 ha in Mauli village of Satara block and minimum about 1200 ha in Sokasan village of Mann block. The major crops grown were onion, vegetable, jowar, bajra and maize. The total number of bullock maximum about 452 in Mauli village of Satara block and minimum about 110 in Jalgaon village of Koregaon block. The major implements were plough, harrow, seed-drill, cultivator etc. The machinery like diesel engine, motor and tractor were also used. The detail is shown in table no.3

Table.3 Information about the villages selected in Satara district.

Sr. No.	Name of Tahsil	Name of Village	Net Sown Area(ha)	Major Crops Grown	Total no. of Bullocks	Implements of Bullock Drawn				Machinery			
						P	H	C	S	PT	DE	T	E
1	Mahabaleshwar	Akade	3211	Maize, wheat,onion	293	275	280	225	217	00	25	14	235
2	Wai	Bhuej	2130	Nachni, chavali, bajra, maize	325	480	425	230	335	00	19	15	270
3	Maan	Sokasan	1200	Maize, onion, jowar	150	85	31	42	70	00	08	06	95
4	Koregaon	Jalgaon	1815	Sugarcane, cotton, wheat	110	100	80	65	75	01	12	15	150
5	Karad	Tambave	1935	Maize, tomato, mug, tur	335	220	237	225	210	01	81	20	225
6	Jawali	Hateghar	1360	Ghewda, tur, sugarcane	178	175	137	85	140	00	51	15	285
7	Waduj	Khatgun	1040	Ghewda, tur, maize	163	137	120	110	125	01	17	11	265
8	Satara	Mauli	3215	Mirchi, vegetable, maize	452	425	487	350	485	02	105	20	378
9	Khandala	Sukhed	2305	Jawari, mug, tur	315	493	330	220	225	02	31	14	335
10	Patan	Umbraj	1535	Onion, maize, tur, wheat	358	315	225	270	225	00	25	17	291
11	Phaltan	Barad	1405	Sugarcane, vegetable	355	335	325	200	317	00	68	18	251

3.4 Status of Solapur District

It is concluded that the maximum net sown area was 6300 ha in Kondi village of North Solapur block and minimum about 1779 ha in Sangavi village of Pandharpur block. The major crop grown was jowar, sugarcane, groundnut, bajra and tur. The total number of bullock maximum about 1300 in Phondshiras village of Malshiras block and minimum about 250 in Limbichincholi village of South Solapur. The major implements were plough, harrow, seed-drill, cultivator etc. The machinery like diesel engine, motor and tractor were used. The details shown in table no. 4

Table.4 Information about the villages selected in Solapur district.

Sr. No.	Name of Tahsil	Name of Village	Net Sown Area (ha)	Major Crops Grown	Total no. of Bullocks	Implements of Bullock Drawn				Machinery			
						P	H	C	S	PT	DE	T	E
1	Pandharpur	Sangavi	1779	Jawari, sugarcane, wheat	305	275	250	225	204	02	65	06	315
2	Malshiras	Phondsiras	4551	Sugarcane, wheat, onion	1300	805	430	305	515	01	32	13	900
3	Barshi	Pangaon	3900	Bajri, maize, jawar, tur	800	650	350	275	350	00	25	15	950
4	Mangalwedha	Gunjegaon	5200	Karadi, onion, sugarcane	795	495	270	320	225	01	15	18	775
5	South solapur	Limbichincholi	2290	Jowar, sugarcane, maize	250	175	235	186	250	00	30	14	650
6	Akkalkoat	Karajl	2060	Maize, groundnut, jawar	300	200	200	175	215	00	15	10	950
7	Mohol	Lamboti	4900	Sugarcane, jawar, onion	610	351	315	228	340	00	20	15	650
8	Madha	Anjgaon	4500	Pomogranate, ber, wheat	600	425	350	217	300	01	15	16	950
9	North solapur	Kondi	6300	Kardi, ber, groundnut	630	460	310	380	315	00	15	14	490
10	Sangola	Mahot	2900	Wheat, sugarcane, maize	325	215	185	190	305	00	15	13	305
11	Karmala	Kandar	2155	Jawari, wheat, cotton	360	340	325	195	220	00	30	16	155

Notations- P-plough, H-harrow, C-cultivator, S-seed drill, PT-power tiller, DE-diesel engine, T-tractor, E-electric motor

3.5 Survey Result of the Selected Villages of Chandrapur, Nashik, Satara and Solapur

The maximum net sown area found in Nashik district as 361.6 ha and minimum in Chandrapur district as 206.6 ha. The maximum total number of bullocks were found in Solapur district as 223 and minimum in Chandrapur district as 183. The maximum number of plough and harrow were found in Solapur district as 98 and 35 respectively. The maximum number of seed-drill and cultivator were found in Nashik district as 42 and 66 respectively. The maximum tractors were found in Satara district as 53, the maximum power tillers and electric motors were found as 8 and 130 respectively in Nashik district as shown in table.5

Table.5 Survey result of the selected villages of Chandrapur, Nashik, Satara & Solapur.

Sr. No.	Name of District	Total net Sown Area(ha)	Total no. of Bullock	Total no. of Implement				Total no. of B.C.	Total no. of Urine & C.D. disposal		Animal Shelter		Total no. of O.P.S.		
				P	H	C	S		Hand	Tool	C/A	U/A	T	PT	E
1	Chandrapur	206.6	183	77	20	45	24	47	48	48	54	35	14	00	97
2	Nashik	361.6	193	88	19	66	42	57	51	73	66	46	50	08	130
3	Satara	226.4	193	93	36	46	16	62	78	39	81	22	53	04	110
4	Solapur	316.2	223	98	35	62	32	58	60	61	82	26	40	03	110

3.6 Status of Utilization of Farm Implements, Disposal of Urine, Cow Dung, Shelter and O.P.S.

The utilization of plough, harrow, seed-drill, cultivator and bullock cart were highest in Solapur 89.09 %, Satara 32.72 %, Nashik 32.30 %, Solapur 56.36 %, and Satara 56.36 % respectively. The methods for collection of urine and cow dung by hand were mostly used in Satara 70.90 %, by tool it was found highest in Nashik 56.15 %. Utilization of covered area of animal shelter was highest in Solapur 74.54 %, and uncovered area of animal shelter was highest in Nashik 35.38 %. The use of tractor, power tiller was highest in Satara 48.18 %, Nashik 6.15 % respectively. The details shown in table no.6

Table.6 Percent utilization of status of farm implements, disposal of urine & cow dung, shelter & O.P.S

Sr. No.	Districts	P %	H %	S %	C %	B.C. %	Urine & C.D.%		Animal Shelter%		T %	PT %	E %
							Hand	Tool	C/A	U/A			
1	Chandrapur	77	20	24	45	47	48	48	54	35	14	00	97
2	Nashik	67.69	14.61	**32.30**	50.76	43.84	39.23	**56.15**	50.76	**35.38**	38.46	**6.15**	**100**
3	Satara	84.54	**32.72**	14.52	41.81	**56.36**	**70.90**	35.45	73.63	20	**48.18**	3.63	**100**
4	Solapur	**89.09**	31.81	29.09	**56.36**	52.72	54.54	55.45	**74.54**	23.63	36.36	2.72	**100**

O.P.S. - other power sources

3.7 Draught Animal Power Availability per ha for Chandrapur, Nashik, Satara and Solapur

It is observed that draught animal power per ha is highest in Chandrapur district i.e. 0.44 kW/ha followed by Nashik, Satara and Solapur, 0.27, 0.42 and 0.35 kW/ha respectively, graphical representation shown in Fig.1

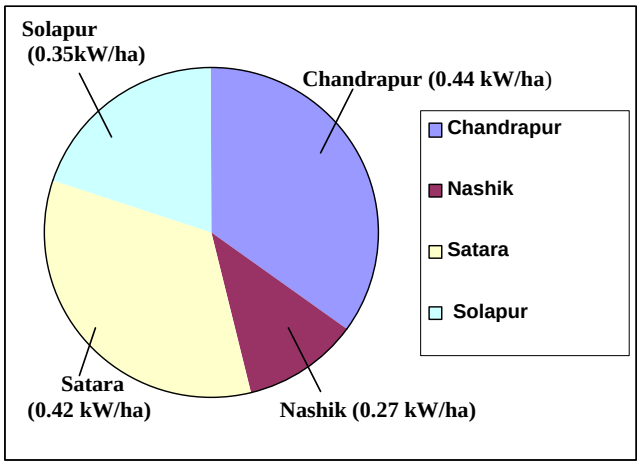

Fig. 1 Pie chart of draught animal power availability per ha for Chandrapur, Nashik, Satara & Solapur district

4. CONCLUSION

From the results and discussion following conclusion could be drawn:

1) Average observed DAP of Chandrapur, Nashik, Satara and Solapur districts were 0.44, 0.27, 0.42 and 0.35 kW/ha respectively.

2) Utilization of tractor, bullock cart and harrow were highest in Satara district. Handling of cattle dung by traditional method (by hand) was highest in Satara district followed by Chandrapur, Nashik and Solapur districts.

3) During field operation the maximum use of seed drill and power tiller were found in Nashik district. Collection of cattle dung by tool was highest in Nashik district followed by Chandrapur, Satara and Solapur districts. Utilization of electric motor was highest in Nashik, Satara and Solapur districts .

4) During field operation use of seed drill, plough, cultivator and harrow were found maximum in Nashik district, ploughs and cultivators were found highest in Solapur district.

5) Covered area of animal shelter was highest in Solapur district while uncovered area was in Nashik district. Utilization of plough and cultivator were highest in Solapur district.

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