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## **THE POTENTIAL FOR SINGLE ANIMAL PLOUGHING IN BANGLADESH**

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### **ABSTRACT**

In Bangladesh, single animal ploughing is practiced only in some parts of Sylhet district. In this note results of a survey showing causes of localized and limited use of this technique are discussed. Only buffaloes were found to be used as single and the single buffalo plough was found to be technically and economically more efficient than a plough drawn by a pair of cattle. However, scope for expansion of the technique outside Sylhet seems to be limited because draught buffaloes account for only about two percent of the total draught animals in the country.

### **I. INTRODUCTION**

Single animal plough (SAP) is used in India and in all south-east Asian countries, but in Bangladesh this is known to be used in some parts of Sylhet district. There is substantial shortage of draught power in the country for tillage, particularly in the peak cultivation periods, and there is some controversy about the role and the potential of SAP in reducing the shortage of power.

Ahmed (1975) and a FAO/Bangladesh Mission on Agriculture (FAO 1977) considered SAP as a potential means of solving the existing power problem. They also thought that the general health of the animals might be improved with available feed supply because a reduced number of animals would be able to provide existing power requirement. On the other hand, Odend'hal (1978) raised serious doubts about the ability of the small and weak Bangladeshi cattle to pull the plough alone, particularly in the dry season when soils become very hard.

Jabbar (1980) and Jabbar and Green (1983) argued that if single animal ploughing could be extended throughout the country obviously the strongest of the present cattle/buffaloes would be initially used in this way, so large farmers would be the immediate and direct beneficiaries, because they would need to maintain fewer animals to meet their current power requirements. But the small farmers, and the society at large, were also likely to benefit because surplus cattle released by large farmers might help small farmers to restore the milk producing status of their cows currently being used for draught. Thus milk production might increase as well.

None of the above arguments, whether supporting or refuting the potential of SAP, are based on empirical evidence about the technical, economic and social possibility of extending this technique throughout the country. Considering this

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technique as a potential means of reducing power shortages, testing the technical and socioeconomic possibility of extending the technique was envisaged in the Two Year Plan (Bangladesh 1978), but nothing is known to have been done yet by the Government. Primarily with a view to filling this gap in knowledge, a study was conducted to find out the reasons for localized use of SAP in Sylhet district, and on that basis, to assess the potential for extending the technique throughout the country.

In section II, results of a survey conducted among 150 purposively selected farms are presented. Among the selected farms 104 used only single animal ploughs or both single and double animal ploughs (DAP), and 46 farms used only double animal ploughs. On the basis of the results of the survey, the potential of extending SAP as a technique throughout the country is discussed in Section III.

## II. CHARACTERISTICS OF SINGLE ANIMAL PLOUGHING IN SYLHET DISTRICT

### Location of the Technique

Single animal ploughs<sup>1</sup> are widely used in Kulaura, Shrimangal, Jokigonj, Rajnagar, Moulavi Bazar, Borolekha, Kamalgonj Upazilas and less widely used in Golapgonj, Jaintiapur, Biani Bazar, Goainghat, and Kanairghat Upazilas. This technique is used by 50-80 percent and 30-50 percent of farmers respectively in the first and the second group of Upazilas. Outside of Sylhet, a few farmers in the low lying areas of Brahmanbaria and Netrokona (Mymensingh) also reportedly use this technique. All these Upazilas are located near the borders of the Indian states of Assam, Tripura, and Meghalaya where SAP has been widely used for a long time.

Before the partition of India, people of Sylhet were closely linked with those of Assam and Tripura, and that is how they learnt this technique. Among the 104 sample users of SAP, 77 percent said that their forefathers started using this technique after learning it from other users in Assam and Tripura. The remaining 23 percent have learnt it from their neighbours or from users in neighbouring Upazilas.

An important reason for the variation in the incidence of SAP among the Upazilas is that in Sylhet only buffaloes are used as singles, while cattle are used in pairs. In a few cases buffaloes of poor health were also found to be used in pairs. Rearing buffaloes requires extensive grazing land and the local *baors* provide such facilities. During the monsoon, *baor* areas are infested with leeches and buffaloes are more resistant than cattle to leech attack. Consequently, the incidence of SAP is higher near the *baor* areas; however, *baor* areas are gradually shrinking due to flood control and *baor* development programmes. Consequently the rearing of buffaloes and use of SAP is decreasing. Some very large farms leave a part of their land for grazing buffaloes. Some farmers living far away from the *baors* but having buffaloes rent them in the winter season to farmers living near the *baor* areas. The arrangement is beneficial to both the parties because buffalo owners solve their feed problem by renting out, while farmers taking them in solve their power problem for producing *boro* rice in the *baor* areas. Another

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<sup>1</sup> Locally known as 'Sater hal'. By plough (Langal) they usually mean plough drawn by a pair of cattle/buffalo

important reason for the decline of SAP is the high mortality of buffalo among calves due to diarrhoea and ring worm. Farmers reported 50-60 percent mortality among calves upto 1.5 years of age. Farms failing to rear their own replacement buffalo may have to ultimately give up SAP because of capital constraint.

### Type of Plough Used and Reasons for Use

In terms of type of plough used, three categories of farmers were observed in the survey areas: those using only DAP, those using SAP, and those using both. Among the 150 sample farms, 46 (30.7%), 69 (46.0%) and 35(23.3%) farms respectively belonged to the above three categories (Table 1). In general, smaller farms used only DAP while large farms used either only SAP or both SAP or DAP. Farmers using only SAP cultivated on average 1.3 times more land per plough than those using only DAP. Farmers using both SAP and DAP cultivated a still larger average amount of land per plough but their bullocks were of much better quality as reflected in their higher values.

**Table1:** Distribution and Average Size of Sample Farms According to Number and Type of Plough Used

No. and type of plough used per farm		No. of farms using combination	Value of draft animal		Acres operated		Intensity of cropping %
SAP	DAP		One buffalo	Pair of cattle	Per farm	Per plough	
–	1	33a	–	2560	3.20	3.20	193
–	2	13	–	3240	6.72	3.36	182
1	–	25	5292	–	4.07	4.07	194
2	–	32	5391	–	8.36	4.18	173
3+	–	12	6125	–	14.13	4.13	161
1	1	12	4947	2828	8.67	4.34	168
1	2	3	5333	3117	15.40	5.13	160
2	1	12	5646	4308	16.12	5.37	162
2	2+	3	5250	4029	44.50	8.34	148
3	1	3	5333	4250	46.33	11.58	132
3	2	2	6800	5000	32.50	6.50	169

SAP. Single animal plough.

DAP. Double animal plough.

a. Some small farmers had only one cattle which was paired with another cattle owned by a different farmer. Such farmers were not included in the sample.

– None. Not applicable.

Source: Field survey in Sylhet, 1984.

Among the 46 farms using only DAP, 18 (40%) previously used SAP but later changed to DAP. Asked why they gave up SAP and/or had not used SAP at all, farmers mentioned the following reasons in different combinations: (a) buffaloes are more costly

than cattle, (b) additional labour is required to rear buffaloes, (c) driving SAP requires a strong ploughman, and (d) size of holding too small to use SAP (Table 2).

**Table 2:** Reasons for Giving up and/or not Using Single Animal Plough

Reasons				Farms responding combination	
Buffalo costly	Rearing buffalo require extra labour	Driving SAP hard/energy intensive	Small amount of land	Number	%
X	X			14	30.4
X	X	X		10	21.7
X	X		X	9	19.6
	X			5	10.9
X		X		2	4.3
X			X	2	4.3
	X		X	2	4.3
	X	X		2	4.3
37 (80.4)	44 (95.6)	14 (30.4)	13 (28.3)	46 (100)	100.0
Farms mentioning reasons					

Figures in the parentheses indicate percentages.

Source: Field survey in Sylhet, 1984.

The 35 farmers using both SAP and DAP were also asked the reasons for doing so. They also mentioned costly nature of buffalo and additional labour requirement for rearing buffalo as the main reasons (Table 3).

**Table 3:** Reasons for Using both Single and Double Animal Plough

Reasons			Farms responding combination	
Buffaloes more costly and require more labour	Cattle gives manure & milk/cattle usually maintained	SAP unsuitable for small plots	Number	Percent
X	X		15	42.8
X			11	31.4
X	X		3	8.6
	X		4	11.4
		X	2	5.7
29 (82.8)	22 (62.9)	13 (37.1)	35 (100)	100.0
Farms mentioning reasons				

Figures in the parentheses indicate percentages.

Source: Field survey in Sylhet, 1984.

The costliness of buffaloes is apparent from Table 1. On average, the price of a buffalo (TK. 5564) was 1.7 times as high as the price of a pair of cattle (Tk.3253). Therefore, farmers with capital constraints had to use only cattle in pair or both SAP and DAP. Some farmers also mentioned that buffaloes prefer to stay in water, but that during the

monsoon some buffaloes die due to too much sucking of their blood by leeches, thus causing great loss to the farmers. Cattle were normally kept away from water, so the changes of leech attack and death of the animal were much smaller.

The need for extra labour for rearing buffaloes arises because normally buffaloes are grazed in the *baor* areas, where constant supervision is required to prevent buffaloes of different owners from fighting.

Some farmers said that they usually maintained cattle to use up crop by-products but ultimately got milk, manure and power as well. Some farmers mentioned that manure was important for farming, and cattle dropping gave better quality manure than buffalo dropping, so they maintained some cattle. A few farmers also mentioned that SAP was unsuitable for cultivating very small plots, particularly those having sharp acute corners.

### **Technical and Economic Efficiency**

Farmers mentioned that the main advantage of SAP over DAP was that deeper ploughing was possible with SAP, so land preparation required fewer ploughings and a smaller amount of time. It was shown earlier that on the sample farms, on average 1.7 times more land was operated per SAP than per DAP, but that this did not affect cropping intensity. The latter depends more on the overall size of farm than on the type of plough used and area of land operated per plough (Table 1). Correlation ( $r$ ) between operated area per farm and intensity of cropping was -0.57 while correlation between operated area per plough and intensity of cropping was -0.47.

The greater technical efficiency of SAP is also manifested in the higher hiring charge for a SAP compared to DAP. During the 1984 winter (Rabi) season, the daily hiring rate for a SAP, including a ploughman, ranged from Taka 60-90 compared to Taka 40-60 for a DAP and a ploughman.

Economic efficiency of these two types of ploughs may be compared by comparing the cost of cultivation per unit of land. Unit costs derived from the hiring rates mentioned above show that differences in costs are not significant, but SAP gives better quality tillage for the same cost. Derivation of unit cost from actual maintenance cost of the animals would require a full year's information on feed, labour and other costs, amount of power and other products produced, land cultivated etc. All of this information could not be collected during the brief field survey. Moreover, it was observed that buffaloes were most of the time free-grazed in the *baor* areas, so that labour was the main item of cost. Cattle on the other hand, were fed mostly on paddy straw, so that both feed and labour were important cost items. Seasonal renting of buffalo and absence of a similar practice for cattle posed another problem for cost comparison. However, the farmers were generally found cost conscious as observed from their choice of either SAP or both SAP and DAP as cultivation techniques to suit their resource endowment and decision making environment.

### **III. POTENTIAL FOR EXPANSION OF SAP**

The experience of Sylhet suggests that only buffaloes can be used as singles; the cattle in Bangladesh are not strong enough for SAP. According to the 1977 Agricultural Census, draught buffaloes constituted only 2.3 percent of the total number of draught animals in the country. Thus the overall potential for SAP as a technique is very limited. Moreover, buffaloes are thinly distributed all over the country, although outside of

Sylhet, the districts of Dinajpur, Rangpur, Rajshahi, Khulna, Bakergonj, Patuakhali, and Noakhali have some concentration of buffalo population (Table 4). While talking to farmers during field visits to some of these districts, it appeared that they would prefer a technique that required fewer animals, because of the animal feed constraint. But they were not aware of any such technique. Operation of a special extension programme to motivate buffalo owners to use SAP may not be economically justifiable/viable even in the few districts with buffalo concentration. Instead, the Ministry of Agriculture may use its extension network, which is very large, to disseminate the idea of SAP among buffalo owners throughout the country and initially help interested farmers to learn and acquire the technique from Sylhet. Further diffusion may automatically follow, as it did in Sylhet.

**Table 4:** District-wise Draught Animal Population in Bangladesh, 1977

District	Number 000			Proportion of buffalo in district total (%)	Proportion of total draught animal in district (%)
	Cattle	Buffalo	Total		
Dinajpur	10731	465	11196	4.1	9.9
Rangpur	20244	389	20633	1.9	8.3
Bogra	7026	4137	7163	1.9	2.9
Rajshahi	13858	383	14241	2.7	8.2
Pabna	8122	120	8242	1.5	2.5
Kushtia	4994	136	5130	2.6	2.8
Jessore	11024	31	11055	0.3	0.6
Khulna	11854	397	12251	3.2	8.5
Bakergonj	10369	463	10832	4.3	9.9
Patuakhali	5166	752	5928	12.7	16.0
Jamalpur	5138	124	5262	2.4	2.6
Tangail	6755	64	6819	0.9	1.4
Mymensingh	17112	129	17241	0.7	2.7
Dhaka	15017	33	15050	0.2	0.7
Faridpur	10493	16	10509	0.2	0.3
Sylhet	16351	357	16708	2.1	7.6
Comilla	13617	57	13674	0.4	1.2
Noakhali	6344	299	6643	4.5	6.4
Chittagong	9148	196	9344	2.1	4.2
Chittagong H.T.	1727	142	1869	7.6	3.0
Bangladesh	205090	4690	209780	2.2	100.0

Source: Bangladesh 1981.

#### IV. CONCLUSIONS

The main objective of this study was to provide empirical evidence for solving the controversy about the potential role of single animal ploughing for reducing the draught power shortage existing in the country. Experience derived from a survey in Sylhet district, where this technique has been in use for a long time, suggests that only buffaloes are used singly, but that single animal plough is technically and economically more efficient than a plough drawn by a pair of cattle. In Sylhet itself, use of SAP is restricted by the higher capital value of buffaloes, dominance of smaller size of holding, shortage of grazing land for buffalo, and high mortality among buffalo calves.

Draught buffaloes constitute only 2.3 percent of the total draught animal population in the country and they are also highly scattered. Thus the potential for expansion of single animal (buffalo) ploughing throughout the country is very limited. However, the Ministry of Agriculture may try to disseminate the idea of SAP through its large extension network and this may produce some results.

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