CHAPTER IV

METHODOLOGY

Selection of Study Area

Haryana state was purposively selected for the study of marketing of buffaloes since it has the distinction of being the original home of 'Murrah' breed which is considered the best milk breed of the world. These buffaloes are in great demand and a large number are exported from Haryana to various other states and some foreign countries as well. Haryana although accounts for only 1.3 million milk buffaloes but ranks high in terms of number of adult females per 100 cropped hectares and per 100 persons. However, no reliable information is available, so far, on the economic aspects of magnitude and conduct of business of buffalo marketing in this state. This state of affairs provided a sufficient background for selection of Haryana state for the purpose of this investigation.

Selection of Districts

Haryana state is comprised of 7 districts1. Out of these, Rohtak, Hisar, Jind and Gurgaon districts constitute the major breeding tract for 'Murrah' breed of buffaloes. These four districts possess about 66 percent of the total

1. Recently the state has been reorganised and 11 districts have been demarcated after the commencement of present study.
breedable buffalo population of the state (Table 4.1). Pal and Mehta (1970) have reported that these four districts contribute about 90 percent of the total number of buffaloes exported annually to various other states of the country. Therefore, to study the economics of buffalo raising and its disposal pattern, these districts merited selection.

**Selection of Markets**

A total number of 66 cattle fairs are held in Haryana. Important buffalo markets, out of these, fall in the earlier mentioned breeding tract including four districts, selected for this study. Out of these, four markets having maximum sales of 'Murrrah' buffaloes were included in the study. These markets are Jahajgarh, Bahadurgarh (both in Rohtak district), Hisar, and Jind, which also represent the extra-large, large, medium and small size of markets, respectively, on the basis of the average annual income received from these markets.

**Selection of Villages and Breeders**

Rearing of buffaloes for dairying and marketing purposes is more common in the villages around cities/towns.

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3. Karnal district of Haryana has the distinction of having maximum buffalo population (about 25 percent of the total) but this was not considered for the study since it is not a important marketing centre for these animals and therefore did not provide a suitable background.
LOCATION OF SELECTED DISTRICTS AND CATTLE MARKETS IN HARYANA

* DISTRICTS
○ CATTLE MARKETS

AMBALA
KURUKSHETRA
KARHAL
SONEPAT

SĪRSA
HÍSSAR
JÍNH

BHINANI
ROHTAK
BAHADURGARH
GURGÁN

INDIA
LOCATION OF HARYANA

LOCATION OF SELECTED DISTRICTS AND CATTLE MARKETS IN HARYANA
<table>
<thead>
<tr>
<th>District</th>
<th>Female buffaloes above 3 years</th>
<th></th>
<th></th>
<th></th>
<th>Percentage to the total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In milk</td>
<td>dry</td>
<td>not calved</td>
<td>others</td>
<td>Total</td>
</tr>
<tr>
<td>Karnal</td>
<td>1840</td>
<td>1218</td>
<td>109</td>
<td>26</td>
<td>3183</td>
</tr>
<tr>
<td>Hisar</td>
<td>1595</td>
<td>806</td>
<td>83</td>
<td>53</td>
<td>2537</td>
</tr>
<tr>
<td>Rohtak</td>
<td>1455</td>
<td>658</td>
<td>111</td>
<td>8</td>
<td>2232</td>
</tr>
<tr>
<td>Gurgaon</td>
<td>1466</td>
<td>534</td>
<td>100</td>
<td>10</td>
<td>2110</td>
</tr>
<tr>
<td>Ambala</td>
<td>745</td>
<td>370</td>
<td>68</td>
<td>4</td>
<td>1187</td>
</tr>
<tr>
<td>Jind</td>
<td>477</td>
<td>277</td>
<td>40</td>
<td>A</td>
<td>794</td>
</tr>
<tr>
<td>Mohindergarh</td>
<td>216</td>
<td>061</td>
<td>22</td>
<td>9</td>
<td>308</td>
</tr>
</tbody>
</table>

A = less than hundred

(Source: Statistical Abstract of Haryana, 1975-76)
of the breeding tract. A list of all the villages falling within the radius of 20 km from each selected market was prepared. Eight villages (2 from each market) were then randomly selected from that list. Further, from each selected village, 10 buffalo breeders were randomly selected for data collection on the economics of buffalo calf rearing and their disposal pattern. Thus, finally, 80 buffalo breeders were interviewed with the help of schedules prepared for this purpose.

Nature and Extent of Data

(1) Economics of buffalo calf rearing

Primary data on the cost of female buffalo calf rearing up to first calving and their disposal pattern were collected from randomly selected 80 buffalo breeders of the breeding tract comprising of Rohtak, Hisar, Jind and Gurgaon district by survey method. The items of cost were milk, fodders, concentrates, labour, veterinary expenses and miscellaneous items like interest, depreciation on building etc. Data were collected according to different age groups of calves. For this purpose the period from birth to age at first calving was decomposed into six age groups; (i) from birth to 1 month, (ii) 1 to 6 months, (iii) 6 to 12 months, (iv) 1 to 2 years, (v) above 2 years and (vi) down calvers (last 60 days of calving).

(11) Existing market structure

To study the existing market structure of buffaloes
in the state, information were collected in the selected market on the organizational structure, sources of income and expenditure of the markets, methods of sale, marketing agencies and functionaries and various malpractices in the buffalo markets. Cattle fair officers, sellers, buyers, various agencies and functionaries involved in the marketing were interviewed in the markets with the help of comprehensive schedules prepared for this purpose.

(iii) Marketing channels, costs and margins

In order to analyse the nature of marketing costs and margins the most popular marketing channel viz., cultivator-breeder-cultivator buyer, was studied. Primary data were collected on pre-tested schedules from 185 buffalo transactions in the selected markets. The particulars included methods of marketing, prices paid and received by the buyers and sellers, market charges paid and various costs incurred by them on various items. Further marketing problems encountered were also detailed. The data thus collected were analysed to establish the relative share of different components of marketing costs.

Another channel of marketing being followed in case of buffaloes in the study area, namely; Producer-Agent-Trader-Dairyman (in other states), was also studied. The relevant data were collected from the breeders, agents, traders and owners of the 'Nohras' in Rohtak city. This channel of
marketing is normally employed for buffaloes exported to West Bengal and Maharashtra state.

Analytical Framework

(1) Trend estimation in prices and export of buffaloes

Time series data on average price of buffaloes in Haryana were collected from the Directorate of Economics and Statistics, Ministry of Food and Agriculture, Govt. of India, as it was the only reliable source for reporting the monthly average buffalo prices from Haryana based on Bahadurgarh market. The data covered a 12 year period extending from the year 1964 to the year 1976. Time series data on export of buffaloes by rail to other states were collected from the four important railway stations of the breeding zone namely; Rohtak, Hisar, Jind and Narnaul for the period starting from the year 1970 to 1976. Earlier to this period, relevant records at concerned railway stations were not available. Reliable information was not available on the part of transporters to provide such data for obvious reasons. Hence this mode of export was not considered in this study.

The scatter diagram of price data showed the possibility of linear function whereas the export data diagram showed the possibility of fitting exponential function. Therefore, following forms of the functions were used to estimate the trend of prices and export.
\[ Y = a + bt \]

\[ Y = ab^t \quad (\log Y = \log a + t \log b) \]

where, \( Y \) = average price of buffaloes/number of buffaloes exported,

\( b \) = regression coefficient,

\( a \) = intercept and

\( t \) = year

The standard error of 'b' were calculated by using the following formula:

\[
\text{s.e.}(b) = \sqrt{ \frac{\sum (Y - \bar{Y})^2}{n-2} } \]

and \( \text{s.e.}(\log b) = \frac{s^2 Y \cdot t}{(t-t)^2} \)

where, \( s^2 Y \cdot t = \frac{(Y_0 - Y_e)^2}{n-2} \)

Student's 't' test was used to examine the significance of trend values.

\[
't' = \frac{\hat{b}'}{\text{s.e.}(b)} \quad \text{and} \quad 't' = \frac{\text{Value of log 'b'}}{\text{s.e.}(\log 'b')} \]

(ii) **Seasonality in prices and export**

**Multiplicative model**

Time series analysis was conducted for analysis of seasonality in average prices and export of buffaloes on the basis of the data collected for trend estimation. Relative
Seasonal fluctuations were calculated after eliminating the trend, cyclic and irregular fluctuations with the help of twelve months moving average by considering the multiplicative relationship. The relative seasonal indices were calculated by using the following formula:

\[
\frac{T \times C \times S \times I}{T \times C} = S \times I
\]

where, 'T' stands for trend, 'C' for cyclic fluctuations if any, 'S' and 'I' for seasonal and irregular fluctuations, respectively.

(iii) Regression analysis

In order to identify the factors responsible for the variation in buffalo prices, cross sectional data from 150 buffaloes in milk and 35 dry pregnant buffaloes collected from the selected markets were used. The regression model considered to explain the variation in prices of buffaloes in milk (lactating buffaloes) was as below:

\[
Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4
\]

where,

- \( Y \) = Price of milch buffalo in rupees
- \( X_1 \) = Age of buffalo in years
- \( X_2 \) = Milk yield in litres
- \( X_3 \) = Order of lactation in numbers
- \( X_4 \) = Stage of lactation in months
- \( a \) = intercept and \( b_i \)'s are the regression coefficients.
The zero order correlation coefficients (Appendix I) indicated the presence of multicollinearity between age and the order of lactation. Hence only one variable namely order of lactation from these two related variables was retained in the regression model. The criterion for retaining the variable in the regression model was high degree of association with the dependent variable and economic logic.

To explain the variation in dry pregnant buffalo prices the following regression model was used:

\[ Y = a + b_1 x_1 + b_2 x_2 + b_3 x_1^2 + b_4 x_2^2 + b_5 x_1 x_2 \]

where,

- \( Y \) = Price of dry pregnant buffalo in rupees
- \( x_1 \) = Age of buffalo in years
- \( x_2 \) = Stage of pregnancy in months.