



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Vol XXXV
No. 4

ISSN 0019-5014

CONFERENCE
NUMBER

OCTOBER-
DECEMBER
1980

INDIAN JOURNAL OF AGRICULTURAL ECONOMICS



INDIAN SOCIETY OF
AGRICULTURAL ECONOMICS,
BOMBAY

Economics of Livestock Enterprise with Special Reference to Its Employment Potential

ROLE OF DAIRY AND POULTRY ENTERPRISES FOR INCREASING INCOME AND EMPLOYMENT ON FARMS IN THE UNION TERRITORY OF DELHI

A. S. Sirohi, B. M. Sharma, Ikbal Singh and Rameshwar Dayal*

In India the average size of holding of the farmers and their income are among the lowest in the world. Disguised employment of labour is one of the important factors for low income of the rural people. Unless the pressure of population is decreased on the land through rural industrialisation or migration of people from the villages to the cities, there can be two possible ways to augment the income and employment of the small farms. These are (i) increasing the net returns of crops per unit of land per year and (ii) increasing the income of the farmers through subsidiary enterprises like dairy and poultry which can be easily carried on these farms. The farms of the Union Territory of Delhi have a greater scope of dairy and poultry enterprises because of the existence of large demand for dairy and poultry products from the people of the metropolitan city of Delhi. The Delhi Milk Scheme has a large network of milk collection centres scattered in the Union Territory of Delhi. In view of the fact that the quantity and quality of protein in the total food production in the country is very low, the increase in the production of milk and poultry products carries added importance for agricultural development in the country. It is in view of this fact that efforts for white revolution is gaining importance in the country.

This study was therefore undertaken to examine the possibilities of increasing income and labour employment through dairy and poultry enterprises on various sizes of farms in the Union Territory of Delhi. An attempt has been made in this study to optimize the use of farm resources such as land, labour, irrigation water, fertilizer and capital including the bank loans for production of crops, dairy and poultry products for maximizing farm income.

The main objectives of the study were (i) to work out the optimal farm plans of marginal farms, small farms, and medium farms with the availability of credit facilities; (ii) to determine the cropping pattern for mixed farms using dairy and poultry along with crops and to examine the changes needed in the cropping pattern for maximizing the net returns of the farmers; (iii) to examine the increase in human labour employment including the hired labour in various months due to optimization of resources and use of dairy and poultry on marginal, small and medium farms; (iv) to compare the scope of human labour employment due to mixed farming between various sizes of farms; (v) to examine and compare the increase in farm income due to

* Division of Agricultural Economics, Indian Agricultural Research Institute, New Delhi-12.

optimization of resources and use of dairy and poultry enterprises on marginal, small and medium farms; and (vi) to determine the amount of credit needed for mixed farming on the three sizes of farms.

METHODOLOGY

The data for this study were obtained by survey method from the farmers of the Bawana village selected purposely from the Kanjawala block of the Union Territory of Delhi. Bawana village is situated at a distance of 45 km. in the north-west of Delhi and has a Delhi Milk Supply scheme milk collection centre. The data for this study were collected from three categories of farm sizes, namely, marginal farms (upto one hectare), small farms (1 to 2.5 hectares), and medium farms (2.5 to 5.0 hectares). A sample of 20 per cent of the total population of farms was selected randomly from each of the three categories of farms. Thus, in all 72 farms (18 marginal, 28 small and 26 medium farms) were included in the sample.

The data on prices, inputs and outputs of crops, dairy and poultry, crop area constraint, minimum feed and fodder requirements were collected from the farmers by interviewing them with the help of a questionnaire designed for the study. The data were collected for the agricultural year 1978-79.

Linear programming was used as the analytical tool for working out optimum farm plans at two levels of cash availability and three levels of mixed farming, *viz.*, crops, crop plus dairy and crops plus dairy plus poultry. The total returns of crops, dairy and poultry were maximized subject to the constraints of land, labour, fertilizer, working capital and minimum feed and fodder and crop area constraints. Average resource availability levels were worked out from synthetic farm situation for each of the three categories of farms. The linear programming model used for maximization of the objective function is given below:

Model

$$\text{Maximize, } Z = \sum_{j=1}^n c_j X_j - \sum_{t=1}^{12} w_t L_t - r_k - P_f F - P_e G_e$$

Subject to,

$$\sum_{j=1}^n a_{uj} X_{uj} \leq A_u \quad \dots \quad (\text{land constraints})$$

$$\sum_{j=1}^n d_{tj} X_{tj} - L_t \leq N_t \quad \dots \quad (\text{labour constraints})$$

$$\sum_{j=1}^n b_j X_j - K \leq H \quad \dots \quad (\text{capital constraints})$$

$$\sum_{j=1}^n f_{ij} X_{ij} - F_i \leq B_i \quad \dots \quad (\text{fertilizer constraints})$$

$$\sum_{j=1}^n g_{ej} X_j - G_e \geq D_e \quad \dots \quad (\text{Minimum feed and fodder constraints})$$

$$\sum_{j=1}^n s_j X_j \geq Q \quad \dots \quad (\text{Minimum cereal constraints})$$

$$\sum_{j=1}^n X_j \leq T_y \quad \dots \quad (\text{Maximum crop area constraints})$$

$$\sum_{j=1}^n v_j X_j \leq M \quad \dots \quad (\text{farmyard manure constraints})$$

$$X_j \geq 0, L_t \geq 0, F \geq 0 \text{ and } G \geq 0$$

where

Z = total net returns of the farm in rupees,

X_j = units of i th crop or livestock process and

C_j = net returns per unit of the crop or livestock process (Rs.),

L_t = units of labour man-days in t th period and

W_t = wage rate per man-day (Rs.)

K = capital borrowed in rupees and

r = annual rate of interest,

F = quantity of fertilizer in quintals and

P_f = price of fertilizer in rupees per quintal,

G_e = quantity of eth feed and fodders in quintals and

P_e = price of eth feed or fodders in rupees per quintal,

a_{uj} = input coefficient of u th land for j th crop or livestock process and

A_u = available quantity of u th type of land in hectare,

d_{tj} = input coefficient of t th period labour for j th crop or livestock process (man-days) and

N_t = number of available man-days of family labour in t th period,

b_j = input coefficient of capital in rupees for j th crop or livestock process and

H = available working capital in rupees,

f_{ij} = input coefficient of i th fertilizer in quintals for j th crop or livestock process and

B_i = available quantity of i th fertilizer in quintals,

g_{ej} = yield of eth feed on fodders in quintals from the j th crop process and

D_e = minimum required quantity in quintals of eth yield or fodders,

s_j = yield of cereals from the j th crop process and

Q = minimum quantity of cereals required in quintals,

T_y = maximum allowable area of y th group of crop process,

v_j = coefficient of farmyard manure for j th crop or livestock process,

M = quantity of available farmyard manure in quintals.

RESULTS

Optimization of farm resources including the capital borrowed from banks and the use of poultry and dairy enterprises not only increased the net returns on all the sizes of farms but also led to significant changes in the cropping pattern and increase in the employment of farm family labour and hired labour during most of the months. The results of this study are, therefore, described under the sub-heads of (i) Farm net returns, (ii) Cropping pattern and (iii) Labour employment. Since dairy and poultry enterprises played

a greater role in the case of marginal farmers, this category of farms are dealt in greater detail in this study.

Effect of Resource Optimization, Dairy and Poultry on Farm Returns

The net returns and cropping pattern of the three categories of farms, namely, marginal farms, small farms and medium farms under the existing as well as under the optimal plans with dairy, poultry and credit facilities are given in Table I. The cropping pattern and farm returns of the marginal farms with and without dairy or dairy plus poultry are given in Table II. It may be seen from these tables that on marginal and small farms, the returns could be increased to about two and a half times. On medium farms the potential was much less than that on small farms. The largest increase was on marginal farms (165 per cent) followed by the small farms (148 per cent) and the medium farms (21 per cent).

It may be seen from Table I that in the existing plan, there was no poultry enterprise on the sampled farms. The optimal plan suggested a poultry enterprise with 489 birds on marginal farms and 269 birds on small farms. This was the reason of the large increase in the income of small and marginal farmers. The introduction of poultry enterprise on marginal and small farms was possible only if liberal credit facilities were made available to these farmers for this enterprise. The largest need for borrowed capital was noticed on marginal farms (Rs. 23,925) followed by small farms (Rs. 14,355) and medium farms (Rs. 11,784). A comparison of columns (3), (4) and (5) in Table II indicates that the marginal farmers required a credit of Rs. 1,500 for dairy enterprise and Rs. 9,000 for poultry enterprise. Besides this, the optimal plan suggested an improved cow in place of a buffalo on small and marginal farms and two improved cows in addition to a buffalo on medium farms for increasing the farm returns.

A comparison of column (2) with column (4) in Table II indicates that the farm returns could be increased by 32 per cent due to resource optimization with credit facilities. The effect of resource optimization and credit facilities was so high that the optimal plan with crops alone yielded 22 per cent higher income than the existing plan with one dairy cattle. Comparison of columns (3) and (4) in the table indicated the effect of poultry. By the introduction of poultry enterprise alone, the marginal farmers could increase their income by 100 per cent. Thus the introduction of poultry enterprise with resource optimization and credit facilities could increase the income by 165 per cent.

Effect of Resource Optimization, Dairy and Poultry on Cropping Pattern

The effect of poultry enterprise with resource optimization and credit facilities may be seen in Table I. The optimal plans suggested the cultivation of high-yielding varieties of wheat in place of *desi* wheat. Another important change suggested was to decrease the area under jowar and to put some area under sugarcane, vegetable crop like *bhindi* and cowpeas (fodder crop) which were not grown in the existing plan. The optimal plan also

TABLE I—CROPPING PATTERN, INCOME AND LABOUR EMPLOYMENT UNDER EXISTING PLAN WITH DAIRY AND OPTIMAL PLANS WITH DAIRY AND POULTRY ON VARIOUS SIZE OF FARMS

Particulars	Marginal farms (0·81 hectare)		Small farms (1·62 hectare)		Medium farms (3·85 hectares)	
	Existing plan	Optimal plan	Existing plan	Optimal plan	Existing plan	Optimal plan
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Kharif</i> crops (hectare)						
Bajra-HB 4	0·40	0·20	0·41	0·48	1·62	1·25
Jowar (fodder crop) ..	0·41	0·47	1·21	0·80	2·22	1·70
Cotton	—	—	—	0·20	—	0·50
<i>Rabi</i> crops (hectare)						
Wheat local	0·81	—	1·62	—	—	—
Wheat 1553	—	0·32	—	0·48	—	0·80
Wheat 306	—	0·34	—	0·39	2·22	1·70
Wheat 2009	—	—	—	0·20	—	0·50
Gram	—	—	—	0·25	—	0·45
Lentil	—	—	—	0·16	—	—
Onion	—	—	—	—	0·81	—
Tomato	—	—	—	—	0·41	—
Peas	—	—	—	—	0·41	—
<i>Zaid</i> crops (hectare)						
Sugarcane	—	0·07	—	0·08	—	0·31
<i>Bhindi</i>	—	0·20	—	0·40	—	0·80
Cowpeas (fodder crop) ..	—	0·12	—	—	—	—
Total cropped area (hectare)	1·62	1·72	3·34	3·44	7·69	8·01
Intensity of cropping (per cent)	200	212	200	212	200	208
Number of cows (Sahiwal)	—	1	—	1	—	2
Number of buffaloes (Murrah)	1	—	1	—	1	1
Number of poultry ..	—	489	—	269	—	—
Family labour (days) ..	251	1,446	405	1,072	947	993
Hired labour (days) ..	—	79	—	72	93	260
Total labour (days) ..	251	1,525	405	1,144	1,046	1,253
Owned capital (Rs.) ..	3,731	3,731	4,917	4,917	7,684	7,684
Borrowed capital (Rs.) ..	—	23,925	—	14,355	—	11,784
Total capital (Rs.) ..	3,731	27,656	4,917	19,272	7,684	19,468
Total net returns (Rs.) ..	4,769	12,661	5,793	14,353	20,796	25,113

TABLE II—CROPPING PATTERN, INCOME AND LABOUR EMPLOYMENT UNDER EXISTING AND OPTIMAL PLANS ON MARGINAL FARMS WITH AND WITHOUT DAIRY AND POULTRY ENTERPRISES

Particulars	Existing plan		Optimal plans	
	Crop+dairy	Crop+dairy +poultry	Crop+dairy	Crop
(1)	(2)	(3)	(4)	(5)
<i>Kharif</i> crops (hectare)				
Bajra HB 4	0.40	0.20	0.20	0.20
Jowar (fodder crop)	0.41	0.47	0.57	0.33
Cotton	—	—	—	0.20
<i>Rabi</i> crops (hectare)				
Wheat local	0.81	—	—	—
Wheat 1553	—	0.32	0.49	0.20
Wheat 306	—	0.34	0.28	0.33
Whea 2009	—	—	—	0.20
<i>Zaid</i> crops (hectare)				
Sugarcane	—	0.07	—	0.08
<i>Bhindi</i>	—	0.20	0.20	0.20
Cowpeas (fodder crop)	—	0.12	0.29	—
Total cropped area	1.62	1.72	2.03	1.74
Intensity of cropping (per cent) ..	200	212	250	215
Number of cows (Sahiwal)	1	1	1	—
Number of buffaloes (Murrah) ..	—	—	—	—
Number of poultry	—	489	—	—
Family labour (days)	251	1,446	307	262
Hired labour (days)	—	79	—	—
Total labour (days)	251	1,525	307	262
Owned capital (Rs.)	3,731	3,731	3,731	1,964
Borrowed capital (Rs.)	—	23,925	1,551	113
Total capital (Rs.)	3,731	27,656	5,282	2,067
Total net returns (Rs.)	4,769	12,661	6,282	5,812

TABLE III—MONTHLY HUMAN LABOUR EMPLOYMENT UNDER EXISTING PLAN WITH DAIRY AND OPTIMAL PLANS WITH DAIRY AND POULTRY ON DIFFERENT SIZES OF HOLDINGS

(man-days)

Months	Marginal farms			Small farms			Medium farms		
	Avail-ability	Exist-ing plan	Opti-mal plan	Avail-ability	Exist-ing plan	Opti-mal plan	Avai-labi-ity	Exist-ing plan	Opti-mal plan
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
June ..	125	7	125	100	36	101 (1)	100	22	107 (7)
July ..	100	18	135 (35)	80	13	103 (28)	80	13	112 (32)
August ..	110	30	129 (19)	88	36	98 (10)	88	50	112 (24)
September ..	120	29	120	96	35	98 (2)	96	95	107 (11)
October ..	125	8	127 (2)	100	54	94	100	154 (54)	107 (7)
November ..	135	11	113	108	21	73	108	37	56
December ..	130	46	152 (22)	104	62	128 (24)	104	116 (12)	204 (100)
January ..	135	10	123	108	14	73	108	97	43
February ..	125	9	101	100	13	60	100	114 (14)	39
March ..	130	40	124	104	14	84	104	106 (2)	67
April ..	135	27	135	103	57	110 (2)	108	113 (5)	145 (37)
May ..	140	16	141 (1)	112	50	117 (5)	112	125 (13)	154 (42)
Total employ-ment of labour (man-days) ..	1,510	251	1,525	1,208	405	1,144	1,208	1,047	1,253
Increase in labour utili-sation (per cent) ..			508			182			20

Note :—Figures in parentheses indicate the hired human labour in the respective months.

included some area under pulse crops like gram on small and medium farms and lentil on small farms, which were not grown earlier on any of these farms. The comparison of optimal plans of marginal, small and medium farms showed that crops like cotton, gram and lentil were more suitable for small and medium farms than for marginal farms. An in-depth examination of the cropping pattern of marginal farms (Table II) indicated that cotton could be grown on marginal farms if dairy and poultry were not used as an enterprise. Another important noticeable point was that the area under cowpeas fodder needed to be introduced into the plan in place of cotton and partly wheat for maximizing the returns through dairy enterprise.

Effect of Resource Optimization, Dairy and Poultry on Labour Employment

Poultry enterprise with resource optimization and credit facilities increased the employment of labour on marginal, small and medium farms nearly in all the months of the year. In the existing plan of small and marginal farms, hiring of labour was not needed in any of the periods. But due to poultry enterprise with resource optimization and credit facilities the utilization of labour increased so much that these farms had to hire labour in several months.

The availability of family labour and employment of labour in various months of the year under existing and optimal plans of marginal, small and medium farms are given in Table III. The last but one row of the table gives the total employment of labour in man-days for the existing and optimal plans for the whole year. It may be seen from the table that under the optimal plans, the labour employment increased from 251 man-days to 1,525 man-days in a year on marginal farms. The employment of labour exceeded the availability of family labour by 79 man-days. Almost a similar situation was observed on small farms. On medium farms, the increase in labour employment was not that high, but here also the hiring of labour increased from 99 man-days to 260 man-days. On marginal and small farms, the increase in the employment of labour was largely due to the introduction of poultry enterprise. The largest increase in labour utilization was noticed in the case of marginal farms (508 per cent) followed by small farms (182 per cent) and medium farms (20 per cent). A comparison of labour utilization between various months in the optimal plans indicated that employment of labour was at its peak during the month of December on all farms. The month of February was noted to be the slack season, in which the utilization of labour was the lowest on all farms. The peak and lean period of utilization of labour in the existing and optimal plans differed only in the case of medium farms where, under the existing plan, the peak period was October and the lean period was July. The hiring of labour was needed in the months of July, August, October and December on marginal farms. These periods were almost identical with small farms. On medium farms, however, the hiring of labour was also needed in the months of June, September, April and May. The largest hiring of labour was needed in December followed by May and April.