RESEARCH METHODOLOGY
CHAPTER-III

RESEARCH METHODOLOGY

The present chapter deals with the research methodology adopted for the analysis and interpretation of the fact of present problem entitled “Economic of production and marketing of milk in Ambedkar Nagar district of Uttar Pradesh”. The methodology aspects have broadly been discussed under the following heads:

1. Sampling technique.
2. Method of enquiry and collection of data.
3. Period of enquiry.
4. Analytical tools and
5. Limitation of study

1. Sampling Technique:

   A multistage purposive cum stratified random sampling technique have been used to select the blocks, cluster of villages and to respondents. Faizabad district was elected purposively for the study.

(i) Selection of Blocks:

   Out of nine development blocks of district Ambedkar Nagar were divided into two group one having density of milch animals above the average density of the district and the other having the density milch animals
below the average density of the district. Accordingly Akbarpur and Tanda blocks were selected randomly for the studies. Akbarpur block was selected randomly from the group of block having milch animal density above the district average and Other block Tanda was selected randomly from the group of block having the density of milch animals below the average density of the district.

(ii) Selection of Villages:

A list of all villages of each selected block was prepared and arrange on the basis of milch animals. From the list of the villages falling under the selected blocks, 10 villages i.e. 5 villages from each block were selected randomly. Five selected villages from Akbarpur block were Karatora, Atangi, Bahadipur, Aruyana, Siani Akhaipur and five villages from Tanda block were Salampur, Brahimpur Kushma, Amada, Balrampur, Mahuwary.

(iii) Selection of the Respondents:

A list of the milk producing respondents of selected villages were prepared on the basis of their operational holding and number of milch animals. The household were categorized into four size group i.e. Marginal (below one hectare), small (1-2 ha), Medium (2-3 ha) and large (above 3 ha) land from each selected village. (Milk producer) farmers under different size of group were selected in proportionate to their population in each village. Thus in all the study related to an intensive enquiry of 150 (milk producers)
farmers selected randomly from ten villages of two selected blocks of district Abmedkar Nagar (U.P.). The distribution of ample household within each selected village are given in Table III-1 and III-2.

Table III-1: Total number of selected milk producer from each village

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the blocks</th>
<th>Name of the Selected villages</th>
<th>Number of the milk producer selected in different size groups</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marginal</td>
<td>Small</td>
</tr>
<tr>
<td>A.</td>
<td>Akbarpur</td>
<td>Karatora</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td>Atangi</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>Bahadipur</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>Aruyana</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>Sianiakhai</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>Tanda</td>
<td>Salempur</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td>Brahimpur</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>Kushma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>Ameda</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>Balrampur</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td>Mahuwary</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>67</td>
<td>44</td>
</tr>
</tbody>
</table>

Table III-2: Selection of milk producer and milch animals

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Categories of household</th>
<th>Number of farmer</th>
<th>No. of animals under each category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Deshi cow</td>
<td>Crossbred cow</td>
</tr>
<tr>
<td>1.</td>
<td>Marginal (0-1 ha)</td>
<td>67</td>
<td>35</td>
<td>55</td>
</tr>
<tr>
<td>2.</td>
<td>Small (1-2 ha)</td>
<td>44</td>
<td>22</td>
<td>47</td>
</tr>
<tr>
<td>3.</td>
<td>Medium (2-3 ha)</td>
<td>25</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>4.</td>
<td>Large farmer (above 3 ha)</td>
<td>14</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>150</td>
<td>73</td>
<td>139</td>
</tr>
</tbody>
</table>
3. Period of enquiry:

The enquiry related to the agricultural year 2003-04 and 2004-05 i.e. 1st July to 30th June of each year.

Method of enquiry:

The enquiry was conducted by survey method. The relevant information on various aspects of milk producers and agriculture were collected through well structured and pre-tested schedules by direct personal interview with the respondents. Each of households was visited thrice during the year personally once in each season viz., winter season (Nov.-Feb.), summer season (March-June) and rainy season (July-Oct.).

Collection of data:

For present study data pertaining to various objectives of the study was collected from both primary and secondary resource.

Primary data:

The primary data pertaining to general features of households, average size of land holding on sample households, general features of milch animals, per households, cropping pattern, income and employment generation, production, consumption and marketed surplus of milk etc. The detailed information was reached on dairy animals with respect to breed, value of animal, order of lactation, stage of lactation, milk yield, feeding and
management practices, veterinary and miscellaneous expenses etc. The price of inputs and outputs along with wage rates for hired labour were also collected. Milk marketing agencies, considered for data collection were co-operatives.

(ii) Secondary data:

The secondary data on various aspects of milk producers co-operative societies were collected from milk producers. Co-operative union, Ambedkar, Nagar district of official records (Statistical bulletin and Parag Dairy), block headquarter of the district.

Cost components:

The expenditure on various items was classified according to their fixed and variable costs.

Fixed costs:

Fixed costs refers to those costs, which remain unchanged over the short period of time. Fixed costs were computed for depreciation on fixed assets like animals, cattle shed, stares for feed and fodder and dairy equipment interest on fixed capital & insurance premium if any.

Variable costs:

Variable costs include labour charges, feed and feeding stuffs, maintenance, transportation charges, packing of milk, processing charges etc.
Depreciation:

Depreciation is a loss of value of an asset due to its use and time. In case of milch animals, it was charged up to 3rd lactation year. However on 4th & 5th lactation order 10% and for 6th above period 20% depreciation was charged.

Interest on capital:

Interest on fixed capital including the animal was charged @ 10 per cent per annum. No interest was charged on working capital on the assumption that owner could realized the income from sale of milk as soon as he interest the money in dairy enterprises.

Cost of feed and fodder:

Information on quantity of feeds & fodders per day per milch animals was obtained. The prevailing market rates were used for purchased and home produced feeds and fodders.

Price spread:

The price that the farmer gets for his produce is known as producer’s price and the price which consumer pay is known as consumer’s price. The difference between consumer’s price and producer’s price is called as market costs. The prices spread includes distribution of market cost on various items of costs it is collected as price spread. The study of price spread also involved ascertainment of actual price at various stage of marketing channels and the margin of various intermediates.
Marketing margin:

Marketing margin refers to the difference between the price paid and price received by specific marketing agency. The net margin received by the agency in a specific marketing channels is the difference between its own gross margin marketing margin cost and is thus a function of the marketing margins received and the cost incurred in the process.

Market:

Economists understand by the terms market, not any particular place in which things are bought and sold but the whole of any region in which buyers sellers are in such a free interaction with one another that the price of the same goods tends to equality, easily and quickly.

Marketing:

Marketing is the part of economics which deals with the creation of time, place and possession utilities.

Marketing channel:

A marketing channel or channel of distribution may be defined as “a path traced in the direct or indirect transfer of title to a product, as it moves from a producer to ultimate consumer of industrial users”.

Marketing cost:

Marketing costs are the actual expenses incurred for bringing goods and services from the producer to consumer.
Labour charges:

The labour charges per day per animal were calculated on the basis of time used in up keep of per million animals and multiplying it with prevailing wage rates.

Veterinary care charges:

The veterinary care charges as incurred by the farmer were obtained for each animal selected for study.

Price of milk:

The average price prevailing in the study area and average price of the societies, during the year was taken as price of milk for non-member and member milk producers respectively.

Marketable surplus:

The marketable surplus is the residual left with the producer farmer after meeting his requirement for family consumption and other requirement etc. MS = PC, where MS = marketable surplus, P = total reduce and C = total requirements.

Maintenance cost:

All cost i.e. cost of fodder + concentrates + labour + miscellaneous + over head charges.
Net maintenance cost:

Maintenance cost - Value of dung + value to appreciation

Gross income:

Gross income from milk = Yield x Rate of milk

Net income = Gross income - Net maintenance cost

Family labour income = Net income + Value of unpaid family labour

Farm business income = family labour income + Interest on own capital

Cost of production of milk = Net maintenance cost + Yield of milk

A. Analytical tools:

The section discusses the analytical tools like tabular analysis and functional analysis.

Tabular analysis:

Tabular analysis was employed to study the production, consumption, market surplus of milk, disposal of milk to different milk marketing agencies by different categories of households/milk co-operative societies members and further costs and returns of milk. The tabular analysis were done as given below.

The weighted average of the variable has been calculated by using following formulae:
\[ WA = \frac{\sum W_i X_i}{\sum X_i} \]

Where,

\( WA \) = Weighted average

\( W_i \) = Weight of variable

\( X_i \) = Value of the variable

Break even analysis was employed to workout

Break even output for milch animals

(Cow and buffalo) on different categories of households

\[ BEP = \frac{TFC}{ASP - AVC} \]

Where,

\( BEP \) = break even point in litres of milk

\( TFC \) = Total fixed cost per milch animal in rupees

\( ASP \) = Average selling price per litre of milk (Rs.)

\( AVC \) = Average variable cost per litre of milk (Rs.)

Marketing costs and marketing margins were worked out using the following formulae:

**Marketing cost:**

\[ TC = CP + \sum_{i=1}^{n} McI \]
Where,

TC = The total costs of marketing

CP = The cost incurred by the producer in marketing of their produce

Mei = The marketing costs incurred by all middleman

**Marketing margin:**

\[ AM = PMa = (Pba + MC) \]

Where,

AM = The absolute margin of the middlemen

PM = The selling price of the middlemen

Pb = the buying price of the middlemen

MC = the marketing costs of the middlemen

The producer’s share in consumer’s rupee was worked out as below

\[ Ps = \frac{Pf}{Pr} \times 100 \]

Where,

Ps = Producer’s share consumer’s rupee

Pf = Producer price

Pr = Retail price

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Price spreads:

Price spreads were studies at the point of time in the selected milk producers/milk co-operative societies marketing plant. The prices for the purposes were calculated through the mode method. In mode method, mode price of obtained to workout the gross margin of various agency. To arrive at the net margin, the costs incurred by the concerned agency were deducted from the gross margin.

B. Functional analysis:

The study the effect of various factors on milk production in (Rs.) in case of milk producer/milk co-operative societies members in annual indifferent categories. Simple and multiple regression was carried out. Method was tried i.e. simple and multiple regression. The mathematical form of each two models are given below:

a. Linear model

\[ Y = a + \sum_{i=1}^{n} b_i x_i + u \]

b. Coub-Dugolas model

\[ Y = a \sum_{i=1}^{n} x_i^{b_i} e^u \]

Where

\[ Y = \text{Dependent variable} \]
\( Xi = \text{Explanatory variables} \)
\( n = \text{total number of explanatory variables} \)
\( a = \text{constant term} \)
\( bi = \text{Regression coefficient associated with explanatory variables } Xi's \)
\( u = \text{Random error term which is assumed to follow normal distribution with zero mean and constant variance} \)

**Significance of test of the sample regression coefficients:**

Having estimated the cost of the milk production, it is desirable to ascertain the reliability of these feeding cost and expenditure of labours estimates. The most commonly used "t" test was applied to determine whether the cost of milk is significantly different from zero or not at some specified probability level.

\[
\text{"t" cal} = \hat{b}_i \pm \text{standard error of } \hat{b}_i
\]

If calculated "t" value is greater than the table value of "t" at specified probability level and "N-K-1: degree of freedom, b_j is said to be statistically significantly different from zero.

K is number of independent factors and n is sample size. Standard error of \( b_j \) equal \( \sigma \sqrt{C_{ii}} \) where \( C_{ij} \) is the diagonal element of matrix C, matrix C is inverse of correlated sum of squares \( \sigma^2 \) is the estimated variance of the error term of equation under estimation.
The Durbin-Watson test:

The test of general kind concerning auto correlation was developed J. Durbin and G. Watson in 1951. This test used what is usually referred to as the Durbin-Watson d-statistics, and is based on the sum of the squared differences in successive values of the estimated disturbance terms:

\[ d = \frac{\sum_{i=1}^{n} 2(\hat{U}_i - \hat{U}_{i-1})^2}{\sum_{i=1}^{n} \hat{U}_{i-2}} \]

Somewhat intuitively, we can see that, if we have positive auto correlation, the successive values of the disturbance terms will tend to close to another i.e. positive value of the \( U_i \) would most likely be followed by another positive value \( U_{i+1} \) which suggests that terms in the numerator of d-statistics will be relatively small. We would, therefore, expect positive auto correlation to result in small value for \( d \). Conversely, negative auto correlation tends to generate large differences between successive values of \( U_i \). The signal for this type of auto correlation is an usually large value of \( d \).

This test now can be explained in two steps as follows.

The null hypothesis; \( H_0 = \hat{\rho} = 0 \) is tested against alternative hypothesis;

From the above relation, therefore,

\[ \hat{\rho} = 0 \text{ suggests } d = 2 \]

\[ \hat{\rho} = 1 \text{ suggests } d = 2 \]
Thus we obtain two important conclusions;

(i) Values of d lie between 0 and 4, and

(ii) if there is no auto correlation, \( P = 0 \) than \( d = 2 \)

Whenever, therefore, the calculated value of \( d \) terms out to be sufficiently close to 2, we accept null hypothesis, and if it is close to zero or four, we reject the null hypothesis.

(a) Milk production function:

The multiple regression on analysis was used to study the relationship between returns from milk and different factors influencing it. The specification of milk production function used in the present study as follows:

\[
Y = (X_1, X_2, X_3, X_4, X_5, D_1, D_2, D_3)
\]

Where =

\( Y \) = Value of milk produced per animal per day (Rs.)

\( X_1 \) = Value of green fodder fed per animal per day (Rs.)

\( X_2 \) = Value of dry fodder fed per animal per day (Rs.)

\( X_3 \) = Value of concentrate fed per animal per day (Rs.)

\( X_4 \) = Value of labour employed per animal per day (Rs.)

\( X_5 \) = Value of veterinary services per animal per day (Rs.)

Three seasonal during variables were introduced as follows:

\( D_1 \) = Winter season
(b) Milk marketed surplus function:

The multiple regression analysis was to study the relationship between marketed surplus of milk and various factors affecting it. The specification of marketed surplus function of milk used in the present study as follows:

\[ Y = f(X_1, X_2, X_3, X_4, X_5, D_1, D_2, D_3) \]

Where

\[ Y \quad = \quad \text{Marketed surplus of milk per household per day (Liters)} \]
\[ X_1 \quad = \quad \text{Milk production per household per day (Litres)} \]
\[ X_2 \quad = \quad \text{Family size of producer household} \]
\[ X_3 \quad = \quad \text{Weighted average price of milk per litre (Rs.)} \]
\[ X_4 \quad = \quad \text{Educational score of the earners of households} \]
\[ X_5 \quad = \quad \text{Size of operational land holding (hectares)} \]

Pooled marketed surplus functions were fitted using seasonal dummies. Three season dummy were introduced as under.

\[ D_1 \quad = \quad \text{Winter season} \]
\[ D_2 \quad = \quad \text{Summer season} \]
\[ D_3 \quad = \quad \text{Rainy season} \]
Again, same two types of functional forms viz., linear and Cobb-Douglas were tried and finally, linear form was found to be the best fit on the basis of magnitude of coefficient of multiple determination ($R^2$), logically of signs and levels of statistical significance. Hence the results of the same have been used for analysis and interpretation in the study.

Chow’s test was employed to test the hypothesis whether marketed surplus function of member and non-member group are statistically different as per the procedure given earlier in section (a) milk production function. In order to know the variables responsible for difference between two functions of member and non-member. The functional analysis was carried out using constant and slope dummies. The model for the purpose is stated as under:

$$ Y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + b_6 (D_{b_0}) + b_7 (D_{x_1}) + b_8 (D_{x_2}) + b_9 (D_{x_3}) + b_{10} (D_{x_4}) + b_{11} (D_{x_5}) + U $$

Where, the variables $Y$, $x_1$, $x_2$, $x_3$, $x_4$, $x_5$ are same as defined earlier. The Dummy variables is defined as under:

$$ D = 1 \text{ for member group and } D = 0 \text{ for non member group.} $$

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