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FEASIBILITY OF INSTITUTIONAL  
FINANCING FOR DAIRY DEVELOPMENT

by  
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**ABSTRACT (within 250 words)**

A commercial bank had undertaken an Integrated Development Project for dairy development in collaboration with a dairy plant. The scheme envisaged the supply of bank finances to the farmers for the purchase of quality cattle and repayments through milk supply to the dairy. A sample of beneficiaries were contacted to find out the impact of bank finances on their income. Also the impact of the scheme on the dairy's milk supply and the viability of this scheme as a commercial proposition was analysed. The findings of the study indicate that commercial lending institutions could join hands with organized dairies to advance money for purchasing cattle; this process would benefit the farmers, the dairy plants, and the bank. The implementation of such schemes could go a long way in improving the incomes of small farmers and at the same time increasing the production of milk in the milk shed areas of organized dairies.

Please indicate restrictions if any that the author wishes to place upon this note:

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*P.S. George*

Signature of Author

Date: June 24, 1974

## FEASIBILITY OF INSTITUTIONAL FINANCING FOR DAIRY DEVELOPMENT

P.S. George and U.K. Srivastava\*

### Introduction

Many developing countries have recognized the need for increasing milk production to augment the incomes of farmers and to improve the nutritional level of consumers. In India, a number of steps were taken by the government to increase the production of milk in rural areas. The organization of special programmes like the Intensive Cattle Development Programme and Operation Flood; encouragement to producer co-operative societies to organize procurement, processing, and marketing of milk and milk products; and the establishment of the National Dairy Development Board are examples of such activities.

It is generally accepted that increases in milk production in many developing countries can be achieved through improvements in the genetic characteristics of the animals, adoption of improved feeding and management practices, and establishment of organized markets for milk to bring a remunerative price to farmers. In a country, like India, with a substantial number of farmers having small holdings, it has been observed that small farmers can augment their farm income by diversifying their operations to include maintenance of dairy cattle. The major difficulty these small farmers face is raising adequate capital for initial investment. The purchase of quality cattle requires a substantial amount of initial investment. Small farmers cannot finance such investments from their own resources. In these circumstances it becomes necessary that some kind of institutional finance be arranged on reasonable terms and conditions. Often small farmers themselves are not in a position to organize such finances. Therefore, the organization of credit for the dairy development activities of farmers, especially for the purchase of milch animals, becomes an important production enhancement activity that can be undertaken by a dairy.

Often dairy plants may not have adequate resources to advance credit to farmers for the purchase of milch animal. Also, they may not have enough experience to undertake commercial lending activities. In such circumstances, a collaboration between a dairy plant and a commercial

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bank can turn out to be profitable for all concerned parties. Such an attempt was made in India by a cooperative dairy in collaboration with a major bank. This paper attempts to summarize the findings of a case study on this scheme. The study attempted to determine the impact of the scheme on the farmers, the viability of the loan as a commercial proposition, and the impact of the loan on the volume of milk collected by the dairy.

The paper is based on the information collected from a selected sample of borrowers under the scheme through a structured questionnaire and the data obtained from the bank, the dairy, and the village level cooperative society. The sample farmers were selected by using a multi-stage stratified random sampling procedure. First, four societies were identified where the programme was already in operation for at least one year at the time of the survey during March-April 1974. Next, about one-third of the farmers from these societies were selected. For this purpose the farmers in the four selected societies were classified on the basis of the size of their holdings and period of loan. From each cell about one-third of the farmers were selected. The distribution of the sample farmers is given in Table 1.

Table 1: Distribution of Sample Farmers

Size of the holding (acres)	Period of loan				Total
	Less than 3 months	3 to 6 months	6 to 12 months	1 to 2 years	
Up to 1.0	1	..	5	..	6
1.01 - 3.0	6	6	10	..	22
3.01 - 5.0	2	2	3	..	7
5.01 - 10.0	4	2	5	1	12
Above 10.0	2	1	2	8	13
Total	15	11	25	9	60

### The Scheme

In India there has been a marked increase in the advances given by commercial banks for agricultural purposes after the nationalization of banks in 1969. In the initial stages, banks generally helped the

relatively well off farmers because of the convenience involved in contacting them and the comparative low level of risk associated with the loan. But soon it was realized that bank finances would not achieve the desired purpose unless there was quality lending and effective supervision over the end use of such finances. The Reserve Bank of India in its guidelines to commercial banks laid emphasis on the adoption of a command area approach to finance a large number of activities on an integrated basis. But in the area of cattle development they found it difficult to exercise adequate supervision over the end use of credit and to ensure prompt repayment of loans. It was realized that financing a cattle development scheme would be most successful if it was undertaken in collaboration with dairy plants because dairies had a network of milk societies having direct contact with farmers. It was in this context that the commercial bank joined hands with the dairy to advance loan for purchasing milch animals.

The objective of the scheme was to enable the farmers to acquire milch cattle of better breed and thereby increase their income source and to improve the supply of milk to the dairy. In the first year, about 3,000 animals (2,000 cows, 850 buffaloes, and 150 cross-bred cows) were to be purchased subject to the availability of cattle of each type. The loans for the purchase of cattle and the repayment were to be arranged in cooperation with the dairy.<sup>1</sup> The steps involved in the execution and follow-up of the loan under this scheme are given in Exhibit 1.

#### Impact of the Finance on the Farmers

As mentioned earlier, the benefits to the farmers from the scheme are mainly on account of increased milk production and cash availability

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<sup>1</sup>The price of a milch cattle depended upon a number of factors like breed, stage of lactation, and milk yield. For the purpose of the scheme, the following average and maximum prices were assumed:

	Average (Rs)	Maximum (Rs)
Cows	1300	1500
Buffaloes	1600	2000
Cross-bred cows	2200	3000

with the farmers. Most of the farmers bought cattle in the second lactation after watching the performance of the first lactation. Thus they were left with a productive period of about six more lactations. Based on the data provided by the farmers, an attempt was made to determine the cost and benefits of maintaining cattle during different lactations. The revenue obtained by the farmers was calculated using the yield data provided by them and the milk prices paid by the dairy. In calculating the cost data, the value of purchased inputs was taken at the actual cost and the value of home produced items was imputed at the market price. The total revenue, out-of-pocket expenses including repayment of loan and interest, and other costs in maintaining the dairy cattle are given in Table 2. The actual cash transactions and imputed costs are shown separately. Further details are available in Exhibit 2.

Table 2: Costs and Returns from Dairy Cattle

Lactation	Revenue (R)	Costs*		R-C <sub>2</sub>	R-C <sub>1</sub>
		Actual C <sub>2</sub>	Total C <sub>1</sub>		
2	1553.70	1051.11	1864.11	501.59	-310.41
3	1793.07	1197.73	1872.82	599.34	-139.75
4	1872.68	1119.99	1887.49	752.69	39.19
5	1866.75	1130.08	1854.58	736.67	12.17
6	1823.87	524.00	1369.25	1299.87	454.62
7	2191.87	482.60	1339.00	1708.27	742.87

\*C<sub>1</sub> corresponds to the total of actual and imputed costs on maintenance of cattle and loan repayment. C<sub>2</sub> corresponds to the actual cash expenditures (i. e., C<sub>1</sub> minus imputed costs on farm grown fodder). Details on the cost items are given in Exhibit 2.

To determine the investment worth of this scheme an attempt was made to calculate some of the standard criteria used for investment decisions. The criteria used and the results obtained are summarized below:

1. Pay back period: It is the time period which is required to recover the cost of purchase and maintenance of milch cattle from its returns. It can be symbolically written as:

$$\sum_{t=2}^{t^*} C_t = \sum_{t=2}^{t^*} R_t$$

Where  $R_t$  = return in period  $t$

$C_t$  = cost in period  $t$

$t^*$  = time period in which the returns exceed costs

$t$  = number of periods (years)

2. Net present value: It is a discounted sum of streams of income during the productive life period of milch cattle. It can be symbolically represented as:<sup>2</sup>

$$\sum_{t=2}^8 \frac{R_t - C_t}{(1+r)^t}$$

Where  $r$  = discount rate.

3. Internal rate of return (R): It is defined as the rate of return which makes the net present value equal to zero. It can be symbolically written as:

$$\sum_{t=2}^8 \frac{R_t - C_t}{(1+r)^t} = 0$$

4. Benefit-cost ratio: The benefit-cost ratio gives the returns per rupee invested during the entire productive life period of milch cattle. It can be symbolically written as:

$$\frac{\sum_{t=2}^8 R_t / (1+r)^t}{\sum_{t=2}^8 C_t / (1+r)^t}$$

These measures were calculated on the basis of the data collected from the entire sample. First, the inter-calving period-wise cost and returns data in Exhibit 2 was converted into yearly cost and returns

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<sup>2</sup>In all these cases, the number of years are taken to be eight, since the interval between the second and seventh lactation is about eight calendar years.



data. The inter-calving period included nine months of lactation plus six months of dry period. Thus the cost and returns for the entire 15 month period were readjusted to convert them on an annual basis. These annual cost and return figures were used to calculate the various measures of investment worth per milch cattle (Table 3).

Table 3: Measures of Investment Worth  
Per Milch Cattle

<u>Measures of investment worth</u>	<u>For all farm size groups</u>
1. Pay-back period	7 years
2. Net present value at	
discount rate 6%	Rs.490.15
discount rate 7.5%	Rs.417.13
discount rate 10.0%	Rs.313.18
3. Internal rate of return using	
10% discount rate	21.68 per cent
4. Benefit-cost ratio at	
discount rate 6%	1.05
discount rate 7.5%	1.05
discount rate 10%	1.04

The pay back period worked out to be seven years; if the farm grown fodder had not been valued at the going market rate, the pay back period would have been much smaller. In most cases, the fodder was a by-product of crops grown by the farmers and involved very little additional expenditure. Thus the major portion of cost imputed to farm grown fodder can also be considered part of the profit.

The net present value is the function of the discount rate used in the formulae given above. Three discount rates were used there is no exact information on the discount rate applicable in this particular case. The discount rates used were 6%, 7.5%, and 10%. The present values of net returns which already accounted for the imputed fodder cost and the repayment of the loan amount and the interest worked out to be Rs.490.15, Rs.417.13, and Rs.313.18 respectively for the three discount rates. These would have been higher if the fodder cost had not been imputed at the going market rate. Similarly, the net present value would have been higher if the price of milk had been taken at

the market rate. In this case, the prices given to milk societies and to the farmers by the dairy have been used. Similar arguments hold true for the internal rate of return which worked out to be 21%.

Benefit-cost ratios were around 1.05, i.e., for every rupee worth of cost incurred the return was Rs.1.05. If the cost of production for farm grown fodder had been considered instead of the going market rate these ratios would have been more than twice the figures reported in Table 3.

The results show that despite the very conservative assumptions used for empirical estimation it is profitable for farmers to invest in milch cattle. If some of the conservative assumptions are relaxed, the investment will appear to be extremely profitable. These assumptions are a) imputing market rate for farm grown fodder in the cost as a cost component and b) valuing the price of milk at the open market rate instead of at the dairy price.

In many cases, the value of milk supplied by the farmers with holdings of various sizes exceeded the amount specified for loan repayments to the bank according to the terms of the loans (Table 4). This excess amount (Column 6, Table 4) ranged between 47 per cent and 70 per cent of the value of milk. Societies were supposed to deduct about 50 per cent of the value of milk towards repayment to the bank. The amount deducted for loan repayment from the total value of milk supplied ranged between 32 per cent and 47 per cent and this amount was more than the amount received by the bank as repayment of loan and interest (Columns 3 and 4, Table 4)<sup>3</sup> except in the case of farmers with more than 10 acres of land. These farmers repaid loans to the bank ahead of schedule. Farmers with more than 10 acres of land supplemented the repayments otherwise possible from the amount deducted from the value of milk supplied to the society. Despite the loan repayment and interest payments enough cash receipts accrued to the farmers for buying feed concentrates and other items. This indicates the profitability of investment in milch cattle from the point of view of the farmer.

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<sup>3</sup>In fact the bank should have asked the societies to deposit the entire amount deducted from the farmers' accounts towards loan repayment. This would have resulted in repayments according to schedule.

Table 4: Average Value of Milk Supplied and  
Loan Repaid to the Bank Until  
February 1974

Size of the holding (acres)	Average value of milk supplied to the village milk societies until February 1974	Average amount deducted by village milk societies for loan repayment until Feb. 1974	Average amount received by the bank towards loan repayment until Feb. 1974	Value of milk supplied to the societies minus amount deducted by the societies	Value of milk supplied to the societies minus amount paid back to the bank
1 and less (6)	750.32	341.66 (45.53)	289.66 (38.60)	408.66 (54.47)	460.66 (61.40)
1.01 - 3.00 (22)	1082.72	338.79 (34.06)	317.50 (29.32)	713.93 (65.94)	765.22 (70.68)
3.01 - 5.00 (7)	854.06	353.14 (41.34)	274.42 (31.89)	500.92 (58.66)	579.64 (68.11)
5.01 - 10.0 (12)	1546.55	735.08 (47.53)	549.66 (35.54)	811.47 (52.47)	996.89 (64.46)
Above 10.0 (13)	1717.76	791.99 (46.10)	894.33* (52.06)	925.77 (53.90)	823.43 (47.94)
Overall (60)	1253.16	529.20 (42.22)	481.10 (38.39)	723.96 (47.78)	772.06 (61.61)

Note: Figures in parentheses indicate the percentage of the total value of milk collected.

\*Paid from own income in addition to necessary loan deductions.

### Impact of Bank Finance on the Dairy

Since the purpose of the scheme was to help farmers to buy milch cattle from outside the district, the primary gain to the dairy should be in the form of increased milk supply. Besides the increase in milk supply on an annual basis, there should be some amount of stability in the supply over seasons because cattle in milk were bought in different months of the year. Also, since the milk was purchased through the milk societies an increase in the turnover of societies could be expected raising their level of profit and improving their financial position.

The increase in the supply of milk by the borrowers to the milk societies can be estimated from the records of the society in terms of the milk supplied by the members and the number of milch cattle they owned. This relationship was estimated on the basis of the following equation:

$$M_{\text{soc}} = f(C_{\text{milch}})$$

Where  $M_{\text{soc}}$  = milk collected by the society in litres per month (Oct.1972 - March 1974).

$C_{\text{milch}}$  = number of milch cattle (cows and buffaloes) in milk with the members supplying milk to the society (Oct. 1972 - March 1974).

This equation was estimated for each society studied.

#### Society I

$$M_{\text{soc}} = 124.563 C_{\text{milch}} \quad R^2 = .948 \quad (1)$$

(1.923)

#### Society II

$$M_{\text{soc}} = 84.823 C_{\text{milch}} \quad R^2 = .672 \quad (2)$$

(1.090)

#### Society III

$$M_{\text{soc}} = 87.206 C_{\text{milch}} \quad R^2 = .845 \quad (3)$$

(4.941)

#### Society IV

$$M_{\text{soc}} = 84.293 C_{\text{milch}} \quad R^2 = .409 \quad (4)$$

(1.440)

(All the coefficients were significant at one per cent probability level).

Equations (1) to (4) show that the supply of milk per milch cattle varied from society to society. Several factors were responsible for the variations. Variations in milk supply per milch cattle to the society are explained by the composition of milch cattle in terms of cows and buffaloes and the level of income of the farmers.

The records of the societies and the dairy indicated that all the milk collected by the societies was not supplied to the dairy. A part of the milk was sold locally to private parties. The relationship between the milk collected by the society and the milk collected by the dairy from the society is shown by the following equation:

$$M_{\text{dairy}} = f(M_{\text{soc}})$$

Where  $M_{\text{dairy}}$  = quantity of milk (in kg.) received by the dairy from the society

Society I

$$M_{\text{dairy}} = .4514 M_{\text{soc}} \quad R^2 = .426 \quad (5)$$

(0.048)

Society II

$$M_{\text{dairy}} = 0.977 M_{\text{soc}} \quad R^2 = .966 \quad (6)$$

(0.079)

Society III

$$M_{\text{dairy}} = 0.491 M_{\text{soc}} \quad R^2 = .544 \quad (7)$$

(0.0137)

Society IV

$$M_{\text{dairy}} = .952 M_{\text{soc}} \quad R^2 = .917 \quad (8)$$

(.0814)

Equations (5) to (8) show that while some societies had supplied nearly the entire quantity of milk collected by them to the dairy, others had not even supplied half the quantity collected by them. The fact, however, remains that the additional milch cattle bought with the help of bank money have assisted the societies and the dairy to get additional supplies of milk.

To test the hypothesis that the scheme financed by the bank might have helped to bring about stability in the milk supply to the dairy over seasons, the coefficient of variation was estimated using monthly data on the milk collected from the four societies during three years (1971-72 through 1973-74). The coefficients of variation in the monthly supply of milk collected by the dairy from each society do not support the hypothesis except in the case of Society IV where the coefficient of variation came down from 76.42 in 1971-72 to 20.76 in 1973-74 (Table 5). In all other cases, the changes in variation did not show any consistent trend towards the decline. Thus it can be concluded that although the supply of milk in the year as a whole did increase from the societies where milch cattle were financed by the bank, the scheme did not bring about substantial reduction in the variation in milk supply over months within the year. The milk supply remained subject to seasonal variations in yield.

Since monthly data on the collection of milk by milk societies in 1973-74 was available, we tried to see whether the coefficient of variation in their case was lower than the coefficient of variation in the supply of milk to the dairy from the same societies. In three out of four cases (Table 5) the coefficient of variation worked out to be much less in the case of milk collection by societies than milk collection by the dairy. This fact was also confirmed during discussion with the dairy and society authorities. While the milk collection by the societies was more stable, the supply to the dairy depended on the demand for milk and the price of milk in the open market. In summer, when the dairy price of milk and the open market price of milk differed, the supply of milk to the dairy was cut down by the societies and surplus milk was sold in the open market to get the benefit of higher prices.

During discussions with the dairy and society officials, it was pointed out that since the inception of the scheme in November 1972, the turnover of the societies had increased and these societies had shown higher profits. A part of these profits was paid to the members, but a substantial part was invested in shares of the dairy, or deposited with the cooperative bank and other commercial banks in the form of reserve funds. It seems that the financial position of milk societies had become more sound and many defunct societies had come to life since the operation of the bank scheme in the district. All this brings indirect benefits to the dairy. Other indirect benefits accrue in the form of sale of concentrates and widening of the effective command area of milk collection.

Table 5: Coefficients of Variation in the Monthwise Collection of Milk by the Dairy from the Society

Society	Milk collected by the dairy from the society			Milk collected by the society (1973-74)
	1971-72	1972-73	1973-74	
Society I	50.38	21.29	59.70	28.55
Society II	28.54	27.75	43.51	38.75
Society III	26.09	62.01	27.64	56.22
Society IV	76.42	59.08	20.76	20.13
Dairy	27.59	34.75	15.86	..

#### Summary and Conclusions

This paper attempts to evaluate the scheme undertaken by a commercial bank in collaboration with a dairy plant in order to increase the milk production in the procurement area of the dairy. The scheme essentially envisaged the supply of bank finances to the farmers for the purchase of quality cattle. The farmers supplied milk to the village societies affiliated to the dairy and the loan amount was recovered by the bank through the milk societies by adjusting a portion of the sales value. The findings of this study indicate the following:

1. It is profitable for the farmers to take part in the scheme and obtain loan facilities from the bank for maintaining quality cattle. The income of the farmers increased. All the investment criteria adopted indicate that it is a worthwhile investment.
2. From the point of view of the dairy, the bank credit helped milk societies to increase the collection of milk and also in some cases even out the seasonality involved in milk collection. The increased supply of milk through the societies improved the income position of these societies, and in some cases it was instrumental in revitalizing a few milk societies.

3. The bank found it easy to organize credit supplies. The repayment was fairly smooth and the bank got back most of the money advanced to the farmers as per the repayment schedule.

Thus the findings of this study indicate that commercial lending institutions could join hands with organized dairies to advance money for purchasing cattle; this process would benefit the farmers, the dairy plants, and the bank. The implementation of such schemes could go a long way in improving the incomes of small farmers and at the same time increasing the production of milk in the milk shed areas of organized dairies.



Exhibit 1: Steps in the Execution and Follow-up of Loans under the Cattle Development Scheme

1. Filling up of the Application Form: First, an application form has to be filled up by the individual farmer. This process can be broken up into the following sub-steps:
  - a) The form is supplied by the bank to the dairy.
  - b) The dairy gives the form to the village milk society.
  - c) The secretary of the village milk society helps the farmer to fill up the form and sends it to the dairy. The dairy scrutinizes the form and then sends it to the bank.
2. Execution of Documents: The representatives of the bank and the dairy together decide the date of execution of documents in the concerned village. On the fixed date, the officials of the dairy and the bank visit the village in question and complete a composite agreement for the hypothecation of the animal and guarantee with the farmer.
3. Purchase of Cattle: On being informed by the secretary of the village milk society, the dairy doctor and a bank official go to the place of purchase where the farmer has contracted the animal. The bank official encashes the pay orders for the loan at the nearest branch of the bank. The insurance premium is deducted from the total loan to the farmer which includes both purchase price and insurance amount.
4. Periodic Inspection of Cattle: The milch animal thus bought is periodically inspected by dairy doctor and also by the bank officials. The dairy doctor visits the villages fortnightly for the inspection of cattle bought under the scheme and bank officials visit the villages quarterly for inspection.
5. Veterinary Aid and Health Services: The dairy has a few mobile medical vans which visit all the societies affiliated with the dairy and provide veterinary aid free of cost. In case of special calls by farmers from these societies a nominal fee of Rs.15 is charged irrespective of the distance involved and the medicines required.
6. Supply of Milk: Farmers supply the milk to their village society office. The village society employs the services of a milk tester who immediately tests the fat content and determines the purchase price. Later, the dairy milk vans collect the milk from societies affiliated with it.

Exhibit 1 continued

7. Payment for Milk and Repayment of Loans: Milk societies make weekly payments to farmers for the milk. The following procedures are adopted to repay the loans taken under the Cattle Development Scheme:
- a) Societies deduct 50 per cent. of the milk price from the total money payable to the farmer and repay to the bank directly in monthly instalments.
  - b) In case of default, the dairy is informed by the bank. The dairy then deducts the defaulted amount from the total money payable to the village milk society in question.
8. The loans granted under the scheme are repayable in four years. The effective interest rate to be charged from the borrowers is about 9 or  $9\frac{1}{2}$  per cent.

Exhibit 2: Revenue and Cost per Lactation per Milch Animal

Lactation number	Revenue components				Total revenue	Cost components			Total cost (C <sub>1</sub> )	Total out of pocket expenses (C <sub>2</sub> )	R-C <sub>1</sub>	R-C <sub>2</sub>	
	Value of milk per lactation <sup>1</sup>	Farm-yard manure	Value of calf/ heifer <sup>3</sup>	Scrap value of cow/buffalo		Farm grown+ green+ dry fodder <sup>5</sup>	Concentrates & other feeds <sup>6</sup>	Total feed cost					Loan repayment & interest
2	1340.13	160.57	53.00	..	1553.70	813.00	483.30	1296.30	567.81	1864.11	1051.11	-310.41	501.59
3	1600.00	132.43	60.64	..	1793.07	735.09	607.50	1342.59	530.23	1872.82	1197.73	-139.75	599.34
4	1710.82	105.78	56.08	..	1872.68	713.50	580.50	1294.00	493.49	1887.49	1119.99	39.19	752.69
5	1753.25	62.50	51.00	..	1866.75	724.50	675.00	1399.50	455.08	1854.58	1130.08	12.17	736.67
6	1625.87	143.75	54.25	..	1823.87	845.25	524.00	1369.25	..	1369.25	524.00	454.62	1299.87
7	1498.50	225.00	57.50	410.87	2191.87	966.40	372.60	1389.00	..	1339.00	483.60	742.87	1708.27

<sup>1</sup> Calculated as follows: 270 lactation days (as observed in the sample) x dairy price of milk per litre x average production of milk per day. The market price was roughly twice the dairy price per litre.

<sup>2</sup> Calculated as follows: FYM production (in cartloads) for 15 months x Rs.10 per cartload.

<sup>3</sup> The value of calf at the termination of the lactation period of the cow.

<sup>4</sup> Derived from the survey of sample farmers

<sup>5</sup> Calculated at Rs.1.50 per day x 270 days and at Rs.1.25 per day x 180 days.

<sup>6</sup> Calculated for 270 days x value of concentrates and other feed per day.