ECONOMICS OF PRODUCTION OF GREEN FODDERS IN MAHARASHTRA OF INDIA

SHRI. B.T. KAMBLE, DR. J. S. KUMBHAR, SHRI. ANIL. S. GAWALI

Abstract: India is basically an agricultural country and nearly three-fourth population depends on agriculture, livestock and allied sectors for livelihood. Nearly 70 percent of country population lives in rural areas. Furthermore, of the 40.7 crore poor in the country, about 80 percent are rural poor. Livestock plays an important role in the rural economy of the country. Livestock is a key source of supplementary income and livelihood especially for small landholdings and landless rural poor households.

The costs and returns analysis for various fodder crops were helpful to examine the relative profitability of these crops in the region in order to ensure fodder supply through extensive cultivation. In view of this, "Economics of production and marketing of Green fodder (Jowar and Maize) in Western Maharashtra" is under taken for study and objectives are To estimate the resource use patternand to estimate per hectare costs and returns.The primary data regarding fodder crops for the year 2012-13 was collected in designed schedule. Thetotal 90 samples irrespective of size groups were selected for two fodder crop separately.

It can be concluded that, the per hectare human labour use was 42.05 and 89.46 mandays, the bullock labour use and manure use was at par for maize and jowar fodder cultivation. The per hectare cost of cultivation for maize and jowar was ` 33143.46 and          ` 48571.91, the per quintal cost of cultivation for maize and jowar was ` 140.93 and ` 156.48 and B:C ratio of 1.49 and 1.60 respectively. The estimates of the production function human labour, Manure, Nitrogen, Phosphorus and Irrigation are the important resource variables contributing on yield. Therefore, it is suggested that, the use of these resource variables has to be extended by the fodder growers to maximization of profit.

Introduction: India is basically an agricultural country and nearly three-fourth population depends on agriculture, livestock and allied sectors for livelihood. Nearly 70 percent of country population lives in rural areas. Furthermore, of the 40.7 crore poor in the country, about 80 percent are rural poor. Livestock plays an important role in the rural economy of the country. Livestock is a key source of supplementary income and livelihood especially for small landholdings and landless rural poor households.

In Maharashtra state, Western Maharashtra is leading in dairy enterprise which is subsidiary occupation of the majority of farming community. With increase in the pressure on land due to urbanisation and industrialisation and decrease in the area under fodder and food crops coupled with increasing demand for milk and milk products, the dependency of livestock / dairy farmers on external or purchased inputs has also increased and it is putting pressure especially on the resource poor dairy farmers. Efforts are being made and underway for reducing the gap between the requirement and availability of feeds and fodders through technological interventions to increase the yields, bringing more area under fodder crops.

The costs and returns analysis for various fodder crops will be helpful to examine the relative profitability of these crops in the region in order to ensure fodder supply through extensive cultivation. In view of this, **"Economics of production and marketing of Green fodder (Jowar and Maize) in Western Maharashtra"** is under taken for study and with the objectives shown below.

Objectives of the study:
- To estimate the resource use pattern.
- To estimate per hectare costs and returns.
- To study the marketing costs and problems faced in production of green fodder.

Methodology:

Selection of Study area: The Western Maharashtra is leading region in the production of Jowar and Maize fodder crop. The primary data regarding fodder crops for the year 2012-13 was collected in designed schedule.

Sampling : The Ahmednagar, Pune and Solapur districts were selected purposively and three tahsil having maximum area under fodder crop was considered for collection of sample. From each tahsil one village was selected. Thus,total 90 samples irrespective of size groups were selected for two fodder crop separately. i. e. Jowar (45) and Maize (45).

Table 1 Distribution of Sample for Maize and Jowar (Green Fodder)					
Sr. No.	District	Tahsil	Village	No. of Sample	
				Maize	Jowar
1	Ahmednagar	A' nagar	Kamargaon	5	5
		Karjat	Kuldharan	5	5
		Rahuri	Sade	5	5
2	Pune	Daund	Lingali	5	5
		Baramati	Wadgaon(Nimbalkar)	5	5
		Shirur	Talegaon (Dhamdhere)	5	5
3	Solapur	Malshiras	Khudus	5	5
		Mohol	Ankoli	5	5
		Madha	Ropale	5	5
	Total			45	45

Analysis of data: In the present investigation, the data was compiled and analyzed. Simple statistical tools such as arithmetic mean average, percentage and ratios were used.

Cobb Douglas production function was used for estimating factors influencing total production.

$$Y = a\, x_1 b^1\, x_2 b^2\, x_3 b^3\, x_4 b^4\, x_5 b^5 \ldots\ldots x_n{}^{bn}\, e$$

Where.

Y= Yield (qtls)

x_1= Total human labour (man/days)

x_2= Bullock labour (man days)

x_3 = Manures (qtls)

x_4= Machine labour (hrs.)

x_5= N fertilizer (qtls)

x_6= P fertilizer (qtls)

x_7= K fertilizer (qtls)

x_8= Irrigation (`)

a = constant

u = error term

bi's= regression coefficients of respective explanatory variable

Result and Discussion:

Resource Use level: The per hectare resource use levels of green maize fodder and jowar cultivation is presented in Table 2.

Table 2 Per hectare resource use levels of maize and jowar (Green fodder)			
Sr. No.	Particulars	Maize	Jowar
1	Total human labour (Days)	42.05	89.46
	a) Male	18.65	75.92
	b) Female	23.40	13.54
2	Bullock labour (pairdays)	8.05	9.59
3	Machine power (hrs)	8.20	5.72
4	Seed (Kgs)	64.00	60.39
5	Manures (qtls)	33.81	40.18
6	Fertilizers (Kgs)		
	N	47.74	70.08
	P	8.22	9.40
	K	7.93	7.71
7	Irrigation charges ((`)	506.26	497.74

The per hectare human labour use was 42.05 and 89.46 mandays which were doubled for jowar fodder cultivation. The bullock labour use and manure use was at par for both fodder cultivation. The seed required was 64 and 60 kg for maize and jowar cultivation. The irrigation charges were at par. The fertilizer nitrogen uses 47.74 kg and 70.80 Kg for maize and jowar cultivation.

Per hectare Cost of cultivation: The item wise per hectare cost of cultivation of green fodder maize and jowar is presented in Table 3.

The per hectare cost of cultivation for maize was ` 33143.46 and jowar was ` 48571.91. The per quintal cost of cultivation for maize was `` 140.93 and jowar was ` 156.48. The production of green fodder was 235.17 and 310.40 quintals per hectare for maize and jowar, respectively. The per cent labour cost was 22.14 and 35.44 for maize and jowar cultivation. The major item of cost was seed, manures and rental value of land constituting 3, 4 and 25 per cent of the total cost of cultivation.

Sr.No.	Cost items	Maize				Jowar			
Table 3 Itemwise per hectare cost of cultivation of green fodder maize and jowar (`/ha)								
1	Total human Labour	Qty	Rate	Value	%	Qty	Rate	Value	%
	a) Male	4.08	200.00	815.30	2.46	5.74	200.00	1148.38	2.36
	b) Female	11.37	150.00	1706.03	5.15	5.39	150.00	807.83	1.66
2	Bullock labour (Pair days)	8.05	662.15	5333.39	16.09	9.59	667.38	6401.81	13.18
3	Machine power (hrs)	8.20	214.85	1761.52	5.31	5.72	205.51	1175.78	2.42
4	Seed (Kgs)	64.00	22.97	1469.81	4.43	60.39	25.00	1509.75	3.11
5	Manures (Qtls)	33.81	100.00	3380.90	10.20	40.18	100.00	4018.00	8.27
6	Fertilizer (kgs)								
	N	47.74	20.90	997.90	3.01	70.08	20.78	1456.55	3.00
	P	8.22	25.70	211.26	0.64	9.40	25.57	240.37	0.49
	K	7.93	11.12	88.13	0.27	7.71	11.19	86.27	0.18
7	Irrigation charges (`)			506.26	1.53			497.74	1.02
8	Plant protection			0.00	0.00			0.00	0.00
9	Incidental charges			360.26	1.09			291.72	0.60
10	Repairs			516.93	1.56			331.05	0.68
	Working capital			**17147.69**	**51.74**			**17965.25**	**36.99**
11	Int on working capital			1028.86	3.10			1077.92	2.22
12	Depreciation			675.42	2.04			381.12	0.78
13	Land revenue and taxes			35.60	0.11			31.14	0.06
	Cost-A			**18887.58**	**56.99**			**19455.43**	**40.05**
14	Rental value of land			8195.35	24.73			12902.19	26.56
15	Int on fixed capital			1342.41	4.05			955.79	1.97
	Cost-B			**28425.34**	**85.76**			**33313.41**	**68.59**
16	Family labour								
	a) Male	14.57	200.00	2913.95	8.79	70.18	200.00	14036.00	28.90
	b) Female	12.03	150.00	1804.17	5.74	8.15	150.00	1222.50	2.52
	Cost-C			**33143.46**	**100.00**			**48571.91**	**100.00**
17	**Output**								
	Main -produce (qtls)	235.17	210.00	49385.70		310.40	250.00	77600.00	
	Bye-produce (qtls)			0.00		0.00		0.00	
18	Cost-C net Bye-produce			33143.46				48571.91	
19	**Per Quintal cost**			**140.93**				**156.48**	

Cost and returns of jowar and maize: The per hectare costs, returns, gross income and B:C ratio for green fodder maize and jowar cultivation is presented Table 4.

Table 4 Per hectare costs, returns, gross income and B:C ratio for maize and jowar fodder (`/ha)			
Sr. No.	Particulars	Maize	Jowar
1	Total cost		
	i) Cost A	18887.58	19455.45
	ii) Cost B	28425.34	33313.41
	iii) Cost C	33143.46	48571.91
2	Profit at		
	i) Cost A	30498.12	58144.57
	ii) Cost B	20960.36	44286.59
	iii) Cost C	16242.24	29028.09
3	Production (Qtls)	235.17	310.40
4	Gross Income (`)	49385.70	77600.00
5	B:C Ratio		
	i) Cost A	2.61	3.99
	ii) Cost B	1.74	2.33
	iii) Cost C	1.49	1.60

The per hectare cost of cultivation of maize was ` 33143.46 and for jowar was ` 48571.91. The returns were to the tune of ` 16242.24 and ` 29028.09 with B:C ratio of 1.49 and 1.60 , respectively.

Production function analysis of maize and jowar fodder: The result of Cobb-Douglas production is depicted in table 5. The 'F' ratio from the analysis of variance has turn out to be highly significant, for jowar and maize fodder crop. The proportion of total variations explained jointly by the resource variables was 74 and 70 per cent of the total variations in maize and jowar crop, respectively. The regression coefficient of human labour, manure, N and irrigation for maize fodder and human labour, manure, N and phosphorus fertilizers for jowar fodder, were positive and significant at 10 and 5 per cent level, which indicated the major contribution of these variables on the output. The regression coefficients of bullock labour, machine labour and potassic fertilizers were non significant indicated low influence on the output.

Table 5 Results of Cobb-Douglas production function for Maize and jowar fodder				
Sr.No.	Items	Variables	Maize	Jowar
1	Constant	(a)	0.2866 (0.3927)	0.7012 (0.6365)
2	Human Labour	(X_1)	1.9604 *** (1.0106)	2.8347** (1.2214)
3	Bullock Labour	(X_2)	0.2092 [NS] (0.4157)	0.7661 [NS] (1.2214)
4	Machine Labour	(X_3)	0.7602 [NS] (0.8698)	0.4087 [NS] (0.7494)
5	Manures	(X_4)	0.1737 ** (0.0692)	0.2479 ** (0.0943)
6	N	(X_5)	1.8765 ** (0.9284)	0.7639 ** (0.2845)
7	P	(X_6)	0.1534 [NS] (0.8618)	0.6076 *** (0.3159)
8	K	(X_7)	1.2181 [NS] (1.0371)	0.3156 [NS] (0.6604)
9	Irrigation Cost	(X_8)	0.0648 ** (0.0257)	0.8460 (0.4196)
8	R^2		0.7422	0.7066

(Figure in the parentheses are standard error of respective variable)

Note:- *, **, *** indicates the level of significance at 1,5 and 10 per cent.

Conclusions: From the results it can be conclude that,

1. The total members of family were 4.34 for maize and 4.98 for jowar sample farms.

2. The total land holding was 2.27 for maize and 1.96 hectares for jowar sample farms. The gross cropped area was 3.57 and 3.50 hectares, respectively.

3. The cropping pattern was dominated by cereals which ranged 43 and 41 per cent for maize and jowar sample farms.

4. The per farm capital assets were ` 99594.73 on maize and ` 865275.34 for jowar sample farms.

5. The per hectare human labour use was 42.05 and 89.46 mandays, the bullock labour use and manure use was at par for maize and jowar fodder cultivation.

6. The per hectare cost of cultivation for maize and jowar was ` 33143.46 and ` 48571.91, the per quintal cost of cultivation for maize and jowar was ` 140.93 and ` 156.48 and B:C ratio of 1.49 and 1.60 respectively.

7. The production function indicated that human labour, manure, N and irrigation for maize fodder and human labour, manure, N and phosphorus fertilizers for jowar fodder, were the most important variables to increase yield.

Suggestions: The estimates of the production function indicated that, human labour, Manure, Nitrogen, Phosphorus and Irrigation are the important resource variables contributing on yield. Therefore, it is suggested that, the use of these resource variables has to be extended by the fodder growers to maximization of profit.

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Shri.B.T. Kamble/ Dr. J. S. Kumbhar /Shri.Anil. S. Gawali /
Department of Agriculture economics/Mahatma Phule Krishi Vidaypeeth/
Rahuri, Dist. Ahmednagar (M.S.)