Research Methodology

This chapter has been devoted to presentation and discussion of the methods and techniques employed in conducting this study. The presentation has been organised into the following six sections:

I: locale of the study.
II: sampling procedure.
III: Selection of the variables.
IV: Operationalization of the variables and their empirical measurement.
V: data collection.
VI: statistical analyses.

3.1.0 Locale of the study

The present study was conducted in the purposively selected Operational area of ILDP, Karnal due to the following cogent considerations:

i) This is one of the four earliest ILDPs sponsored by the Government of India with higher resource concentration than other ILDPs which numbered around 60 in 1973-74.

ii) Exposure of dairy production innovations to the cattle owners for a longer period of time i.e. since 1967.

iii) Easy and convenient accessibility in the area and the investigator's familiarity
with the area, language and customs, considered important for rapport building and information seeking.

iv) Recognition of the area having high potential for milk production not only in the state but in the country as a whole.

The agro-physical and institutional conditions of the study area are described below:

3.1.1 Physical situation

Intensive Cattle Development Project district Kamal, which has been taken up for this study is situated in the central part of Haryana, a state of India which come to exist on First November, 1968. The elevation of Kamal is 250 meter above mean sea-level. Its latitude is $20.7^\circ_\mathrm{N}$ and longitude $77^\circ_\mathrm{E}$. The total geographical area of the district is 2470.97 sq.km. and the total population according to 1971 census is 6,25,256. This district has been divided into four sub-divisions and 14 blocks out of which 8 block are IMF blocks. The river Yamuna flows by the eastern side of the district. The climate of this region is marked by a wide range of temperature and humidity; the maximum temperature during 1971 went as high as 40.3°C in the month of June and fell down to as low as 22.3°C in the month of January. The humidity percentage varied between 85 in the month of March to 84 in the month of August during the same year. The
The average annual rainfall of the district is 70 centimeters, much of which is received during the rainy season, i.e., from July to September.

The soil of the area is typical Alluvium deposits of Indo-gangetic basin and ranges from clay loam to sandy loam. The problem of soil salinity/alkalinity exists in this district. The district is irrigated both by canal and tube-wells.

3.1.2 Agricultural situation:

Karnal is one of the leading districts of the state with respect to agricultural production. The gross cultivated area of the district is 950,000 hectares with 470,000 hectares under assured irrigation. This district is agronomically rich and farmers usually grow two to three crops in a year. Paddy and wheat are the main crops of the region while Jowar (Sorghum) and Berseem (Egyptian clover) are the fodder crops commonly grown all over the district. According to the cattle census of 1966, there were 5,62,900 heads of cattle and 4,94,800 heads of buffaloes in the district. The density of cattle population works out to be 68 per sq km and buffaloes 62 per sq km. Similarly, 316 cattle and 235 buffaloes are found per thousand human population of the district.

3.1.3 Rural institutions:

Panchayats, Cooperatives and Primary Schools are
the three basic institutions found in almost all villages of the district. Village panchayat in the district as elsewhere in the state, is a statutory body and comprises 2-3 revenue villages. Most of the Panchayats have their own office buildings. There are Primary Cooperative Societies meant for providing credit and other agricultural inputs in most of the villages and the total number of cooperatives in the district is 322. A few Rural Commercial Banks are also operating in selected areas of the district.

3.1.4 IEEP activities

The IEEP project was initiated in October, 1987 in this district. The project area comprises of R.E.A. blocks of Samalkha, Panipat, Sahaunda, Nising along with some villages of Sahaunda and Asandh blocks of the district and a few adjoining villages of the Safidon block of the neighbouring district Jind. The IEEP was conceived as a three tier organisation. Next to the project level, there were four regional cattle development blocks in each of the project. The grassroot functionary is the Stockman who is posted at the village level. Each project intended to cover a total breedable population of one lakh which gives an average of one thousand cattle per stockman.

There are four regional insemination centres, three sub-regional insemination centres and 100 Stockman centres in the project area (Fig.3). Nine Jersey bulls
and 34 Murrah bulls are maintained at the Central Semen Bank, Karnal and Regional Artificial Insemination Centre, Panipat. Besides 34 Murrah bulls are maintained at different sub-centres for natural service. Natural service is not provided in case of cows.

According to the project's annual report 1974-75, the total number of inseminations done on indigenous cows till the close of the year since inception is 61,326. Out of these inseminations, the figures reported for the calves born are 5,745 males and 5,569 females. A tally made on 31-3-75 shows the number of female calves as 3,335 and the cross bred cows 388, the remaining ones, presumably were disposed off at varying stages of growth to the adjoining states.

It is reported that a total of 1973 fodder demonstrations were organised by the end of 1974-75 and seventy five quintals of improved fodder seeds were distributed among the farmers. Similarly, it is reported that 93 Co-operative Milk Societies and one Co-operative Milk Union were organised and Rs. 5,48,500 advanced to milk producers for the purchase of milch animals by the end of 1974-75. It may be of interest to mention that a total budget of Rs. 112.30 lakhs was allotted to the project during last eight years, out of which Rs. 90.81 lakhs were actually spent on various activities.
3.2.0 Sampling Procedure:

A list of house-holds having crossbred cows was prepared from the records of the KMF office, Karnal. There were only 16% house-holds having crossbred cows on 31st December, 1973.

In view of the small number of the house-holds having crossbred animals, all of them were selected as respondents for data collection. However, 155 respondents out of 16% provided the necessary information for this study. The others were either not available or were hesitant to give information. The classification of the house-holds is given in Table 3.1.

Table 3.1 House-holds having crossbred cows as on 31st December, 1973 in CMP, Karnal and the households providing responses.

<table>
<thead>
<tr>
<th>Regional Artificial Insemination Centres</th>
<th>Rural House-holds</th>
<th>Rural House-holds Responded</th>
<th>Urban House-holds</th>
<th>Urban House-holds Responded</th>
<th>Total House-holds</th>
<th>Total House-holds Responded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samalkha</td>
<td>8</td>
<td>3</td>
<td>10</td>
<td>4</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>Panipat</td>
<td>24</td>
<td>22</td>
<td>87</td>
<td>81</td>
<td>111</td>
<td>103</td>
</tr>
<tr>
<td>Churuanda</td>
<td>27</td>
<td>24</td>
<td>14</td>
<td>11</td>
<td>41</td>
<td>35</td>
</tr>
<tr>
<td>Assandh</td>
<td>18</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>77</strong></td>
<td><strong>57</strong></td>
<td><strong>115</strong></td>
<td><strong>98</strong></td>
<td><strong>192</strong></td>
<td><strong>183</strong></td>
</tr>
</tbody>
</table>
3.3.0 **Selection of variables:**

In consonance with objectives of the study, the dependent variable of the study, was adoption of various dairy farming innovations by the respondents. A study of this type can be scientifically meaningful and otherwise purposeful, if the causal, relational or associational effects of some of the relevant correlates are brought out after the valid and reliable measurement of the dependent variable. It, therefore, appeared pertinent to include some traits of the adoptor. Knowing fully well the numeroseness of the possible correlates and also the likely taxonomical problem of at least some variables to be justifiably placed in the class of antecedent or intervening variable, decisions had to be taken regarding (a) the precise number of variable to be covered in the study and thereafter (b) placement of a few of those in one or the other category. Manageability by a single handed investigator was the chief criterion for deciding the number of correlates to be included in the study.

A number of researches have demonstrated different socio-psychological, economic and communication correlates of adoption of the technology. Sinha and Sinha (1971) enlisted certain characteristics of adopters while discussing differential adoption of dairy production innovations, such as age, education, family size, farm size, herd size, extension contact, social participation, innovation patronage etc. Kakoty 1976 studied age, size of family, size of holding
and herd size as important variables for adoption of dairy technology. Sumal (1976) while discussing differential adoption of improved dairy practices stated some important characteristics associated with adoption of dairy technology such as age, caste, education, family size, herd size, income and contact with extension agencies etc. Singh (1976) found some of the variables like age, caste, education, herd size, farm holding, socio-economic status, knowledge, attitude, media exposure and extension contact as important determinants of various aspects of dairy technology. Nakkilinemi (1976) reported evidences from his study on "A study of adoption of a few selected dairy practices in upland and delta areas of Vijaywada(A.P.)", that age, education, farm size, herd size, media exposure, extension contact, social participation and knowledge were some key characteristics associated with adoption of dairy technology. Rath (1977) in a study on "A critical analysis of an intensive cattle development project: progress, problems, and prospects", delineated some important characteristics associated with adoption level of dairy innovations such as knowledge, extension contact, media exposure, and size of holding. In the context of adoption of agricultural technology Nair (1989) and Singh (1989) studied, beside other socio-psychological characteristics, economic motivation as an important factor for adoption of the technology.
The studies quoted above clearly suggest some of the correlates of adoption of technology which form a base for selection of variables in the present study besides the personal knowledge of the investigator as a result of his own long standing in the field of dairy extension, consultation with available experts and pilot study which were the bases taken into consideration for choosing the correlates for this study. On the basis of the aforesaid considerations, the following were the variables included in the study.

Table 3.2: Variables and their measurement.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antecedent Variables:</strong></td>
<td></td>
</tr>
<tr>
<td>1. Family size</td>
<td>Schedule developed for the purpose.</td>
</tr>
<tr>
<td>2. Family education</td>
<td></td>
</tr>
<tr>
<td>3. Occupation</td>
<td></td>
</tr>
<tr>
<td>4. Farm size</td>
<td></td>
</tr>
<tr>
<td>5. Mode of milk marketing</td>
<td></td>
</tr>
<tr>
<td>6. Price of milk</td>
<td></td>
</tr>
<tr>
<td>7. Media exposure</td>
<td>Schedule developed for the purpose.</td>
</tr>
<tr>
<td>Variables</td>
<td>Measurement</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>10. Herd size</td>
<td>Schedule developed for the purpose.</td>
</tr>
<tr>
<td>11. Innovation knowledge</td>
<td>Test developed for this study.</td>
</tr>
</tbody>
</table>

**Dependent Variable**

| 12. Adoption of dairy innovations | Index developed for this study.                  |

### 3.4.0 Operationalization of the variables and their empirical measurement.

#### 3.4.1 Antecedent variables

##### 3.4.1.1 Family size:

The family size was operationalised as the number of individuals of both sexes living permanently together in a household and eating food cooked from the same hearth. This was measured by actual enumeration.

##### 3.4.1.2 Family education:

It refers to the academic qualifications of all the family members acquired through formal schooling and any training in dairying.

The years of schooling of different family members have been quantified by giving one score to illiterate, two scores to literate and 3, 4, 5, 6 to primary, middle, matric, graduate and above graduate respectively. One additional score has been given for any training in dairying.
The average score of education for the household has been the overall educational level of the family which has been computed as under:

\[ \text{F.E.S.} = \frac{E_1 + E_2 + \ldots + E_n}{N} \]

Where:
- \(\text{F.E.S.}\) = Family education score.
- \(E_1, E_2, \ldots, E_n\) = Education score of the family members
- \(N\) = Number of family members above six years of age.

3.4.1.3 **Occupations**

It refers to the main occupation of the respondents which is the major source of earning livelihood. The respondents have been classified in the four categories on the basis of the occupations predominantly prevalent in the area of study. The four predominant occupations in the area of the study were agriculture, business, service, and labour. On the basis of relative importance assigned by the people in the area to these occupations in respect of different occupation scores of 4, 3, 2, and 1 were assigned to them respectively.

3.4.1.4 **Farm Size**

It is operationalised as the total area in hectares operated by the respondents and was determined by asking question about area owned or cultivated.
3.1. Mode of milk marketing:

It refers to the agencies to which the milk is being marketed by the respondents. The milk, in this area, is usually marketed by the milk producers to (i) Cooperative Milk Society; (ii) Consumers; (iii) Milk collectors (middlemen) tea shops/ Halwais. Numerical scores, as given below were assigned by investigator to these modes of milk marketing by keeping in view the relative advantage of these agencies to the milk producer for selling his milk:

<table>
<thead>
<tr>
<th>Agencies</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Cooperative milk society</td>
<td>3</td>
</tr>
<tr>
<td>(ii) Consumers</td>
<td>2</td>
</tr>
<tr>
<td>(iii) Milk collector (middlemen</td>
<td>1</td>
</tr>
<tr>
<td>or teashop/Halwais)</td>
<td></td>
</tr>
</tbody>
</table>

3.1.6 Price of Milk:

It indicates the price received by the respondents for their milk sold to different agencies. It was ascertained by asking a direct question.

3.1.7 Media Exposure:

Learner (1958) developed a weighted index of media exposure by taking into account newspaper, radio and film viewing. Rogers (1969) used five mass media namely newspapers, magazines, films, radio and T.V. for calculating media exposure. In the present study, the six media taken into account are Film viewing, Radio listening, T.V. viewing, reading of Pamphlet and Magazines, participation in exhibitions and contact with ICDF personnel. These are the media which are mostly in vogue in the area of study.
in the present study is conspicuous by its absence because of non-availability on a mass scale in rural areas of the country. Frequency of use of these media by the respondents were acquired through direct questioning.

Media exposure has been operationalised as the respondents' indication of degree of exposure to each medium in terms of the number of times films, on dairying and animal husbandry were seen during the last one year and the frequency of listening to and seeing the rural programmes on radio and T.V. respectively. In addition to that the number of pamphlets, journals read, the number of dairy cattle shows, exhibitions attended, the number of times the staff of I.C.D.R. (Stockmen, Vedas and District Officers) contacted were also taken into consideration in measuring media exposure of the respondents. It has been measured through an index developed for the purpose, which is succinctly described hereafter.

**Media Exposure Index**

The media exposure has been studied in relation to exposure of six media viz. Radio, Television, Film, Literature, participation in dairy cattle shows exhibition and contact with extension agency. Continuous of varying lengths were developed to measure the extent of exposure to these media. In order to have a composite measure of the respondents' media exposure in general the scores of an individual obtained on the various continua were standardised and pooled as detailed below.
The score on a particular continuum (for a particular medium) obtained by a respondent was divided by the maximum obtainable score on that continuum and then multiplied by 100. The coefficients so obtained for each of the six continua were then added to and divided by the number of media i.e. six in this case, to yield an overall (composite) score of media exposure for that respondent.

The indices for individual character in each component have been estimated for each respondent to overcome the scaling effect at the time of aggregating the individual character and individual component. The index for \( i^{th} \) character in \( j^{th} \) component for \( k^{th} \) respondent was calculated by the following formula and expressed in percentage:

\[
I_{ijk} = \frac{s_{ijk}}{s_{ij}} \times 100
\]

Where \( s_{ijk} \) = Score obtained by the \( k^{th} \) respondent for \( i^{th} \) character in \( j^{th} \) component.

\( s_{ij} \) = Maximum possible score that can be obtained by \( i^{th} \) character in \( j^{th} \) component.

\( I_{ijk} \) = Percentage score obtained by \( k^{th} \) respondent for \( i^{th} \) character in \( j^{th} \) component.

Index for each component (medium) was calculated as:

\[
I_{jk} = \frac{1}{n_j} \sum_{i=1}^{n_j} I_{ijk}
\]

Where \( n_j \) = number of characters in \( j^{th} \) component (medium).

\( I_{jk} \) = Index for \( k^{th} \) respondent, \( j^{th} \) components (medium).
The components (media) have been aggregated to obtain the composite index by assigning equal weight to each component (media). The composite index is given by

\[ I_k = \frac{1}{J} \sum_{j=1}^{J} I_{jk} \]

where \( J \) = number of components (media),
\( I_k \) = Composite index for kth respondent.

3.4.1.8 Empathy

Empathy is the ability of an individual to project himself into the role of another person. Learner (1958) stated empathy in various ways (a) "the capacity to see oneself in the other fellow's situation". (b) "the capacity for rearranging the self system on short notice," (c) "mobile sensibility" and (d) "psychic mobility."

Empathy is the individual's ability to identify with other's roles, especially with those who are different from oneself. In the present study, it has been operationalized as the ability of cattle owners to assume (imaginatively) the role of a village leader, extension agent, a local elected leader, state minister of agriculture and animal husbandry and the Prime Minister of India.

Empathy has been measured with the help of five-item scale developed by Rogers (1959) which has been adopted for this study with little modification (Appendix II).

The responses have been scored as under:
Using the split-half method of determining the scale reliability, the coefficient of reliability of the empathy scale has been found to be 0.75, which was significant at 0.05 level of probability.

3.4.1c9 Economic Motivation:

Motivation is a broad term which is described by Atkinson (1965) as "direction, vigour and persistence of behaviour or action". In essence, motivation seems to be goal directed, initiating stage which leads to increased activity and persists till the ends are achieved. From the broad spectrum of motivation, economic motivation has been selected for the present study.

In this study, economic motivation, refers to the profit maximisation and relative value placed by the cattle owners on economic ends. It has been measured with the help of scale developed by Cape (1968). The reliability
of the scale under the local conditions has been further tested by split-half method and the correlation coefficient has been found to be 0.82. The scale appears in (Appendix II).

3.4.1.10 HARD SIZE:

It refers to the number of adult dairy animals both cows and buffaloes owned by the respondents. It has been determined by asking direct questions (Appendix II).

3.4.1.11 KNOWLEDGE OF DAIRY INNOVATIONS:

Knowledge is generally understood as an intimate acquaintance of an individual with facts. Bloom et al. (1956) considered knowledge as those behaviours and test situations which emphasises remembering either by recognition or recall of ideas, material or phenomena. English and English (1961) defined knowledge as "the body of understood information possessed by an individual or by a culture." They further explained "knowledge as that part of a person's information which is in accord with established fact." Rogers and Shoemaker (1971) while describing the model of the innovation decision process considered knowledge as a function or a stage of the decision process when "the individual is exposed to an innovation's existence and gains some understanding of how it functions." The knowledge of the dairy technology in this study has been operationalised as the extent to which the recommendations pertaining to dairy innovations concerning breeding, feeding and veterinary care are known to cattle owners.
Measurement of Knowledge:

Measurement of knowledge in the present study included the test situations which emphasised the recalling of ideas or information received so far with respect to different dairy innovations such as breeding, feeding and veterinary care of the cattle owners. A suitable teacher-made-type of knowledge test was developed by framing suitable questions on information usually passed by the extension personnel, radio and literature to the cattle owners in respect of dairy technology. Questions were framed not only to get the factual information from the cattle owners but also to get response about their understanding of the technology. By 'understanding', it is implied that the respondent is not only aware of the elementary aspect of the newly recommended practices but also knows its full purport, significance and applicability to his (respondent's) own situation. In other words, there were both "what" as well as "why" and "how" type of questions which were supposed to yield information about their understanding or comprehension of the dairy technology.

Selection of dairy innovations:

The content of any scale is composed of questions called items. According to Guilford (1964) the item analysis of a test usually yields two kinds of information. It, firstly, provides an index of item difficulty and secondly, an index of item discrimination. In this study item discrimination has been considered for the purpose of item selection. Selection of the items for the scale was
made with the following two criteria in view, as used by Singh and Jha (1971):

(a) the item should promote thinking rather than simply rote memorization.

(b) the item should differentiate the well informed respondents from the poorly informed ones.

Keeping this point in view a comprehensive list of the recommended dairy innovations was prepared in consultation with experts available in NUKI and IDBP, Karnal. The applicability of these dairy innovations in the study area was further validated by the Stock Assistants in the IDBP area.

Thirty items were initially selected, checked and modified in the light of pretesting as suggested by Conrad (1949). Out of these twenty items were retained in the scale for further selection. The difficult items as perceived during the pretesting were deleted so as to make the items understandable by the respondents. All the twenty items supposed to measure the knowledge with regard to the dairy production practices related to breeding, feeding, and veterinary care, were administered to 48 scientist and practicing veterinarians selected randomly from NUKI and IDBP, Karnal. They were asked to rate the suitability of the items with regard to the practice to be measured on five point continuum ranging from most
suitable, quite suitable, moderately/reasonably suitable, less suitable and least suitable and scores were assigned 5, 4, 3, 2 and 1 respectively.

The selection of items for the final scale was done by the critical ratio item analysis technique as suggested by Eidward (1957). For this the total score of 48 respondents were arranged in ascending order on twenty item scale. 25 per cent, that is, twelve respondents with the highest total scores and the same number with the lowest total score in respect of items or questions related to the practices were separately identified to form high and low criterion groups. The difference in respect of high and low group in respect of all the items were worked out using the formula as given by Eidward (1957).

It was observed that the calculated 't' value in respect of ten of the 20 items related to the selected practices were significant at .05 level of probability. All the ten items were selected to constitute the final scale for measuring the dairy innovation knowledge (Appendix II).

Quantification:

Each of the 10 selected items or questions related to dairy innovation was provided with three alternate answers,
reflecting most relevant, relevant and least relevant answer to a question. In order to give weightage to each alternative answer of each question or item, the selected questions along with their alternate answers were given to twenty judges selected from amongst the Scientists of NDRL. They were requested to place the three alternate answers of each question or item on the three point continuum i.e. most relevant, relevant, and least relevant. Further the most relevant, relevant and least relevant answers were scored as 3, 2, and 1. Thus the score ranged from 30 to 10 i.e. maximum to minimum. Nunnally (1967) suggested that a linear model can be accepted as the most appropriate for the development of most measures of psychological attributes. He stated, "the model stipulates that test scores are to be obtained by summing scores over items. The items can be either weighted or unweighted, and either they can all have positive signs in the combination or some can have negative signs. . . . . . . . . . . . . . . . . the linear model should be used as a guide in nearly all test construction". He further stated, "the principles apply to any measure that is obtained from a linear combination of individual responses, items on mental tests constituting only a special case. The principles apply to measures of ability, personality, and attitude; and they apply both to dichotomous or more than two points".

In view of the above, the scores of the selected items in respect of knowledge of dairy technology were summed up in order to get a total score of a respondent.
Reliability:

In the present study test retest method has been used to test the reliability of the scale. This method yielded information about the stability of rank orders of individuals over a period of time.

The knowledge scale with 10 items were administered twice to 30 progressive dairy farmers around Kurnool at an interval of 30 days. Two sets of knowledge scores were thus obtained for each of the 30 respondents. The correlation coefficient between these two sets of scores was found to be 0.36 which was significant at 0.01 level of probability. Thus, it indicated that the scale was dependable.

Validity:

The validity of the present test was established through content validity which refers to the representativeness or sampling adequacy of the content of a measuring instrument. Munnally (1967) also stated "validity depends primarily on the adequacy with which a specified domain of content is sampled". Further he illustrated two major standards for ensuring content validity: (1) a representative collection of items and (2) "sensible" method of test construction. In order to ensure the above two criteria, the content of the knowledge test were derived from the content analysis of the literature concerned and advice of the experts dealing with the technology in the area of investigation. Therefore, it was assumed that the scores obtained by administering these tests measured what was intended to measure.
The selected items for measuring the knowledge of dairy innovation with regard to breeding, feeding and veterinary care are listed below:

(1) What are the heat symptoms of a Cow?

i) Enumeration of more than four heat symptoms. 3

ii) Enumeration of 3 to 4 heat symptoms. 2

iii) Enumeration of 1 to 2 heat symptoms. 1

(2) After how many days does the Cow repeat its heat cycle?

i) Between 20 to 23 days 3

ii) Between 18 to 24 days 2

iii) Between 17 to 25 days 1

(3) When should a Cow in heat be inseminated?

<table>
<thead>
<tr>
<th>Oestrus first observed</th>
<th>Heat time to breed</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early morning</td>
<td>Evening</td>
<td></td>
</tr>
<tr>
<td>Noon/Afternoon</td>
<td>Next day early morning</td>
<td></td>
</tr>
<tr>
<td>Evening</td>
<td>Next day noon</td>
<td>3</td>
</tr>
</tbody>
</table>

i) Early morning

ii) Early morning

iii) Early morning
iii) Early morning

<table>
<thead>
<tr>
<th>Time</th>
<th>Feeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noon</td>
<td>Noon</td>
</tr>
<tr>
<td>Noon/Afternoon</td>
<td>Late in the evening.</td>
</tr>
<tr>
<td>Evening</td>
<td>Next day morning</td>
</tr>
</tbody>
</table>

(4) When should a cow be checked for pregnancy?

1) Between 45 to 60 days after insemination.

2) Between 61 to 90 days after insemination.

3) Between 91 to 120 days after insemination.

(5) When should a cow be inseminated after calving?

1) Within 60 to 90 days post-partum

2) Within 91 to 120 days post-partum

3) More than 120 days post-partum

(6) What should be fed to a cross-bred cow?

1) Green fodder + Compound feed or Concentrate mixture (Prepared at home in proper proportion) + Mineral mixture and feed supplement + Clean water all the time.

2) Green fodder + Concentrate mixture (prepared at home in proper proportion) + Salt + Clean water three times a day.

3) Feed and feeds (whatever available) + water twice a day.

(7) What do you understand by vaccination?

1) Vaccination is a prophylactic measure against certain diseases.

2) Vaccination is a treatment for certain diseases.

3) Vaccination stops all the diseases.
(8) Name the diseases against which vaccination should be done?

Any three contagious diseases e.g.
1) R.S., R.F., FeFoBo
2) Any two contagious diseases e.g. R.S., R.F.
3) Anyone disease e.g. R.S.

(9) What should be done if the cow falls ill?

1) Call the Veterinarian
2) Take the cow to dispensary
3) Treat it locally

(10) What should be done if the cow is not coming into heat?

1) Consult the Veterinarian
2) Consult the local knowledgeable person (quack)
3) Try family prescriptions

Adoption of Dairy Technology

Various measures have been developed by researchers for the measurement of adoption behaviour of the farmers, but only a few researchers dealt specifically with the methodology of adoption measurement.

Wilkening (1952, 1953) reported the use of an index of improved farm practices. He presented a detail account of the procedure followed in evolving the index. The scoring of the index emphasised the extent of adoption. He indicated the differential nature of practises and
assigned differential weights in the adoption index. In considering the potentiality of adoption, he stated that since some practices were not applicable on particular farms the index of adoption used was the percentage of the practices adopted to the number applicable to each operator.

Hoffer and Strangland (1958) introduced an important variable in measurement - the potentiality of adoption by a particular farmer by noting the nature of applicability of the practice. They also used the concept of possible adoption and studied adoption of practices in terms of the ratio of the number of possible adoptions to the number of actual adoptions as well as in terms of the number of practices adopted by each grower.

Rice and Dasgupta (1962) computed the adoption index for Bengal farmers by simply counting the number of improved practices adopted by the farmers. They used five practices for computation of the adoption index. Freeman (1961) similarly used six practices for determining the adoption index of farmers by counting the number of practices adopted by them. Marsh and Coleman (1964) used practice adoption score to measure the level of adoption of farmers. The score was computed on the basis of extent to which each of the farmers had tried and was using the applicable practices out of the list of 21 recommended farm practices.
Chattopadhyay (1963) used adoption quotient for measuring the adoption behaviour. It is a ratio scale having components like applicability, potentiality, extent, time, consistency and differential weight.

Neal and Sibley (1967) operationalized the adoption of agricultural technology in terms of composite score of a number of practices logically consistent with the general concept of the adoption of agricultural technology and judged to be applicable to the farmers in the study area.

**Adoption Index:**

In the present study, the farmers level of adoption of dairy technology was measured in terms of some selected dairy practices used by the farmers. It was measured with the help of adoption index developed for this purpose. The main reason for computing the adoption index was that the practices selected were with regard to breeding, feeding and veterinary care having ten items. It could have been otherwise difficult and unmanageable for the measurement of adoption quotient. The procedure for developing the index is discussed below under two heads namely selection of the practices and their related items along with assignment of the weights.

**Selection of the improved dairy practices:**

In the present study eight recommended practices with regard to breeding, feeding and veterinary care of
Dairy technology were selected for computing adoption index of the respondents from the ten practices earlier selected for measuring the knowledge of dairy technology.

The schedule constructed for measuring the adoption index of cattle owner in relation to dairy technology appears in appendix III.

Assignment of weights to the practices:

The improved dairy practices communicated to the cattle owners differ in their difficulty of adoption by them. It is customary to give more credit to the performance of a more difficult task. Logically, then, the cattle owners who adopt more difficult practices should get credit of this aspect viz. adoption of more difficult practice. Rogers (1961) while constructing his scale has however, stated "it was necessary to utilize scoring system that will give equal weightage to each of the practices included in the adoption of farm practices-scale. According to him, there was little reason to believe that any greater weight should be applied to anyone practice in the scale". But he did not elaborate the reasons why equal weights should be applied to all practices or in other words why more weight should not be given to a more difficult and a more complex practice. Therefore Wilkening (1952,53) and Chattopadhyay (1963) assigned differential weights on the basis of difficulty level while scoring adoption behaviour of the farmers. In this study also the practices have been assigned scores on the basis of differential difficulty level in adoption of the technology.
For this, twenty scientists from FDRI and twenty progressive cattle owners around Karnal were selected to assign weights to each of the practices in order of difficulty in the adoption. All the practices were placed on a difficulty continuum ranging from most difficult, difficult, and least difficult. A score of three, two and one were assigned accordingly. All the weights for each practice obtained from the scientists and the Cattle owners were summed up and the mean weight was taken for the purpose of calculation. All the practices along with their weights rounded to whole number are shown in Table 3.3.

Table 3.3: Practices and Weights assigned

<table>
<thead>
<tr>
<th>No.</th>
<th>Practices</th>
<th>Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Observance of heat</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(a) Keeping watch on the Oestrus cycle and heat symptoms.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(b) Keeping watch on heat symptoms.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>(c) Keeping watch only on believing.</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Getting Cows Laminated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oestrus first observed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next time to breed</td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>Early morning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noon/Afternoon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evening</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next day early morning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next day noon</td>
<td>3</td>
</tr>
<tr>
<td>ii)</td>
<td>Early morning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noon/Afternoon</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evening</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next day late in the morning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next day late in the morning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next day afternoon</td>
<td>2</td>
</tr>
</tbody>
</table>
3. Getting Pregnancy Diagnosed at proper time:

1) Between 45 to 60 days after insemination. 3
2) Between 61 days to 91 days after insemination. 2
3) Between 91 to 120 days after insemination. 1

4. Insemination of Cow after calving:

1) Within 60 to 90 days post partum 3
2) Within 90 to 120 days post partum 2
3) More than 120 days post partum. 1

5. Feeding Practice Adopted:

1) Green fodder +
Compounded feed or concentrate mixture
(prepared at home in proper proportion) +
Mineral mixture and feed supplement +
Clean water all the time. 3
2) Green fodder + Concentrate mixture
(prepared at home in proper proportion) + Salt +
Clean water thrice daily. 2
3) Fodder and feeds (whatever available) + Water twice daily. 1

6. Vaccination done:

1) Against R.S., R.F. and F.M.D. 3
2) Against R.S., R.F. 2
3) Against R.S. 1
7. **Seeking Veterinary Aid at the Time of Cow Falling Ill.**
   i) Call the Veterinarian
   ii) Taking cow to dispensary
   iii) Treating locally

8. **Seeking Veterinary Help at the Time of cow not coming to heat.**
   i) Consulting Veterinarian
   ii) Consulting the local knowledgeable person.
   iii) Not consulting anybody, trying own prescriptions.

The scores for each of the practices of the dairy technology reported to have been adopted by a particular respondent were summed up and divided by total number of weights. The resulting value was finally multiplied by hundred and the value so obtained was taken to be the adoption index of the respondents. This indicated the extent of adoption of improved practices of dairy technology of an individual cattle owner.

3.5 **Data Collection:**

Data was collected by the Investigator through personal interviews with the help of structured schedule. A prior rapport with rural and urban respondents was established for obtaining factual information. The cooperation of local officials like Stock Assistant, V.A.S. and Panchayat is noted.
Secretaries and Village Leaders were availed. However, their presence during the actual interview was not encouraged to avoid bias of respondents. The respondents selected in the sample were individually interviewed by the researcher.

3.6.0 **Statistical analyses**

The data so collected were scored, compiled and properly tabulated to employ the following statistics:

1) Percentage
2) Correlation
3) Partial correlation
4) Multiple regression
5) Path analysis as suggested by Duncan (1975)