

Package of Improved Animal Drawn Implements as a Stepping Stone to Total Mechanization

A SUCCESS STORY



**ALL INDIA COORDINATED RESEARCH PROJECT ON
INCREASED UTILIZATION OF ANIMAL ENERGY
WITH ENHANCED SYSTEM EFFICIENCY**

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INTRODUCTION

The role of mechanization in raising the income of farmer through reduced cost of operation, reduction in drudgery and improvement in timelessness of operation has been proven time and again in farmers fields. However the mechanization process usually involves capital inputs for purchase of mechanical power sources and improved implements. The small and marginal farmers are usually not in a position to invest money needed to purchase costly farm power and machinery even if it is subsidized. Due to this reason farmers only accept technology if it is low cost or if it is feasible and available under custom hiring. In many cases however, small farmers are not in a position to pay in cash for the expenses for custom hiring. Therefore they continue to adopt traditional tools and technologies used by them. This is one of the reasons why this section of the farmers are conservative in nature and not ready to adopt the new technologies.

Under this situation, one way out is to adopt a step by step approach to mechanization. Improved animal drawn implements provide a low cost alternative to farmers to enhance their income through lower cost of operation. This is because adoption of improved yokes and harnesses with improved implements results in increased field capacity thereby reducing cost of operation per hectare. The increased earnings can then be further reinvested. By so doing farmer can ultimately go in for complete mechanization with power operated implements and machinery.

A typical case of an enterprising farmer of Odisha is presented who adopted improved animal drawn implements and with his additional earnings adopted completely mechanized farming with power operated machinery within a space of 7-8 years. Improved animal drawn implements, served as a stepping stone to completely mechanized farming.

PROFILE OF FARMER AND HIS INCOME IN 2002

Sri Laxmi Narayan Dash is an enterprising farmer staying in village Bentapur Sasan in Baliana block of district Khurda of Odisha State. He is 49 years old. His family consists of wife and two sons. He possesses 2.0 ha land out of which he cultivates his crop in 1.88 ha. He follows paddy – paddy rotation in 1.4 ha area and grows banana in 0.4 ha area. Potato is grown in 0.08 ha area. He had a pair of medium sized bullocks and cultivated his land using traditional bullock drawn implements. The details of the cost of operation for farm operations in paddy and potato, as well as gross and net income using traditional implements in 2002 are presented in Tables 1 and 2.



Table1: Cost of cultivation of paddy and potato crop using traditional animal drawn implements in 2002.

Sl. No.	Operation/ Inputs	Details	Cost Rs/ ha
1	Dry tillage	With own traditional plough and own pair of bullocks (field capacity 0.015 ha/h, bullock hiring rate with operator, Rs 150/day).	1667
2	Wet tillage	With local iron plough, 3 operation (field capacity 0.011 ha/h).	6818
3	Planking	Wooden planker once (field capacity 0.25 ha/h).	100
4	Seed	30 kg at rate of Rs 12/kg.	360
5	FYM & fertilizer	FYM – ½ tractor load Gromore – 150 kg MOP – 50 kg Urea – 40 kg	200 1200 250 600
6	Transplanting	Random manner – labour requirement 45 man days (labour wages Rs 80/day)	3600
7	Weedicide	Butachlor 1000 ml	300
8	Plant Protection	Manual knapsack sprayer operation (0.1 ha/h, labour wages Rs 80/day).	80
	Chemical	Thimate 12.5 kg	900
9	Harvesting	Manual labour 35 man-days	2800
10	Threshing	Bullock treading	900
Total			19795

Potato crop			
1	Tillage	Traditional plough 3 operations (field capacity 0.025 ha/h, Rs 150/day (6h) bullock hiring rate with operator)	5000
2	Planking	Wooden planker, 3 operations (0.25 ha/h)	300
3	Sowing	Manually, 15 man-days (Rs 80/day)	1200
4	Seed	Potato 12 q at rate of Rs 600/q	7200
5	Farmyard manure and fertilizer	Farmyard manure 25 trolley loads. Potash 125 kg at Rs 5/kg. Gromore 125 kg at Rs 5/kg.	10000 625 625
6	Medicines	-	1000
7	Spraying	Knapsack sprayer 0.1 ha/h (Rs 80/day labour).	80
8	Harvesting	Manually (25 man -days/h, labour Rs 80/day).	2000
Total			28030

Note: All assumptions on unit cost are based on current rates so as to offer an uniform basis of comparison (since inflation has resulted in increased unit costs).

Table 2: Gross and Net Income of the farmer on 2002 (based on current unit costs).

Sl. No.	Variable	Value Rs
1	Operating and input cost for growing paddy per season for 1.4 ha.	27713
2	Gross income from paddy crop per season considering the following; a. Average paddy yield 33 q/ha. b. Returns from paddy sale Rs 800/q. c. Average paddy straw yield 13 q/ha. d. Returns from paddy straw Rs 70/q	27310
3	Gross income per ha per season from paddy crop for 1.4 ha.	38234
4	Net income per year for paddy crop for 1.4 ha. (2 seasons)	21042
5	Operating and input cost for growing potato in 0.08 ha.	2242

6	Gross income per ha from potato crop per ha per season considering the yield 150 q/ha and returns Rs 600/q.	90000
7	Gross income from potato crop 0.08 ha per season.	7200
8	Net income from potato in 0.08 ha per season.	4958
9	Net income from growing banana in 0.4 ha area (as reported by farmer and converted to current rates).	25000
10	Total net income from growing paddy in 1.4 ha for 2 seasons and banana in 0.4 ha and potato for 1 season in 0.08ha.	51000

In order to reduce errors due to difference in unit cost prices during 2002 and current position due to inflation, all assumptions in cost was made at current rates. As seen in Table 1 and 2, the total net income of farmer obtained by growing paddy in 1.4 ha in two seasons, potato in 0.08 ha in one season and also from banana cultivation was Rs 51000/-. As informed by farmer, the total annual expenditure for maintaining family per year was Rs 50000/- in 2002. As per current estimates this may be estimated at Rs 75000/-. He was therefore unable to meet requirements of expenses for his family. To meet his requirements he was engaged in activity of procuring paddy from farmers of his locality during harvesting season, hoarding them and then selling them later at higher price. He slowly became disillusioned and wanted to give up agriculture and take up vegetable selling.

INTRODUCTION OF PACKAGE OF IMPROVED ANIMAL DRAWN IMPLEMENTS BY FARMER

The turning point in career of the farmer Laxmi Narayan Dash came in the year 2003 when he witnessed the demonstration of bullock drawn puddler organized by Bhubaneswar Centre of AICRP on UAE at village Dedhalo, 2 km away from his village. He was impressed with demonstration and contacted the Scientists of

AICRP on UAE regarding improved animal drawn implements. Considering the interest shown by him, he was selected as one of the beneficiaries under Village Saturation Programme (VSP) of the Project. The package of animal drawn implements was as follows;

- a. Paddy crop
 - Improved OUAT yoke, Bullock drawn MB plough (Bose plough), OUAT animal drawn puddler, animal drawn interculture plough + electric motor operated manually fed hold on type paddy thresher.
- b. Potato crop
 - OUAT yoke, Bullock drawn MB plough, bullock drawn disc harrow, bullock drawn planker, electric motor operated 1 hp pump, animal drawn potato digger.

The details of the above equipment are as follows;

- 1. OUAT improved yoke
 - This yoke was developed keeping in mind the hump of bullocks found in Orissa. The main feature was the increase of contact area at neck and hump. As compared to 48.6 cm² contact area of local yoke, the contact are of OUAT yoke was 70.12 cm². This brought about 7-8% increase in draughtability of animals.

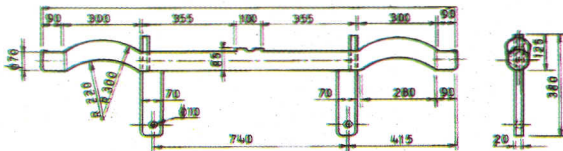
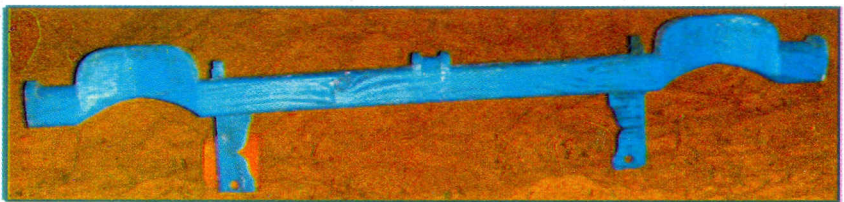


Fig : OUAT improved yoke

2. Animal drawn MB Plough

150 mm MB plough popularly known as Bose plough was adopted. Weight of plough was 7 kg. Draught required for ploughing varied for 55-60 kgf. Field capacity of plough was 0.05 ha/h.

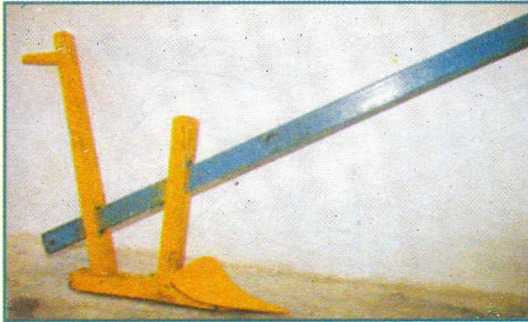


Fig : Animal operated MB plough (Bose Plough)

3. Animal drawn Disc harrow

Animal drawn 4 disc harrow was used for secondary tillage in potato crop. Field capacity of harrow was 0.2 ha/h.

4. Animal drawn Interculture plough

This was used for paddy thinning. Working width of plough was 150 mm and draught required was 440-490 N. Cost of plough was Rs 190/-.



Fig : Animal drawn interculture plough

5. OUAT puddler

This was used in paddy cultivation for wet tillage and puddling. Working width of puddler was 0.95 m. Field capacity of unit was 0.1 ha/h. Draught requirement was 550 N.

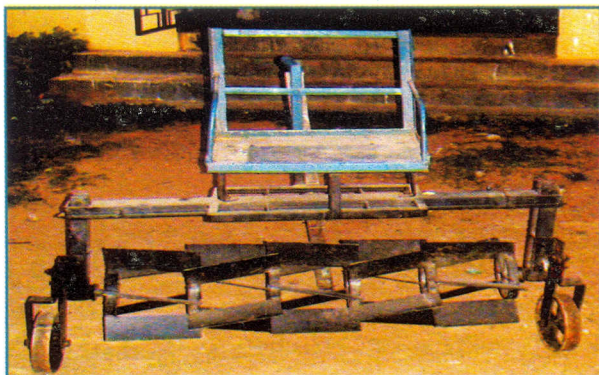


Fig : Animal drawn OUAT puddler

6. OUAT animal drawn potato digger

The OUAT animal drawn potato digger weighed 9 kg and had a working width of 300 mm. This was suitable for digging of potatoes by medium size bullocks of Orissa. Field capacity of unit was 0.05 ha/h.



Fig : Animal drawn OUAT potato digger

BENEFITS OF IMPROVED PACKAGE OF ANIMAL DRAWN IMPLEMENTS AND PROGRESS MADE BY FARMER

Sri Laxmi Narayan Dash started cultivation of paddy and potato crops with improved package of equipment from Rabi season of 2004. Details of cost of operation is presented in Table 3. The unit cost are as per current rates

Table 3: Cost of cultivation of paddy and potato with improved package of equipment.

Sl. No.	Operation/ Input	Details	Cost Rs/ha
Paddy Crop			
1	Dry tillage	MB plough once (field capacity 0.03 ha/h).	833
2	Wet tillage	OUAT puddler – 2 operations (field capacity 0.1 ha/h, bullock hiring rate, Rs 150 /day with one operator and Rs 80/day for one additional labourer).	660
3	Planking	Not required	-
4	Seed	30 kg at Rs 12/Kg.	360
5	Farm yard manure and fertilizer	Farmyard manure – ½ tractor load Growmore – 150 kg MOP – 50 kg Urea – 40 kg	200 1200 250 600
6	Transplanting	Transplanting in lines 50 mandays.	4000
7	Weedicide	Butachor – 1000 ml.	300
8	Plant Protection	Manual knapsack sprayer operation (0.1 ha/h, labour wages Rs 80/day).	80
	Chemical for plant protection	Thimite – 12.5 kg.	900
9	Harvesting	Manual labour 35 man days.	2800
10	Threshing	Electric motor operated hold on tyre thresher.	825
Total			13008

Potato crop			
1	Primary tillage	With animal drawn MB plough once (field capacity 0.03 ha/h).	833
2	Secondary tillage	Disc harrow one operation (Field capacity 0.2 ha/h) with planker.	125
3	Sowing	Manually – 15 man days, Rs 80/day.	1200
4	Seed	Potato 12 q at rate of Rs 600/q.	7200
5	Farm yard manure and fertilizer	Farm yard manure 25 trolley at Rs 400 per trailer.	10000
		Potash 125 kg at Rs 5/ kg.	625
		Gromore 125 kg at Rs 5/ kg.	625
6	Medicines	-	1000
7	Spraying	Knapsack sprayer 0.1 ha/h (Rs 80/day labour).	80
8	Harvesting	By animal drawn potato digger (Field capacity 0.05ha/h).	500
Total			22188



MB plough



Four disc harrow



OUAT puddler

Fig 6: Improved animal drawn implements in operation.

From Table 3 it is seen that the cost of operation per ha was reduced from Rs 19795/- per season for paddy crop to Rs 13008/- and for potato crop from Rs 28030 to Rs 22188/- per ha. The saving in operating paddy in two seasons in 1.4 ha thus works out to Rs 9502/-. Similarly the saving in cultivation and input cost for potato crop per has in one season works out to 5842/- ha. The saving in 0.08 ha works out to Rs 467/-. Thus total benefit by introducing improved implements was Rs 9969/- ha.

The farmer Mr. Dash got encouraged with additional savings obtained in 2004 and 2005. From 2006, in addition to cultivating his own land, he took another 1.2 ha area land on lease for cultivation purpose. The condition was that he would meet all the operational expenses and cost of inputs and would also deposit 6.25 q of paddy per hectare. The gross and net income of farmer after taking land on lease is shown in Table 4.

Table 4: Gross and Net Income of farmer in 2006.

Sl. No.	Variable	Value Rs
A. From own land		
1	Gross returns from paddy in 1.4 ha own land (2 seasons)	76468
2	Gross returns from potato in 0.08 ha own land (1 season)	7200
3	Total gross returns from paddy and potato	83668
4	Operating and input cost for growing paddy in 1.4 ha in 2 seasons	36422
5	Operating and input cost for growing potato in 0.08 ha	1775
6	Total operating and input cost for growing paddy and potato in own land	38197
7	Net profit from paddy and potato in own land	45471
8	Net profit from growing banana crop in 0.4 ha	25000
	Total net profit from own land	70471
B. From lease land of 1.2 ha		
1	Gross income from paddy crop per ha per season considering the following: a. Average paddy yield 26.75 q/ha (33-6.25). b. Returns from paddy sale Rs 800/q.	22135

	c. Average paddy straw yield 10.5 q/ha. d. Returns from paddy straw Rs 70/q.	
2	Gross income during year for growing paddy in 1.2 ha lease land. (2 seasons)	53124
3	Operating and input cost for growing paddy in 1.2 ha in 2 seasons	31220
Total profit from paddy in lease land		21904
Total net income from own land and lease land		92375

From Table 4 it is seen that by adopting improved animal drawn equipments, the farmer was able to increase the command area of pair of bullocks from 1.4 to 2.68 ha. By taking 1.2 ha of land on contract, he was able to increase his income from Rs 51000 to Rs 92375/-, an increase of 81.13%. He had surplus income of Rs 17375/-.

In the year 2007 the farmer purchased two sets of improved implements and a pair of bullocks. He increased the lease land for contract farming to 4.8 ha. This increased his income to Rs 1.22 lakhs which was more than double of his original income. With his increased income he purchased a power operated paddy thresher and a self propelled vertical conveyor reaper at a subsidy cost of Rs 9500/- and Rs 37500/-. He then increased the lease land for contract farming to 6.0 ha in 2008. From his profits he next purchased a power tiller at a subsidy cost of Rs 81000/-. His net annual income was over Rs 2.0 lakh by end of 2009. He is continuing the good work and is planning to purchase a self propelled rice transplanter from his profits.

CONCLUSION

The above is a real life illustration of the growth of a small farmer who owned a bullock pair and traditional implements and who could not earn enough income to meet his annual expenses of running a family. The farmer in course of time was able to become a progressive farmer through introduction of package of improved animal drawn implements and later switch to totally mechanized power operated machinery for farm operations. This Success Story practically illustrates how a Package of Improved Animal drawn Equipment served as Stepping Stone to Total Mechanization.

