RESULTS AND DISCUSSION

This chapter presents the results of the study. An attempt has been made to interpret and discuss the results of the study in the light of the findings of other investigators. These have been presented under the following three sections:

1. Occupationwise analysis of knowledge and adoption of dairy innovations.
2. Correlational analysis between the selected antecedent, intervening and dependent variables.
3. Relational analysis of correlates of adoption.

A: Intervening Variables:
   i) Media Exposure
   ii) Empathy
   iii) Economic motivation
   iv) Herd size
   v) Innovation knowledge

B: Dependent Variables:
   Adoption of dairy innovations.

The first section deals with the analysis of the knowledge and adoption of dairy innovations by respondents pursuing different occupations. In the second section, the variables have been first classified into antecedents,
intervening variables and consequents and then associations amongst these have been worked out with the help of Pearsonian coefficient of correlations. In a further, first order partial correlations have been estimated, by removing the effect of intervening variables, from the relationship between a pair of antecedent and consequent variables. In the third section, relational analyses (correlation, regression and path) have been employed in order to delineate important correlates for proposed intervening variables and adoption of the dairy technology taken as dependent variable. Path analysis has been employed to estimate the direct and indirect effect among independent, intervening and dependent variables, as they are measured. It may be further clarified that the independent and intervening variables were treated as antecedents to adoption of dairy innovations (dependent variable) in path analysis.

Section II

The knowledge of dairy innovations leading to their adoption has been investigated in relation to ten different traits of the respondents. It was 'occupation' as a trait out of these ten characteristics covered by the study that appeared to have more intimate association with knowledge and adoption of dairy innovations by the respondents. Accordingly, it has been deemed appropriate to present here an analysis of the knowledge and adoption of dairy innovations with regard to occupation.
4.1.0 Occupationwise Analysis of Dairy Innovation Knowledge

The knowledge of dairy innovations of the respondents belonging to predominantly occurring occupations has been worked out and the data are presented in Table 4.1.

4.1.1 Knowledge of Dairy Cattle Breeding

As revealed by Table 4.1 the knowledge about cattle breeding in the rural and urban areas, taking all the cattle owners together maintains more or less the same level. It is 67.17 per cent of the expected potential knowledge in the rural areas, whereas it is 64.30 per cent in the urban areas. Having studied the occupational differentiation in the knowledge spectrum, the service group was observed to be possessing the highest score (77.61) followed by agriculturists (73.09), labourers (60.47) and businessmen (67.36). On the other hand in the urban areas, it is maximum for labourers (74.19) followed by businessmen (66.91), agriculturists (65.25) and service group (54.95).

The service group in the rural areas is having maximum breeding knowledge, while in urban areas, it has minimum. This may be ascribed to better social contacts of the service class in the rural society, a down to earth background in farming and sufficient background of cattle keeping as compared to the service class in the urban areas.
The agriculturists have reasonably good knowledge of breeding innovations in both rural and urban settings. However, labourers in the urban areas have better breeding knowledge (74.19) as compared to the ones in rural areas (50.47). This difference may be explained by the fact that the labourers in the urban areas evidence more interest due to better marketing facility for the milk they produce than what is available to their counterparts in the rural areas.

In the urban areas, the business community in particular, shows a higher level (66.91) of knowledge in the breed improvement of cattle, while the same community in rural areas indicates a comparatively poorer performance (47.85). In the urban areas, as the tradition goes, especially in Haryana, members of the business class do keep a cow or two as to meet the domestic requirement of milk. They take pride in the high milking ability of their animals and this, sometimes, is considered to be a prestigious symbol of prosperity and a higher social status among fellow citizens. Although they are ever willing to give these cows the best of feeds, yet their preoccupation with the affairs of the trade spares little opportunity for an intimate understanding of the practices recommended for the breeding of animals in the context of a package of innovations. The rural businessman, on the other hand, displays a rather casual and indifferent attitude towards acquiring the knowledge of cattle breeding practices.
4.1.2 Feeding knowledge

The feeding knowledge in urban areas is higher as compared to rural areas for all the occupational groups. The level of knowledge, taking all the cattle owners together, is 57.33 per cent in the urban areas and 42.09 per cent in the rural areas. In both the settings, the feeding knowledge is maximum for the service class, followed by business community, agriculturists and labourers. The level of knowledge ranges from 47.49 to 63.88 in the urban areas, whereas in the rural areas the range is from 33.33 to 53.33. These findings are in line with the findings of Fosu (1974) that 71 per cent of the selected cattle owners had no knowledge of balanced diet for their cattle. The reasons for the highest knowledge in case of service groups in both the settings and higher level of knowledge for the urban cattle owners as compared to rural owners can be attributed to the following:

(i) Higher educational level, better media exposure and better social contacts in the urban areas especially for the service group.

(ii) The urban cattle owners generally purchase the feed and fodder requirements, and in this process, gain some knowledge with regard to optimal feeding to maintain the cow economically.
(iii) The urban cattle owners are also benefited in increasing their feeding knowledge by the sale promotion activities of different feed manufacturing companies which are mostly operative in the urban areas.

Amongst the cross-bred cattle owners, the service and business class have been found to have more knowledge of feeding innovations compared to agriculturists and labourers. This difference seems to suggest that while the labour class has better potentialities to gain feeding knowledge, the same has not been fully exploited by the change agents in the ICDF areas by providing them necessary knowledge, inputs and services.

4.1.3 Veterinary Knowledge

The veterinary knowledge is higher in the rural areas than in the urban areas for all the occupational groups, except the service class. In rural areas the level of knowledge ranges from 19.60 for the labourers, which is minimum, to 79.94 for service class, which is maximum. In the urban areas, it ranges from 29.34 to 43.72 which is minimum for business group and maximum for farmers. The overall figures for the veterinary knowledge is 46.66 in the rural areas and 36.13 in the urban areas.

Animal husbandry is a regular subsidiary occupation in rural areas and the cattle owners have rich experience accumulated from generation to generation regarding the cattle diseases as compared to cattle owners in urban areas.
The cattle owner in urban areas usually dispose of their animals more frequently either for a favourable bargain or for replacement of a dry or less productive cow. Thus in comparison to rural cattle owners, they pay less attention to the acquisition of veterinary knowledge.

4.1.4 Overall knowledge of dairy innovations

After studying the level of knowledge of respondents for breeding, feeding and veterinary separately, it is of interest to study the influence of occupation in the rural and urban areas on the composite knowledge of these dairy innovations.

It can be seen from the Table 4.1 that the level of overall knowledge ranges from 34.46 to 68.59 in rural areas amongst the occupational groups, whereas in the urban areas, it ranges from 50.05 to 63.04. This shows that there is no impact of occupation on the level of knowledge in the urban setting, although some differences have been noted between the different occupational groups, with regard to individual dairy innovations. But there is considerable difference between the occupational groups in the rural setting. In the rural areas, the knowledge level for the service group is as high as 68.59 per cent of the potential level, followed by agriculturists (54.38), business group (44.75) and labourers (34.64).
These results reveal that the level of dairy innovations knowledge is extremely poor in the labour group. It is, therefore, suggested that more efforts be made with the labour class in particular, to improve their knowledge with regard to different dairy innovations, so that they may participate in the dairy development programmes for their own upliftment with better understanding and in a purposeful manner. The present level of knowledge of the agriculturists in the rural areas can also be increased at least to the level of knowledge possessed by the service class by making extra efforts through educational activities. A wide gap exists between the potential knowledge and the knowledge acquired by the cattle owners in both the study areas. It can, therefore, be suggested that this gap should be narrowed down to the minimum by accelerating the educational efforts, so that the cattle owners may adopt the dairy innovations with a still greater appreciation for resultant benefits.

4.2.0 Occupationwise Analysis of Adoption of Dairy Innovations

The adoption of dairy innovations, concerning breeding, feeding and veterinary care by the respondents belonging to various occupations has been measured and presented hereafter.
4.1.2.1 Breeding Adoption

As shown in Table 4.2, the breeding adoption, taking all the cattle owners together, is more or less of the same level, in both rural and urban areas. It is 73.60 per cent of the expected potential breeding adoption in rural areas whereas it is 72.84 per cent in urban areas. This level of adoption of breeding practices by the respondents of this study is, in a way, comparable to the 79.04 per cent respondents reported by Sinha and Sinha (1974) in respect of adoption of artificial insemination technique. The breeding adoption is the maximum for service group (89.04) followed by agriculturists (75.56), labour group (66.15) and business group (59.11), whereas in the urban areas it is maximum for the labourers (77.65) followed by business class (73.86), service group (74.29) and agriculturists (70.11). The service class in the rural areas is having maximum breeding adoption, while it has poor breeding adoption in the urban areas. This may be due to the fact that in rural areas, the service class due to its cosmopolite nature, has got the maximum contact with the extension agency, as compared to service class in urban areas. Another reason seems to be the fact that service class in rural areas has the agricultural background, which may not be true with the service class in urban areas. The labourers have the best breeding adoption in urban areas.
but in the rural areas they have a poor level of breeding adoption. This difference can be attributed to the fact that the labourers in the urban areas have better milk marketing facility, as compared to what is available in the rural areas.

The adoption of breeding innovations seems to be quite reasonable for agriculturists in the rural areas while it is poor in the urban areas in the same group.

Amongst the business community, the breeding adoption is reasonably good in the urban areas, while it is poorest in the rural areas. The reason may be that the urban businessmen are fond of high milk producing cows, and therefore, have better adoption of cattle breeding practices, as compared to their counterparts in rural areas.

4.1.2.2 Feeding Adoption

The adoption of the practices of feeding innovations is higher in urban areas (57.13) as compared to rural areas (42.09) for all the occupational groups. Sinha and Sinha (1974) also found that 45.4 per cent of the dairy farmers adopted feeding of cattle feed mixture. In both the settings, it is worthy of note that the adoption of feeding practices is maximum for the service group, followed by business community, agriculturists and labourers. The level of adoption ranges from 33.33 to
53.33 in rural areas, whereas in the urban areas the range is between 37.49 to 63.86. The reasons for the highest adoption in case of service groups in both the settings and higher level of adoption for urban cattle owners as compared to rural ones, can be attributed to the following cogent reasons:

(i) Higher educational level, better media exposure and better social contacts in the urban areas, specially for the service group.

(ii) Cattle owners in the urban areas in all the occupational groups are economically better off as compared to rural areas. In other words, they have better resources than their corresponding counterparts in the rural areas.

(iii) Cattle owners in urban areas have better knowledge with regard to feeding innovations as compared to rural areas.

4.12.3 Veterinary adoption

In both rural (§2.48) and urban (§2.32) settings, the veterinary adoption level is more or less the same, considering all the cattle owners together. In rural areas the range is from 70.00 in business community to 100.00 in service class, whereas in urban areas the range is from
Thus, in both the settings the adoption of veterinary practices is poorest among the business community. This shows that business community is not paying much attention to the health of their animals as is being paid by other occupational groups. This may be because this community is very busy with their main occupation and are not able to pay personal attention to the health of the animals.

The service class is most prominent in adopting the veterinary innovations in the rural areas (100.00), while in the urban areas also this class is doing fairly well (83.78). The reason may be that this class is having better contacts with the extension agencies and also has the general background of cattle keeping.

The agriculturists have reasonably good veterinary adoption in the rural as well as in the urban areas, because of their cattle keeping background, and more interest in the health of their animals.

The labour class in the urban areas has the best veterinary adoption, while in the rural areas this class is slightly better (71.21), than the business class (70.00) which is the poorest. The reason for this difference seems to be better incentive in the urban areas in the shape of better milk market compared to rural areas.
41.3.4 Overall Adoption of Dairy Innovations

It is of interest to study the influence of occupation in the rural and urban areas, on the overall adoption of dairy innovations.

Table 4.2 indicates that the relative importance of adoption of breeding and veterinary innovations is more or less the same, while the relative importance of feeding is substantially low in both the rural and urban areas.

It can be seen from table 4.2 that the level of overall adoption is slightly better in urban areas in comparison to rural areas. In the rural areas, it ranges from 87.34 to 80.79, whereas in urban areas the range is between 67.34 to 87.06. It is further indicated that the adoption level for the service class is the highest in rural area while in urban setting agricultural class is having highest adoption level which is followed by service class (73.31), businessmen (71.39) and labourers (67.34) in the urban areas, and by agriculturists (67.31), businessmen (86.94) and labourers (67.34) in rural areas. This shows that the level of adoption is extremely poor in labour group, which requires special attention of the project workers, so that this group can also participate in the adoption of dairy innovations and increase the milk production, which in turn will generate additional income for this group which they so badly need to raise their standard of living.
The present level of adoption by the agriculturists can also be increased, at least, to the level of service class in rural settings by making extra efforts. A wide gap exists between the potential adoption of dairy innovations and the level of actual adoption by the cattle owners in both the study areas. It can, therefore, be suggested that this gap should be narrowed down to the minimum by making extra efforts, so that the cattle owners adopt the dairy innovations in order to have the maximum advantage of the new milk production technology.

**Section - II**

4.4.0 Correlational analysis between the proposed antecedent, intervening and dependent variables.

To begin with the approach on the part of most of the research workers has been to report inter-correlations of the zero-order in between all possible pairs of variables, covered by a study. Later on some workers while reporting such inter-correlation matrices, differentiated the variables into dependent (explained) and independent (explanatory) variables. Such direct correlations did not take into account the effect of some variables whose operative influence, in addition to being direct with other variables, was also that of an intervening nature. It was Rogers and Svenning (1969) who suggested that variables
could be placed on a continuum having three recognizable but inter-merging categories of variables. On the starting point of the continuum are placed the 'antecedent' variables and the consequent variables on the other end with intervening variables in between. This concept of differentiating variables into three categories is an important over the earlier approaches of either treating all variables on equal footing or putting them into two categories of explanatory and explained variables. It is, however, admitted that the categorization of the variables into three sets, namely, antecedent, intervening and consequent variables is not rigid and watertight. Nevertheless, the concept is both logically sound and empirically testable.

It is observed that the variables according to this scheme of Rogers, can be categorized primarily of one or the other category and can thus be deemed to be in any of the adjoining two categories. The variables of the present study according to this approach are set in Fig.1 into three categories.

For the analysis of a process such as adoption, which occurs over time, it is methodologically useful to classify the variables as antecedent, intervening and consequent. Antecedent variables, are those which at the beginning end of continuum precede the others in order of time, and which theoretically are expected to lead to, or to be followed by certain other variables. Consequent variables on the other
end of continua, follow with or without the influence of intervening variables, the antecedents in time. Intervening variables affect the relationship between antecedent and consequent variables.

Five variables have, in the present study, been considered as intervening variables. They are media exposure, empathy, economic motivation, herd size and innovation knowledge in both rural and urban settings, except economic motivation which could not be measured, and hence has not been considered in urban areas.

Simple and partial correlations of the five intervening variables have been studied separately in the following order:

1) Relationship with antecedent variables.
2) Relationship with consequent variables.
3) Partial correlations with control on intervening variables.

4.2.1 Levels of Media Exposure

Table 4.3 shows the levels of exposure to each of the medium in both rural and urban areas. In both rural and urban areas, most of the respondents have extension

The basic measure of association utilized in this study is the Pearsonian coefficient of correlation. Partial correlation has been used here to determine whether or not any other variable(s) covered by the study intervenes the relationship between the two variables.
contacts. Radio reaches the next largest audience in the study area. Media participation occupies the third position in order of merit of its utilization by the respondents in both the settings. Films occupy fourth position in rural areas, while it is printed material which occupies the fourth position in urban areas. Fifth position is occupied by printed material in the rural areas while in urban areas the use of films and T.V. is almost at the same level that is the fifth position. These findings are in line with the findings of Bhurk (1968), Badhur (1967), Singh and Pareek (1966), Rogers (1969), Badur, Singh and Lokhande (1974) and Bashir and Patel (1975).

4.5.1.1 Extension Contacts

While comparing the use of each medium by different occupational groups in both rural and urban settings, it is seen that in rural areas, only 71.4% per cent of the respondents belonging to the business group have contact with extension agencies while all the respondents from other occupational groups namely, agriculture, service and labour have extension contacts in one form or the other.

In the urban areas, only 87.50 percent of labourers have extension contact, while all respondents from other occupational groups have contact with the extension agency. The present findings are supported by the findings of Bhuriwal and Sohal (1965) who found 'other things being constant, the higher the contacts a person has with the extension agency, more are the number of improved practices followed by him.'
On the basis of the above results, it can be suggested that the extension agency should pay more attention to labourers in urban areas.

4.2.1.2 Radio:

In rural areas 59.45 per cent of the agriculturists, 71.42 per cent of the businessmen, 80.00 per cent of the servicemen and 25.00 per cent of the labourers used radio as a source of information. In urban areas the percentage of respondents from agriculture, business, service and labour groups utilizing radio as source of information is 62.50, 70.00, 85.83 and 37.50, respectively. These results indicate that the use of radio as source of information is quite common in both the settings, although more of cattle owners in urban areas are using it, as compared to cattle owners in rural areas. In the study of Singh and Ambastha (1975), radio emerged as the most used channel of information input, followed by progressive farmers, W.I.S.W. and block level workers in the client system. Sen and Roy (1966) found that 56 per cent of the villagers listened to the radio.

4.2.1.3 Media participation:

As regards the participation of cross-bred cattle owners in dairy melas, cattle shows, calf rallies etc., the participation is almost identical in both rural and urban areas. The percentage of cattle owners from agriculture, business, service and labour in rural areas is 56.75, 45.85, 20.00, 37.50 and in urban areas, it is 31.25, 52.00, 50.00 and 37.50, respectively.
4.5.4 Films

The educational films regarding dairying and animal husbandry have been used by more cattle owners in rural areas as compared to urban areas. The percentage of cattle owners from agriculture, business, service and labour groups using films in rural areas is 16.21, 23.57, 36.00 and 37.50, respectively. Similarly, in urban areas the percentage is 6.5, 8.00, 6.33 and 6.00, respectively.

These findings are in conformity with those of Singh and Akhouri (1966) who found that among the three extension methods, farm and home visit was most effective. Next in effectiveness was group discussion, followed by film show. Similarly, Singh and Jha (1965) and Jha and Singh (1965) found that amongst various media, demonstration was the best channel of communication, followed by exhibition and film show. The results show that films are liked more in rural areas than in urban areas, extension agency should, therefore, organise more of film shows in rural as well as in urban areas. The emphasis should be given to the organisation of film shows in labour colonies.

4.5.5 Printed Material

Printed material, as expected, has been utilised more by the cattle owners in urban areas as compared to rural areas. The percentage of cattle owners from agriculture, business, service and labour groups in rural areas is 5.40, 14.48, 40.00 and 0.00 respectively. Sen and Roy (1966) found that 78 per cent of our villagers do not
read newspapers. Similarly, Rai (1967) found that agricultural magazines were least preferred by the farmers. In urban areas the percentage is 6.25, 20.00, 40.83 and 60.00, respectively. The results indicate that the extension agency should use printed material very judiciously otherwise most of the material is likely to go waste.

4.2.1.6 \textbf{Television}

Singh (1970) is of the opinion that T.V. has great potential as a moderniser once it reaches wider audiences than at present. Though none of the cattle owners used T.V. in the rural areas, in urban areas, excepting labour group some cattle owners from other occupational groups have used T.V. as source of information. The percentage is 6.25 from agriculture, 3.00 from business and 4.16 from service groups.

\textbf{4.2.2 Media Exposure}

The zero-order correlation and first order partial correlation of media exposure with other variables of the study are presented hereafter.

\textbf{4.2.2.1 Antecedents of Media Exposure}

The zero order correlation coefficient between the antecedent variables (family size, family education, occupation, farm size and mode of milk marketing) and
Fig. 4

Paradigm of the role of Empathy

RURAL

Antecedents

Intervening

Consequences

- Family size
- Family education
- Occupation
- Media exposure
- Mode of milk marketing

Empathy

Family size

Economic Motivation

Knowledge

Adoption

Interventions of the role of Empathy
intermediate variable (media exposure) and consequent variables (economic activation, knowledge and adoption) along with the partial correlation coefficients between antecedents and consequent variables after removing the impact of intervening variable i.e. media exposure have been worked out and presented in Tables 4.4, and 4.6.

The correlation coefficients between the antecedent variables and the media exposure in rural areas show a positive trend except family size and farm size where a negative trend is visible. The magnitude of association of media exposure is maximum with mode of milk marketing (0.4277) which is statistically highly significant. Other antecedent variables are not significantly associated with media exposure, their coefficients of correlation in descending order are 0.174, 0.052, -0.032, -0.029, and 0.048 in respect of occupation, family education, family size and farm size, respectively. Similar findings have been reported by Jha and Singh (1965) "There seems to be a negative association between media use and, age, education and size of farm."

In the urban areas, the correlation coefficient between all the antecedent variables and media exposure is positive. The magnitude of association of media exposure is highest with mode of milk marketing (0.247) which is highly significant, followed by occupation (0.145) which is significant. The family education (0.061) and family size (0.061) are not associated with media exposure.
The above findings indicate that in both rural and urban settings, from amongst the antecedent variables, mode of milk marketing has got a positive and a significant association with media exposure. This suggests that the cattle owners in the rural areas supplying milk to co-operative societies and the cattle owners in urban areas supplying milk directly to consumers have better contacts with the extension agency and that they also utilize various other media. Thus mode of milk marketing seems to be a very important factor for better utilization of various media.

4.2.3.2 Consequent Variables of Media Exposure:

The theory suggests that the general consequences of media exposure are the increase in empathy, economic motivation, knowledge and adoption of innovations. The results of this study also indicate that in both rural and urban areas, from amongst all the consequent variables empathy, and economic motivation are significantly and positively correlated with media exposure while for knowledge and adoption it is not significant. The correlation is 0.416 for empathy which is highest, followed by economic motivation (0.327), knowledge (0.160) and adoption (0.003) in rural areas. In urban areas the correlation is 0.408 for knowledge which is highest, followed by 0.243 for empathy, and 0.080 for adoption which is lowest. In support of the findings of Lerner (1954), Frey (1966)* and Rogers (1969)

* Quoted by Rogers (1969).
the present results indicate positive and a significant relationship between media exposure and empathy.

The above results suggest that in urban areas the increase in the exposure to various media brings about corresponding increase in knowledge of dairy innovations. Singh (1969) and Nair (1969) found positive correlation between mass media and extent of adoption. Chouhey (1974) concluded that greater the intensity of exposure of a farmer, the higher was his level of adoption of technology of high yielding varieties. Singh (1974) found that mass media was positively correlated with adoption. In the rural areas, the corresponding increase is brought about in the level of empathy and economic motivation as compared to knowledge and adoption. Possibly empathy and economic motivation in turn increase the knowledge and adoption. It shows that in rural areas the empathy and economic motivation are important variables to be considered for adoption process, while in urban areas knowledge and empathy are important variables. Among the consequent variables, empathy and economic motivation, are positively correlated with media exposure. Rogers (1969) also found that the consequent variables, empathy, agricultural innovations, home innovativeness, political knowledge and educational aspirations for children were those most strongly related to mass media.
4.2.2.3 Media exposure as Intervening Variable

The results of first order partial correlation between antecedent and consequent variables, while controlling the effect of media exposure (Table 4.4 and 4.5) indicate that media exposure does not intervene between the antecedent and consequent variables, as the 't' value is non significant in all the cases, in both rural and urban settings. Thus the relationship between the antecedent and consequent variables is direct or independent. It can be seen from the tables 4.4 and 4.5 that in rural areas, there is no relationship between the antecedent variable family size and any of the consequent variables namely, empathy, economic motivation, knowledge and adoption. Family education (antecedent variable) is positively and significantly correlated with empathy (0.442) and economic motivation (0.315), while no significant correlation exists with knowledge and adoption. Similarly, occupation is positively and significantly correlated with empathy (0.513), economic motivation (0.769), and knowledge (0.253), and adoption (0.204). Farm size is positively and significantly correlated only with economic motivation (0.313) and with no other consequent variables. Similarly, amongst all the consequent variables, mode of milk marketing is positively and significantly associated only with empathy (0.417).
In urban areas also there is no relationship between family size and consequent variables empathy, knowledge and adoption. Family education is positively and significantly associated with empathy (0.299) but not with knowledge and adoption. Mode of milk marketing is, however, positively and highly significantly correlated with knowledge (0.228).

The results presented above indicate that none of the antecedent variables namely, family size, family education, occupation, farm size and mode of milk marketing is showing any relationship with the knowledge and adoption, except occupation which shows a corresponding increase in knowledge in rural areas; which means that the agriculturists and service class are having better innovation knowledge in comparison to other occupational groups, which may be due to their better economic status and better contacts with extension agency.

In urban areas, mode of milk marketing shows a corresponding increase in knowledge, which means that cattle owners selling milk directly to the consumers are having better knowledge of dairy innovations. This may be attributed to the better price which they are getting for their produce in comparison to the cattle owners supplying their milk to either tea-shops or Halwais.
Both in rural and urban areas, the rest of the antecedent variables namely, family education and family size may be influencing knowledge and adoption through empathy and economic motivation, except family size, which has no relationship with any of the consequent variables.

4.2.3 Empathy

The zero order correlation and first order partial correlation coefficients of empathy with other variables of the study are presented hereafter.

4.2.3.1 Antecedents of Empathy:

The results presented in Tables 4.6 and 4.7 indicate that all the antecedent variables namely family size, family education, occupation, media exposure, farm size and mode of milk marketing are correlated with empathy except family size and size of holding. The highest correlation is observed between empathy and occupation (0.513), followed by family education (0.488), media exposure (0.415), and lowest in case of mode of milk marketing (0.317). This shows that the agriculturists in the rural areas have better empathy in comparison to labour class. Further, higher the family education, better is the empathy. An increase in the use of various media also tends to increase with the level of empathy of the respondents. The milk producers
Fig. 6  Paradigm of the role of Empathy

Fig. 7  Paradigm of the role of Empathy
supplying milk to co-operatives seems to exhibit better empathy. In urban areas, from amongst all the antecedent variables family education and media exposure are positively and significantly correlated with empathy. The highest correlation is seen between empathy and family education (0.299), followed by media exposure (0.243). This indicates that occupation does not play an important role in urban areas, as it does in rural areas, in increasing the empathy. In urban setting, family education plays the most important role in increasing the empathy, followed by utilization of various media. Lerner (1950) found strong relationship between literacy and empathy, using data from Syria and Turkey. Rogers and Swanning (1969) substantiated this positive relationship between empathy and literacy with Colombian data. Similarly, he found the highest correlation between media exposure and empathy.

4.2.3.2 Consequences of Empathy

In rural areas, empathy is positively and highly significantly correlated with the consequent variables namely, economic motivation (0.502) and innovation knowledge (0.405). This confirms the theoretical concept that persons having higher empathy are likely to be motivated towards higher levels of economic gains and higher levels of knowledge with regard to new ideas. Rogers (1969) also found positive relationship between empathy and
consequent variables, agricultural innovativeness, achievement motivation, and political knowledgeability.

In urban areas, the empathy is not significantly correlated with either knowledge or adoption which means that, unlike rural areas, cattle owners in urban setting having higher empathy utilize this quality in their main occupation that is business and not in aquisition of knowledge or adoption of dairy innovations.

4.2.3.3 Empathy as an Intervening Variable

The results show that empathy does not intervene between any of the antecedent and consequent variables in the urban areas, but in rural areas it does intervene between the antecedent variable, family education and the consequent variable, economic motivation. This intervention is highly significant between family education and economic motivation. Thus the family education helps in the increase of economic motivation through empathy in rural areas.

It can thus be concluded that in rural areas the antecedent variable, family education tends to increase the consequent variable, economic motivation through empathy. While farm size has direct, positive and highly significant correlation with economic motivation, the other antecedent variables namely, family size and mode of milk marketing have no association. Similarly, no association is seen in urban areas between antecedent
Fig. 5  Paradigm of the role of Economic Motivation

RURAL
and consequent variables, except between media exposure and knowledge, and none of milk marketing and knowledge, which is independent.

4.2.4 Economic Motivation

The zero order correlation and first order partial correlation coefficients of economic motivation with other variables of the study are presented hereafter.

4.2.4.1 Antecedents of Economic Motivation:

A positive and significant correlation is seen between economic motivation and all the antecedent variables namely, family education, empathy and media exposure except price of milk where no significant correlation is visible. The correlation coefficient is highest between economic motivation and empathy (0.898), followed by media exposure (0.377) and family education (0.313) where it is lowest. This implies that the economic motivation rises with the rise in empathy, media exposure and family education, in rural areas. This is in conformity with the theoretical concept that the family education, empathy and media exposure tend to increase the economic motivation among the cattle owners.

4.2.4.2 Consequences of Economic Motivation:

A positive and highly significant correlation is observed between economic motivation and consequent variables namely, herd size, knowledge and adoption. The correlation coefficient is highest between economic
motivation and innovation knowledge (0.416), followed by herd size (0.303) and adoption (0.256) where it is lowest. This shows that an increase in economic motivation is reflected in the corresponding increase of knowledge, and adoption of dairy innovations and also increase in the herd size in rural areas. Thus, the empirical evidences support the theoretical proposition that economic motivation, on one side, and the herd size, knowledge and adoption, on the other, travel in the same direction. In other words, increase in herd size, knowledge and adoption can be expected with the increase in economic motivation among the cattle owners in the rural areas. Singh (1969) also found positive correlation between economic motivation and adoption behaviour.

### 4.2.3 Economic Motivation as an Intervening Variable

The 't' statistics of partial correlation r = 1.3 (Table 4.3) indicates that economic motivation does not intervene between antecedent variables namely, family education, empathy, media exposure and price of milk, and consequent variables herd size, knowledge and adoption. This shows that relationship between antecedent and consequent variables is independent.

### 4.2.5 Herd size

The zero order correlation and first order partial correlation coefficients of herd size with other variables of the study are presented hereafter.
4.4.5.1 Antecedents of Herd Size

In the rural setting, there is positive and highly significant correlation between herd size and all the antecedent variables namely, occupation, economic motivation and farm size except family size and price of milk where hardly any correlation is observed. The correlation coefficient is highest between herd size and occupation (0.421), followed by economic motivation (0.302) and farm size (0.274) where it is lowest. The empirical evidences support the theoretical postulates that the number of milk animals will increase with the increase in the farm size, and economic motivation in rural areas. Price of milk prevailing in the rural areas for the milk produced by cross-bred cows at the time of the study does not seem to be so remunerative, so as to motivate the milk producers to increase their herd strength. The number of family members also does not seem to affect the herd size.

In the urban areas, only occupation (from amongst the antecedent variables, namely, family size, occupation and price of milk) has a positive and significant correlation with the herd size. The family size and the price of milk have no significant relationship with herd size. The results reveal a definite association between occupation and herd size in urban areas. This can be
attributed to the fact that some of the cattle owners having agriculture and business as their main occupation in urban areas keep milk animals to meet their family requirements for milk and milk products.

4.8.5.2 Consequences of Herd Size:

Theoretically it was expected that the herd size will have bearing both on knowledge and adoption of dairy innovations, but the empirical evidence presented in Tables 4.9 and 4.10 shows that knowledge and adoption of dairy innovations is not associated with herd size. This may be due to inability of the cattle owner to adopt dairy innovations, because of more number of animals in his herd. In other words, the cattle owners having less number of animals (small herds) have better chance of adoption of scientific dairy innovations as they are labour and capital intensive in nature.

In urban areas no correlation is visible between herd size and consequent variables namely, knowledge and adoption, which means that the knowledge and adoption of dairy innovations have no association with the size of herd maintained by the cattle owners in urban areas.

Sinha, Sinha and Sohal (1974) also reported that inspite of their better resourcefulness, the farmers with large farm, bigger herd and bigger family did not
show high adoption levels. Thus, adoption promotion strategy for cattle feed mixture can be developed with little consideration for farm size and family size.

4.5.3 Herd Size as an Intervening Variable

Herd size is not acting as an intervening variable between antecedents and consequents in both rural and urban areas. The results of first order partial correlation between antecedents and consequent variables while controlling the effect of herd size (Table 4.9 and 4.10), the \( t \) value is non-significant in all the cases in both rural and urban settings. Thus, the relationship between antecedents and consequent variables is direct and independent. The antecedent variables occupation, economic motivation, and price of milk have positive and significant correlation with knowledge and adoption of dairy innovations while family size and farm size have no significant relationship with knowledge and adoption of dairy innovations. This means that the respondents having agriculture as their main occupation, economically motivated and getting better price for their milk tend to have better knowledge and adoption of dairy innovations in rural areas.

In urban areas, no relationship is observed between antecedents and consequent variables, and between consequent and intervening variables. However, positive
and significant relationship is observed between occupation and herd size which has already been discussed.
Thus herd size has not emerged as an intervening variable.

4.2.6 **Innovation Knowledge**

The zero order correlation and first order partial correlation coefficients of innovation knowledge with other variables of the study are presented hereafter.

4.2.6.1 **Antecedents of Knowledge**

All the antecedent variables except occupation and economic motivation do not have significant association with knowledge. The correlation coefficient is highest between knowledge and economic motivation (0.416) which is followed by empathy (0.405), and occupation (0.355) in which case it is lowest. These results indicate that a corresponding increase in the knowledge of dairy innovations among the cattle owners in rural areas can be expected with an increase in economic motivation and empathy amongst the agriculturists. Family education quite surprisingly does not show any direct relationship with the innovation knowledge, which means even those who are not educated can acquire knowledge of technology.

In urban areas, none of the antecedent variables namely, family size, family education, occupation, empathy and herd size show any association with knowledge, except
media exposure, which is positive and highly significant (0.406) in relation to the innovation knowledge. Other variables seem to be related through some intervening variables. This indicates that the use of various media tends to increase the knowledge of dairy technology which in turn increases the adoption of dairy innovations in urban areas.

4.2.6.2 Consequences of Knowledge

Theoretically, it is presumed that the increase in the knowledge of dairy innovations will increase their adoption. The empirical evidences presented in the Table 4.11 and 4.12 support the above presumption, as the relationship between knowledge and adoption is of very high order. The correlation coefficient between the two is 0.653 which is positive and highly significant. This implies that the adoption (dependent variable) is dependent to a large extent on the knowledge of dairy innovations in the rural areas. Other variables probably are related to adoption through knowledge. All efforts should, therefore, be made to increase the knowledge about dairy innovations in the rural areas, so that their adoption can be increased by the cattle owners. This seems to be very important prerequisite for the adoption of dairy innovations.

In urban areas also, the correlation coefficient between the adoption and knowledge is positive and highly significant (0.418). This association indicates the importance of knowledge of dairy innovations for
Paradigm of the role of Knowledge

Fig 11

RURAL

Antecedents

Intervening

Consequences

Knowledge
their adoption. Therefore, in both rural and urban areas much emphasis should be laid on the educational activities, so that the adoption of dairy innovation can be increased.

Hess and Miller (1954) in their study on "Factors Influencing Dairymen's Action and Success" found that many dairymen appeared to lack much knowledge required for proper decision making. They reported that operators scoring high on a knowledge test had higher producing herds than farm operators with low scores. The farmers also culled their herds more rigidly and had adopted more recommended dairy practices than the latter.

Similarly, Singh (1969) found positive correlation between knowledge of package of practices and adoption behaviour of farmers. Chouhey (1974) also reported that higher the technological knowledge of a farmer, more was the level of adoption of technology of high yielding wheat varieties.

4.4.6.3 Knowledge as Intervening Variable:

In rural areas, out of the seven antecedent variables namely, family size, family education, occupation, empathy, media exposure and economic motivation and herd size, two variables namely, occupation and economic motivation are positively and significantly related with consequent variable (adoption). The correlation coefficient is highest between adoption
and occupation (0.204), followed by economic motivation (0.256). As the 't' values of first order partial correlations indicate in the Table 4.11, 'knowledge' as an intervening variable really intervenes highly significantly between consequent variable 'adoption' and antecedent variables 'empathy', 'economic motivation', occupation and media exposure. No correlation is, however, observed with family size, family education and herd size.

In the urban areas, no correlation is found between adoption and other antecedent variables. Knowledge does intervene, but only between the association of media exposure with adoption and with no other antecedent variable, as indicated by 't' values of first order partial correlations in Table 4.12.

The results presented above highlight the important position held by knowledge as intervening variable particularly in rural setting. It further suggests that utmost emphasis should be laid on improving the innovation knowledge in order to increase the level of adoption of dairy innovations by the cattle owners in rural areas in particular, and urban areas in general.

In the present investigation, family size, family education and herd size have shown no significant relationship with the adoption of dairy innovations. In conformity with these findings, Sinha, Sinha and Sohal (1974) also found that family size, education, farm size, herd size, extension contact, fatalism-scienticism were not significantly associated with adoption levels of cattle feed mixtures.
Section III

Relational Analysis of Correlates of Adoption

The paradigm of the research design reported in figure 1 indicates that the correlates of adoption of the technology fall in two categories. Five of the correlates have been considered as intervening variables. These variables are media exposure, empathy, economic motivation, herd size and innovation knowledge. Economic motivation has not been considered in urban areas, for the reasons already explained. Both intervening and independent variables have been considered as antecedents to adoption behaviour. It is, therefore, of considerable interest to note how these intervening variables are shaped by their antecedent variables included in the study. Thus, relational analyses of these intervening variables with the antecedent variables was also carried out, the results of which are reported immediately before the discussions of adoption behaviour of the cattle owners. The following pages discuss these relational analyses in further detail.
4.3.1.0 Intervening Variables

4.3.1.1 Media Exposure:

Rural Setting:

As indicated in Figure 4, family size, family education, occupation, farm size and mode of milk marketing of the respondents were considered as antecedents to media exposure. Thus the relational analyses between the media exposure of the respondents and its antecedent variables were carried out by employing correlation, regression and path analyses, the results of which are reported as under.

As is evident from the table 4.14, only one variable i.e. mode of milk marketing has been found to be significantly associated (0.427) with media exposure in rural areas. The remaining 'r' values were, however, not found significant.

The data were then put to multiple regression analyses. In this case also, the mode of milk marketing with a regression coefficient value of 9.476 emerged to be highly significant and had quite substantial incremental contribution (0.12). The regression coefficient of remaining four variables were found to be non-significant and were negative in case of family size and farm size.
### Table 4.13

**Multiple regression analysis of media exposure with some selected variables.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Rural Regression Coefficient (Standard error)</th>
<th>Rural Incremental contribution</th>
<th>Urban Regression Coefficient (Standard error)</th>
<th>Urban Incremental contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family size</td>
<td>-0.419 (1.195)</td>
<td>0.0021</td>
<td>0.491 (0.886)</td>
<td>0.0039</td>
</tr>
<tr>
<td>Family Education</td>
<td>0.0312 (0.215)</td>
<td>0.0012</td>
<td>0.049 (0.083)</td>
<td>0.0039</td>
</tr>
<tr>
<td>Occupation</td>
<td>3.378 (1.4437)</td>
<td>0.0341</td>
<td>2.727 (2.086)</td>
<td>0.0193</td>
</tr>
<tr>
<td>Farm size</td>
<td>-0.163 (0.2267)</td>
<td>0.0000</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Mode of milk</td>
<td>9.478** (3.8139)</td>
<td>0.1832</td>
<td>4.555** (1.103)</td>
<td>0.0587</td>
</tr>
<tr>
<td>marketing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.23</td>
<td></td>
<td>0.057</td>
<td></td>
</tr>
<tr>
<td>Multicollinearity</td>
<td>0.0043</td>
<td></td>
<td>0.0003</td>
<td></td>
</tr>
<tr>
<td>effect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$'F'$ value</td>
<td>2.59 NS.</td>
<td></td>
<td>1.970 NS.</td>
<td></td>
</tr>
</tbody>
</table>

** Significant at 1 per cent level of probability
### Table 4.14

Path analysis of Independent Variables with Media Exposure as dependent variable.

#### Rural Setting

<table>
<thead>
<tr>
<th>Variables</th>
<th>( r )</th>
<th>Direct effects</th>
<th>Indirect effects</th>
<th>Substantial indirect effects through</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family size (1)</td>
<td>-0.032</td>
<td>-0.0470</td>
<td>0.014</td>
<td>0.0333 (10) -0.020 (3) 0.001 (7)</td>
</tr>
<tr>
<td>Family size (2)</td>
<td>0.082</td>
<td>0.0367</td>
<td>0.016</td>
<td>0.058 (3) -0.039 (10) -0.008 (1)</td>
</tr>
<tr>
<td>Occupation (3)</td>
<td>0.174</td>
<td>0.202</td>
<td>-0.023</td>
<td>-0.040 (10) 0.010 (7) 0.004 (1)</td>
</tr>
<tr>
<td>Farm size (7)</td>
<td>-0.029</td>
<td>-0.007</td>
<td>-0.022</td>
<td>-0.005 (10) 0.004 (3) 0.009 (1)</td>
</tr>
<tr>
<td>Mode of milk (10)</td>
<td>0.427</td>
<td>0.460</td>
<td>-0.023</td>
<td>-0.018 (3) -0.003 (2) -0.003 (1)</td>
</tr>
</tbody>
</table>

#### Urban Setting

<table>
<thead>
<tr>
<th>Variables</th>
<th>( r )</th>
<th>Direct effects</th>
<th>Indirect effects</th>
<th>Substantial indirect effects through</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family size (1)</td>
<td>0.061</td>
<td>0.063</td>
<td>-0.022</td>
<td>-0.038 (2) 0.021 (10) -0.006 (3)</td>
</tr>
<tr>
<td>Family size (2)</td>
<td>0.051</td>
<td>0.133</td>
<td>-0.026</td>
<td>-0.057 (10) -0.044 (1) 0.009 (3)</td>
</tr>
<tr>
<td>Occupation (3)</td>
<td>0.145</td>
<td>0.136</td>
<td>0.010</td>
<td>0.009 (2) 0.004 (10) -0.003 (1)</td>
</tr>
<tr>
<td>Mode of milk (10)</td>
<td>0.470</td>
<td>0.472</td>
<td>-0.025</td>
<td>-0.033 (2) 0.006 (1) 0.002 (3)</td>
</tr>
</tbody>
</table>

** Significant at 1 per cent level of probability.
* Significant at 5 per cent level of probability.
Further, the five antecedent variables included in the regression analyses explained 43 per cent of the total variation ($R^2=0.433$). The multicolinearity effect was found to be quite small (0.0023) and the 'F' value ($F=4.59$) for $R^2$ was found to be non-significant.

The path analysis of the data reported in Table 4.14 indicates some additional information. In this case also, mode of milk marketing emerged as the most dominant variable. The direct effect (0.450) of mode of milk marketing was even higher than its 'r' value as some negative indirect effect (-0.023) channelled to the dependent variable through some accompanying independent variables. Therefore, the results of path-analysis of this variable simply substantiate the earlier correlational and regression results. It indicates that the manner in which milk is marketed has much to do with the media exposure. It may be mentioned here that the mode of milk marketing has been studied in relation to sale of milk to cooperative societies, direct to the consumers and to the milk collectors. On the basis of the obtained result, it may be said that respondents having orientation of marketing their milk through cooperative societies or directly to consumers are better exposed to various communication media as compared to their counterparts. The reason seems to be obvious since the cooperative sector in milk marketing has its own outreach unit which provides information to its clients.
Further it has been observed (Researcher's observation) that in situations where the milk producers have been provided with organised milk marketing facilities in the shape of Cooperative Milk Societies/Unions or milk collecting centres of the dairy plants, the producers have been able to get supply of various inputs and market their milk at reasonable rates. This probably encouraged them to seek more technological information from the employees of the milk collecting centres. This might have also encouraged them to seek information from other available media like radio, extension literature etc. thus leading them to a higher communication exposure.

In case of the variable "Occupation", it is interesting to note that it has substantial direct effect, although the correlation coefficient of this variable is positive but non-significant. It can be explained by taking into consideration the total indirect effect of this variable which is negative in direction. This means that occupation has substantial bearing on media exposure of the respondents but its accompanying variables like mode of milk marketing etc. restricted any indirect bearing through occupation on media exposure. It seems that those in farming occupation have an edge over the others like businessmen and service holders, etc. in respect of their communication exposure, but the latter categories of the respondents perhaps have more access to marketing cooperatives which provide them information about dairying.
If marketing cooperatives are made accessible to dairy farmers, they will probably improve their communication exposure to the extent that occupation would have a significant correlation coefficient with media exposure.

The direct and indirect path coefficients in cases of farm and family size are negative, but very small in magnitude. The indirect effect channeled through other variables to media exposure has also been found to be meagre. The results, therefore, indicate that the IWP workers (Extension workers) do not contact big land owners more than the small land owners as has been blamed in the past. This appears to be a healthy trend. A similar finding has been reported by Mishra (1979), but contradicting findings have been reported by Koul (1968), Singh (1969), Ernest (1973), Ramachandran (1974), Somasundaram (1976), Chauhan (1976). In respect of variable, family size the relational analyses (correlation, regression and path) have indicated a meagre value in all the cases; thereby making this variable of little importance so far media exposure in the dairy owners is concerned.

Urban Setting:

In urban setting, the relational analyses seems to have yielded almost similar results as in case of the rural setting. Only four variables i.e. family size, family education, occupation and mode of milk marketing were considered as antecedents to communication exposure in
case of the urban respondents. It may be mentioned here that farm size was not included as an antecedent variable since majority of the respondents (54 per cent) belonged to non-farming community. The data reported in Table 4.14 showed that all the four variables had positive correlation with media exposure but significant correlation (at 5 per cent level of probability) was found only in case of mode of milk marketing. This analysis only indicates the extent of relationship between the antecedent and consequent variables and not the contribution of the former to the latter. It was, therefore, proposed to reset the data to employ regression analysis to them.

The Table 4.13 contains the regression coefficients of the four variables considered to be antecedents to media exposure. In this case also, only the mode of milk marketing was found to have significant and positive regression coefficient and substantial incremental contribution to the media exposure of the urban dairy owners.

The value of \( R^2 \) explained only 9 per cent variability in the media exposure which was not found to be significant \( (F = 1.97 \text{ NS}) \). An inference, may therefore, be drawn from the result that the variables chosen as antecedents to media exposure under urban setting were not adequate. Perhaps, some more important variables ought to have been included. However, path analysis of the data yielded some additional information.
The path coefficients reported in Table 4.14 indicate that all the four variables discussed earlier have positive direct path coefficient but it is substantial only in case of mode of milk marketing and moderately substantial in case of occupation as well as family education. The indirect path coefficient in all the cases were found to be very meagre.

The results, therefore, clearly show that mode of milk marketing has a definite and direct bearing on media exposure of urban respondents also as in case of the rural respondents perhaps for the same reasons.

The variables occupation and family education were found to have moderately substantial direct effect and negligible indirect path coefficients. It may, therefore, be inferred that these two variables had atleast some effect on the media exposure of urban dairy owners.

An overview of the result discussed so far suggest that the following variables are important for respondents' exposure to sources of communication in both rural and urban setting: (i) mode of milk marketing and (ii) occupation. It can, therefore, be inferred from these results that the important factor which induces exposure to different media like radio, T.V., leaflet, cattle exhibition and contact with extension agency etc. are (i) mode of milk marketing which in a way indicates their
involvement either with milk cooperatives or consumers and
(ii) occupation which indicates respondent's association
with agriculture in case of rural setting and business
orientation in case of urban setting.

4.3.1.2 Empathy

Empathy has been considered as another intervening
variable with family size, family education, occupation,
media exposure, farm size and mode of milk marketing as the
antecedent variables. The analyses were done both for
rural and urban settings separately and the results are
presented in Tables 4.15 and 4.16.

Rural Setting:

A perusal of the data reported in Table 4.16 reveals
that out of the six antecedent variables, only three viz.,
family education, occupation and media exposure were found to
be positively and highly significantly (0.01 level) related
with empathy of the respondents. Mode of milk marketing
which was found to be the most important in case of media
exposure showed a positive but non-significant relationship
with empathy while media exposure yielded a highly
significant 'r' value. This, at the face of it, appears to
be illogical, but a perusal of the path coefficients makes
the relationship justified which has been discussed while
discussing the path coefficients. The remaining two
antecedent variable viz, farm size and family size exhibited
a negative but non-significant relations with empathy.
## Table 4.15

### Multiple Regression Analysis of Farmer's level of Empathy with some selected Independent Variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Rural</th>
<th>Incremental contribution</th>
<th>Urban</th>
<th>Incremental contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regression coefficient</td>
<td></td>
<td>Regression coefficient</td>
<td></td>
</tr>
<tr>
<td>Rainfall</td>
<td>-0.292</td>
<td>0.014</td>
<td>0.100</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>(0.251)</td>
<td></td>
<td>(0.186)</td>
<td></td>
</tr>
<tr>
<td>Family Size</td>
<td>0.096**</td>
<td>0.125</td>
<td>0.0518**</td>
<td>0.079</td>
</tr>
<tr>
<td></td>
<td>(0.025)</td>
<td></td>
<td>(0.018)</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td>1.992**</td>
<td>0.150</td>
<td>0.366</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>(0.523)</td>
<td></td>
<td>(0.470)</td>
<td></td>
</tr>
<tr>
<td>Media Exposure</td>
<td>0.068a</td>
<td>0.047</td>
<td>0.054a</td>
<td>0.049</td>
</tr>
<tr>
<td></td>
<td>(0.032)</td>
<td></td>
<td>(0.024)</td>
<td></td>
</tr>
<tr>
<td>Farm Size</td>
<td>-0.113</td>
<td>0.077</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(0.060)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode of milk marketing</td>
<td>0.849</td>
<td>0.016</td>
<td>0.358</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>(0.075)</td>
<td></td>
<td>(0.486)</td>
<td></td>
</tr>
</tbody>
</table>

- $r^2$ 0.56
- Multicollinearity effect 0.177
- **p** Value 9.15**

** Significant at 1 per cent level of probability

* Significant at 5 per cent level of probability

Figures in parentheses indicate standard errors.
## Table 4.16
Path Analysis of Independent Variables with Empathy as Dependent

<table>
<thead>
<tr>
<th>Variable</th>
<th>Rural Setting</th>
<th>Urban Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct</td>
<td>Indirect</td>
</tr>
<tr>
<td></td>
<td>effects</td>
<td>effects</td>
</tr>
<tr>
<td>Family size (1)</td>
<td>-0.112 -0.120</td>
<td>0.008</td>
</tr>
<tr>
<td>Family Education (2)</td>
<td>0.482** 0.370</td>
<td>0.112</td>
</tr>
<tr>
<td>Occupation (3)</td>
<td>0.513** 0.435</td>
<td>0.078</td>
</tr>
<tr>
<td>Media Exposure (5)</td>
<td>0.416** 0.248</td>
<td>0.168</td>
</tr>
<tr>
<td>Farm size (7)</td>
<td>-0.074 -0.205</td>
<td>0.131</td>
</tr>
<tr>
<td>Mode of milk (10)</td>
<td>0.217 0.146</td>
<td>0.071</td>
</tr>
</tbody>
</table>

** Significant at 1 per cent level of probability.
* Significant at 5 per cent level of probability.
The correlational analyses revealed that the family education, occupation and media exposure were important antecedent variables for empathy of the respondents but how much they contribute to their empathy remains unknown for which the data were subjected to regression analysis. The regression coefficients of the antecedent variables are reported in Table 4.15.

It may be observed from Table 4.15 that family education and occupation contributed significantly to the respondents' empathy. The incremental contributions of the family education (0.125) and occupation (0.150) of the respondents were also found to be quite substantial providing further evidence of their importance to the respondents' empathy.

Media exposure has been found to be another important variable having significant regression coefficient (0.05 level) and moderately substantial incremental contribution. This finding, in fact, confirms the correlational finding.

The other variables like family size, farm size and mode of milk marketing yielded regression coefficients of varying magnitude which were found to be non-significant; but negative in direction in cases of family size and the farm size. The question arises at this stage as to why the farmers having large family size and farm size had a low level of empathy? To seek answer to this question
and to get some additional information, it was proposed to employ path analysis to the data, the results of which are presented in Table 4.16.

It may be observed from Table 4.16 that the family education, occupation and media exposure had quite substantial direct path coefficients and also they channelled substantial indirect path effects of some other variables.

The variable media exposure was found to yield a highly significant correlation coefficient, but its direct path coefficient was not found to be that substantial (only 0.248). The reason why it did yield that substantial correlation coefficient is obviously, the substantial indirect path coefficient being channelled quite substantially through occupation and mode of milk marketing. It may be recalled that occupation and mode of milk marketing were found to be significant antecedents to media exposure (Table 4.14). The mode of milk marketing in this case also worked as an effective antecedent to media exposure to make it significantly related to empathy of the respondents, though itself failed to yield a significant 'r' value. On their own, neither media exposure nor mode of milk marketing appear to be very important for empathy of the respondents, as evident from their direct path coefficients. It therefore appear justified that mode of milk marketing did not yield significant 'r' value even when its consequent (may be considered as intervening in this case) i.e. media exposure did yield a significant 'r' value.
The result of path analysis in relation to the variable 'farm size' appears to be interesting. Its direct path coefficient although only somewhat substantial (-0.205) was found to be negative. The results, thus, indicate that there is tendency on part of the big land owners to have poorer empathy with the change agents and the localite as well as cosmopolite leaders. It may be recalled that land holding yielded a negative correlation coefficient, regression coefficient as well as path coefficient when considered as an antecedent to media exposure. Even though these coefficients were not found to be significant, they indicate a tendency in them to have less media exposures. It is the investigator's experience also that big farmers in the area of study usually remain too busy in their farm operations and find little time to have outside contacts. Perhaps this is the reason that they were not able to empathise with the change agents whether professional or elected.

The data reported in Table 4.15 indicated that the antecedent variables altogether explained about 56 per cent variation in empathy which was found to be highly significant ($F = 9.157$). Their interactional effect was positive and accounted for only about 17 per cent (interactional effect = 0.17). Thus the remaining 39 per cent contribution made by the variables under study on their own is also quite substantial.
Urban Setting

In urban settings, the relational analysis of empathy was done with respect to five antecedent variables, i.e., family size, family education, occupation, media exposure, and mode of milk marketing.

The correlation coefficients as reported in Table 4.15 indicate that family education and media exposure were positively and significantly associated with the respondents' empathy. The remaining variables were found to be non-significant. To find out the exact magnitude of contribution and also their incremental contribution, multiple regression analysis was employed, the result of which are presented in Table 4.15.

The analysis with selected set of five variables yielded some meaningful results as reported in Table 4.15. In this case, only about 15 per cent variation ($R^2 = 0.15$) in respondents' empathy was explained by the five variables included in the regression analysis. The result further indicated that out of the five variables only two of them were found to be significant. These variables are family education and media exposure.

The regression analysis indicated that only family education and media exposure have significant regression coefficients and their incremental contribution in the empathy of the respondents was also substantial.
The regression coefficients of the remaining three antecedent variables were positive but non-significant. All the five antecedent variables explained about 15 per cent variation in the Empathy of the respondents which was found to be statistically significant.

The multicollinearity effect was found to be so small (0.012) that it practically did not matter so far the total contribution made by these variables towards explaining empathy of the respondents is concerned.

A similar trend of results is observable from the data of path analysis but it also gives some additional information. The data of path analysis reported in Table 4.16 indicated that the variable 'family education' and 'media exposure' have such substantial direct effect on respondents' empathy. They also appeared to channel indirect effect of some of the variables indicating thereby that they are important for empathy of the urban respondents with their professional as well as elected change agents.

As indicated earlier the variable 'family education' was found to have highly significant regression coefficient and quite substantial incremental contribution and direct effect on respondents' empathy. It is further noteworthy that it also channels quite substantial amount of indirect effects of other variables like family size, media exposure and occupation. Thus better the family education, more would be the ability of the respondents in projecting
themselves in other situations. This seems to be quite logical as education provides opportunity to gain knowledge about the things in one's own and others' environment. Perhaps education facilitates exposure to the large society and hence develops empathy. It is, therefore, obvious that the respondents coming from the educated family would be more predisposed to empathise with others.

The relational analyses also revealed that the variable media exposure is a dominant variable in shaping the respondents' empathy. Findings related to this variable have indicated as mentioned earlier, that, the respondents' exposure to different media and contacts with extension personnel, etc. had significant and positive association with the respondents' ability to empathise with others. It was also found to have significant regression coefficient and substantial incremental contribution and direct path effect. The variable media exposure also channelled substantial indirect effects of the variables like occupation and mode of milk marketing. Therefore, it seems that exposure to different modes of communication is an effective prerequisite to the empathetic ability of the respondents. The various media provide opportunity for imaginative access to far away places. The isolation caused by inadequate roads and means of transportation is easily overcome by radio, newspaper, magazines, books and participation in
exhibitions, cattle shows and demonstrations etc. which put individuals in contact with new places, new situations and new way of approaching old problems. Exposure to these media, thus, enhances the individuals' empathetic skill. This is how the media exposure could explain the empathetic ability of the respondents so dominantly.

A comparative overall view between rural and urban settings in respect of the respondents' empathy brings to light two significant points (a) Family education and media exposure were found as dominating variables in both the cases (b) Occupation could show its worth in case of rural setting only. The importance of family education and media exposure have already been discussed which indicates in a way, that respondents of highly educated family with high exposure to mass media seem to be more empathetic towards others. The variable occupation was found to be important variable for rural setting only.

4.3.1.3 Economic Motivations

In this study, economic motivation refers to one's active inner desire to maximise production as well as profit from his enterprise.

Family education, empathy, media exposure and price of milk have been hypothesised to be explanatory variables for economic motivation in rural areas as mentioned earlier. Out of these four variables, it was
<table>
<thead>
<tr>
<th>Variables</th>
<th>Regression Coefficient</th>
<th>Incremental Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RURAL SETTINGS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Education</td>
<td>-0.0489 (0.093)</td>
<td>0.0039</td>
</tr>
<tr>
<td>Empathy</td>
<td>1.683* (0.436)</td>
<td>0.2139</td>
</tr>
<tr>
<td>Media Exposure</td>
<td>0.0672 (0.1046)</td>
<td>0.0059</td>
</tr>
<tr>
<td>Price of milk</td>
<td>-4.4893 (17.4555)</td>
<td>0.0009</td>
</tr>
</tbody>
</table>

$R^2$ 0.360

Multicollinearity effect 0.139

"p" value 6.290**

** significant at 1 per cent level of probability
* Significant at 5 per cent level of probability

Figures in parentheses indicate Standard Error.
<table>
<thead>
<tr>
<th>Variable</th>
<th>r</th>
<th>Direct effects</th>
<th>Indirect effects</th>
<th>Substantial indirect effect through</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Education (2)</td>
<td>0.218</td>
<td>-0.073</td>
<td>0.291</td>
<td>0.238(4) 0.005(5) -0.001(9)</td>
</tr>
<tr>
<td>Empathy (4)</td>
<td>0.392**</td>
<td>0.597</td>
<td>-0.005</td>
<td>0.036(5) -0.035(2) -0.006(9)</td>
</tr>
<tr>
<td>Media Exposure(5)</td>
<td>0.327**</td>
<td>0.066</td>
<td>0.241</td>
<td>0.248(4) -0.004(9) -0.004(2)</td>
</tr>
<tr>
<td>Price of milk(9)</td>
<td>0.183</td>
<td>-0.031</td>
<td>0.134</td>
<td>0.124(4) 0.013(5) -0.005(2)</td>
</tr>
</tbody>
</table>

** Significant at 1 per cent level of probability.
found that empathy and media exposure are significantly and positively correlated with economic motivation (r value being 0.592, 0.327 respectively). Family education was found to be significantly and positively correlated with economic motivation only at 10 per cent level of probability. The relationship between price of milk and economic motivation was observed to be positive but non-significant.

The regression coefficients as reported in Table 4.17 revealed that only empathy had a significant and positive beta coefficient, explaining significant variation in the economic motivation of the rural dairy owners. The contributing values of media exposure (0.067) was not found to be significant while those of the family education (-0.048) and price of milk (-4.439) were found to be negative. All three variables, however explained 56 per cent of variation in the economic motivation of which 14 per cent was found to be the multicollinearity effect. The total contribution of these variables in the variability of economic motivation was however found to be significant at .01 level of probability.

From the result of path analysis reported in Table 4.16 it becomes very clear that empathy is the most dominant antecedent to economic motivation of the rural dairy owners. It is the only variable which yielded substantial direct effect and it also channelled substantial indirect effects of the remaining three variables. It is natural that those having high economic motivation would like to get the modern
technological know how to make their enterprise more productive and profitable. This might have brought them in closer contact of the extension agency leading them to have a better empathy. A view of the other way round suggests, that greater the empathy, greater would be the understanding of change agent system, greater would be the adoption of modern technology which would heighten the economic activation of the respondents.

The media exposure of the rural respondents showed significant correlation coefficient with economic activation but its direct effect was quite meagre (0.066) that means media exposure as such does not affect economic motivation of the respondents considerably, but empathy channels a very substantial indirect effect of this variable (0.248) which increased its total effect to the extent that the 'r' value could obtain statistical level of significance. Such a high indirect effect of media exposure channelled through empathy substantiate the assumption made above that greater contact with extension agency leads to greater empathy (which in turn leads to greater economic motivation).

The variable family education did not yield significant correlation and regression coefficient. Even the direct effect was found to be meagre. Interestingly this variable exerted substantial indirect effect (0.291) on economic motivation which is mainly channelled through the variable empathy. It, therefore, indicates that this variable may
act as facilitator of empathy to some extent which has ultimately emerged as a determinant of the economic motivation. It may be mentioned here that the family education and empathy have been found to be highly correlated ($0.482, P<.01$).

An overview of the results, therefore, indicates that the variable empathy on its own has a significant and direct bearing on economic motivation of the rural respondents. But the variables/media exposure and family education have also their importance in relation to economic motivation as they tend to influence the economic motivation through empathy.

4.3.1.4 Herd Size:

As described in the methodology chapter, the herd size has been operationally defined as the number of animals (adult cows and buffaloes) owned by the respondents. This was studied both in urban and rural settings. The herd size, as a dependent variable in rural setting, was studied in relation to family size, occupation, economic motivation, farm size and price of milk as antecedent variables; whereas in urban setting, the antecedent variables for herd size were family size, occupation and price of milk.

The relational analyses of the above mentioned antecedent variables in both rural and urban situations were studied by subjecting the data to correlation, regression and path analyses. The results are presented and discussed below.
Table 4.19

Multiple Regression Analysis of Farmers’
Hard size with some selected Independent
Variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Rural, N = 57</th>
<th>Urban, N = 93</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regression Coefficient</td>
<td>Incremental Contribution</td>
</tr>
<tr>
<td>Family size</td>
<td>0.1578 (0.1781)</td>
<td>0.0200</td>
</tr>
<tr>
<td>Occupation</td>
<td>1.0779 (0.5186)</td>
<td>0.0780</td>
</tr>
<tr>
<td>Economic Motivation</td>
<td>-0.0155 (0.0399)</td>
<td>0.0027</td>
</tr>
<tr>
<td>Farm size</td>
<td>0.0545 (0.0416)</td>
<td>0.0310</td>
</tr>
<tr>
<td>Price of milk</td>
<td>-0.6294 (3.6710)</td>
<td>0.0005</td>
</tr>
</tbody>
</table>

\[ r^2 \] 0.22 0.174

Multicollinearity effect

\[ V^2 \] value 2.45** 5.83**

** Significant at 1 per cent level of probability
* Significant at 5 per cent level of probability

Figures in parentheses indicate standard errors.
It is evident from the table 4.20 that in rural setting all the five antecedent variables viz. family size, price of milk, occupation, economic motivation and farm size were positively related with herd size. The relationship of the three variables occupation, economic motivation and farm size with herd size was observed to be significant at one per cent level of probability. The correlation of antecedent variables with herd size in urban setting showed a similar trend that is positive relation with herd size but only occupation could demonstrate a significant relationship (\( r = 0.375 \)).

The regression analysis reported in Table 4.19 reveals that in rural setting all the five antecedent variables explained 22 per cent variation in herd size (\( R^2 = 0.22, \ F = 2.46^{ns} \)) whereas three antecedent variables in urban setting i.e. family size, occupation and price of milk explained 17 per cent variation which was found to be significant (\( R^2 = 0.17, \ F = 3.05^{ns} \)). The important point emerged from this analysis is that in both rural and urban settings the antecedent variable 'occupation' had made significant contribution to the size of herd possessed by them.

To find out the direct as well as indirect effects of these antecedent variables towards herd size, the data were further subjected to path analysis, the results of which are presented in Table 4.20. In rural setting, occupation,
Table 4.20
Path Analysis of Independent Variable with
Nord size as dependent variable.

<table>
<thead>
<tr>
<th>Variables</th>
<th>x</th>
<th>Direct effects</th>
<th>Indirect effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural Setting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family size</td>
<td>0.067</td>
<td>0.148</td>
<td>-0.061</td>
</tr>
<tr>
<td>Occupation</td>
<td>0.421**</td>
<td>0.442</td>
<td>-0.021</td>
</tr>
<tr>
<td>Economic Motivation</td>
<td>0.302**</td>
<td>-0.082</td>
<td>0.384</td>
</tr>
<tr>
<td>Farm size</td>
<td>0.274**</td>
<td>0.190</td>
<td>0.086</td>
</tr>
<tr>
<td>Price of milk</td>
<td>0.056</td>
<td>-0.023</td>
<td>0.079</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Setting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family size</td>
<td>0.154</td>
<td>0.171</td>
<td>-0.017</td>
</tr>
<tr>
<td>Occupation</td>
<td>0.375**</td>
<td>0.393</td>
<td>-0.018</td>
</tr>
<tr>
<td>Price of milk</td>
<td>0.002</td>
<td>-0.074</td>
<td>0.078</td>
</tr>
</tbody>
</table>

** Significant at 1 per cent level of probability.
* Significant at 5 per cent level of probability.
farm size and family size showed positive and substantial direct effect though the direct effect (0.442) of occupation was much greater in magnitude than those of the other two variables. It also channelled substantial indirect effects of all the other variables considered as antecedents in this part of the study.

It is interesting to note that the direct effect of economic motivation though not very substantial, was found to be negative. It seems that those having a greater need to maximise profits are disposed to maintain a smaller size of herd so that they may continue maintaining them well and getting a good profit. But it so happened in the case of rural dairy owners that the respondents with high economic motivation were those who had dairying as their occupation and as such they were disposed to keep a larger size of herd. Perhaps this is the reason that occupation channelled very substantial indirect effect of economic motivation (0.339) to size of herd making the correlation coefficient between economic motivation and herd size as positive and significant at .01 per cent level of probability.

The size of land holding of the rural respondent showed a highly significant correlation with the size of herd but its direct effect was not that substantial. It was the respondents' occupation which channelled substantial indirect effect of farm size (0.140) which made the 'r' value to be significant.
The path analysis results in urban setting with three antecedent variables have shown that only the variable occupation had a substantial direct effect on herd size. The substantial indirect effect through other variables had indicated that the first indirect effect was mainly channelled through the variable occupation. It, therefore, clearly brings to light that occupation has a significant bearing on herd size of urban respondents as well.

A mention may be made here that majority of the respondents (51 per cent) were found to have business as their main occupation in urban setting which falls in second position of occupational hierarchy. The importance of occupation as revealed by the relational analyses in urban setting suggests that the cattle owners having business as their main occupation tend to keep large herds in order to make dairying as an enterprise, especially by selling cross-bred cows to maximise their income. It has also been observed that the facilities in terms of marketing cross-bred heifers available in urban setting are much more inclusive for maximising income through selling of cross-bred cows. This may be another reason that the respondents with business occupation preferred to have more number of animals.

The above finding implies that if cattle marketing facilities along with availability of financial assistance
to the cattle-owners are provided, it would facilitate the multiplication of cross-bred cows at a faster rate in the study area.

4.3.1.5 Knowledge

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 the cattle owners. It has been considered another intervening variable for adoption of the technology, the antecedents of which have been discussed earlier. It was of considerable interest to know as to how the knowledge of the technology was influenced by the antecedent variables in both rural and urban settings. For this, relational analyses (Correlation, regression and path) were employed and the results are presented in Tables 4.21 and 4.22.

Rural Setting

As indicated in Table 4.22 among the antecedent variables of the rural respondents, economic motivation was found to have significant and highest correlation coefficient with the knowledge of the technology. (r = .416 p < .01). Its direct path coefficient was also found to be substantial (0.223), but its total indirect effect was only a little less substantial than its direct effect (0.190). Empathy was the most dominant variable channelling its quite substantial indirect effect (0.189) to the dependent variable. The result therefore indicates
### Table 4.22

Path Analysis of Independent Variable with the Farmers' Knowledge of the Technology as Dependent Variable.

<table>
<thead>
<tr>
<th>Variables</th>
<th>r</th>
<th>Direct effects</th>
<th>Indirect effects</th>
<th>Substantial indirect effects through</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family size (1)</td>
<td>-0.010</td>
<td>0.051</td>
<td>-0.061</td>
<td>-0.032 (4) -0.020 (6) -0.010 (7)</td>
</tr>
<tr>
<td>Family Education (2)</td>
<td>0.181</td>
<td>-0.017</td>
<td>0.196</td>
<td>0.138 (4) 0.048 (6) 0.006 (3)</td>
</tr>
<tr>
<td>Occupation (3)</td>
<td>0.355**</td>
<td>0.024</td>
<td>0.331</td>
<td>0.171 (6) 0.147 (4) 0.015 (7)</td>
</tr>
<tr>
<td>Empathy (4)</td>
<td>0.405**</td>
<td>0.267</td>
<td>0.118</td>
<td>0.132 (6) -0.015 (5) 0.012 (3)</td>
</tr>
<tr>
<td>Media Exposure (5)</td>
<td>0.160</td>
<td>-0.036</td>
<td>0.196</td>
<td>0.119 (4) 0.073 (6) 0.004 (3)</td>
</tr>
<tr>
<td>Economic Motivation (6)</td>
<td>0.416**</td>
<td>0.223</td>
<td>0.190</td>
<td>0.169 (4) 0.018 (3) 0.015 (7)</td>
</tr>
<tr>
<td>Farm size (7)</td>
<td>0.104</td>
<td>0.049</td>
<td>0.055</td>
<td>0.070 (6) -0.021 (4) -0.010 (1)</td>
</tr>
<tr>
<td>Hard size (8)</td>
<td>0.179</td>
<td>0.030</td>
<td>0.149</td>
<td>0.067 (6) 0.062 (4) 0.013 (7)</td>
</tr>
</tbody>
</table>

#### URBAN SETTING

<table>
<thead>
<tr>
<th>Variables</th>
<th>r</th>
<th>Direct effects</th>
<th>Indirect effects</th>
<th>Substantial indirect effects through</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family size (1)</td>
<td>0.057</td>
<td>0.001</td>
<td>0.056</td>
<td>0.025 (5) 0.20 (2) 0.009 (8)</td>
</tr>
<tr>
<td>Family Min. (2)</td>
<td>-0.055</td>
<td>-0.071</td>
<td>0.016</td>
<td>0.021 (5) -0.007 (4) 0.004 (8)</td>
</tr>
<tr>
<td>Occupation (3)</td>
<td>0.042</td>
<td>-0.031</td>
<td>0.075</td>
<td>0.060 (5) 0.021 (6) -0.005 (2)</td>
</tr>
<tr>
<td>Empathy (4)</td>
<td>0.060</td>
<td>-0.023</td>
<td>0.156</td>
<td>0.100 (5) -0.021 (2) 0.008 (8)</td>
</tr>
<tr>
<td>Media Exposure (5)</td>
<td>0.406**</td>
<td>0.415</td>
<td>-0.009</td>
<td>-0.005 (4) -0.004 (2) 0.004 (8)</td>
</tr>
<tr>
<td>Hard size (8)</td>
<td>0.066</td>
<td>0.056</td>
<td>0.010</td>
<td>0.030 (5) -0.012 (3) -0.006 (2)</td>
</tr>
</tbody>
</table>

** Significant at 1 per cent level of probability.
* Significant at 5 per cent level of probability.
I— DIRECT EFFECT

|—■ SUBSTANTIAL INDIRECT EFFECT |

II TOTAL INDIRECT EFFECT

III FIRST INDIRECT EFFECT

**LEGEND**

- DIRECT EFFECT
- SUBSTANTIAL INDIRECT EFFECT
- TOTAL INDIRECT EFFECT
- FIE: FIRST INDIRECT EFFECT
that high economic motivation induces rural dairy owners quite reasonably to acquire greater knowledge of the technology, but this motivation gets accelerated when respondents with high economic motivation have greater sympathy with change agent system. Sympathy itself yielded a highly significant correlation coefficient ($r = 0.405$, $p < .01$) and substantial direct path coefficient with the amount of technological knowledge held by rural dairymen. In this case however economic motivation was found to reciprocate to this variable by channelling its most substantial indirect effect (0.132) to the knowledge of the respondents. Thus economic motivation and sympathy seem not only to be inter-related but also interdependent atleast for the purpose of acquiring greater knowledge of dairy technology by the rural dairymen.

Interestingly enough occupation of the respondents yielded a highly significant correlation coefficient ($r = 0.355$, $p < .01$) with gain in knowledge but its direct effect was found to be negligible (0.024). It is again economic motivation and sympathy of the respondents which channelled quite substantial indirect effect of occupation to the gain in knowledge which made the 'r' value significant. The results, therefore, make it evidently clear that occupation of the respondents as such has nothing to do with their knowledge of modern dairy technology.
In other words, there may be some farmers who might be maintaining dairy in traditional way without paying heed to the recent advances made in the technology. But fortunately it so happened in the present investigation that such farmers, by and large, had high economic motivation as well as greater empathy with the change agent system which induced them to go for acquisition of the knowledge of modern technology.

The direct path coefficients show that economic variable like farm size and herd size and social variable like family size, family education and communication exposure failed to induce the farmers to go in for a greater knowledge of modern dairy technology. Only two psychological variables, that is, economic motivation and empathy jointly played a central role in encouraging them to acquire modern knowhow to bring them on the path of progress. This is evident not only from their significant 'r' values and substantial direct path coefficients but also from the fact that they channelled substantial indirect path coefficients of all the other antecedent variables studied in the present investigation.

This suggests a significant implication for the extension agency to transfer modern dairy technology to rural dairymen. For this rigorous and extensive programme to heighten the economic motivation of the dairy farmers
needs to be launched. Sufficient experience has been generated for successful organisation of motivation development training programmes in India (McClelland and Winter (1969), Mehta (1976), Rao (1978), full advantage of this experience should be taken to popularise dairy technology among the existing as well as potential dairy entrepreneurs.

**Urban Setting**

In case of urban setting, media exposure is the only variable which yielded significant correlation coefficient with their knowledge of dairy technology (r = .406, p < .01) and also substantial direct path coefficient (0.415). Communication exposure also channels substantial direct path coefficients of all the other antecedent variables. The results, therefore, clearly reveal that media exposure is probably the major source of gaining knowledge of dairy technology in case of urban dairy owners. It, therefore, implies that in case of urban dairy owners the extension agency should resort to intensified media activities to diffuse technological knowhow to them conveniently and efficiently. It may be mentioned here that urban population in India, in particular, is believed to have a greater exposure to mass media including the written material because of their higher education. This makes the task of extension worker to communicate technology to them convenient and easy.
Table 4.21

Multiple Regression Analysis of Farmers’ Knowledge of technology with some selected independent variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Rural</th>
<th>Incremental</th>
<th>Urban</th>
<th>Incremental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Size</td>
<td>0.4599</td>
<td>0.0023</td>
<td>-0.0306</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(1.3275)</td>
<td></td>
<td>(1.044)</td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>0.0147</td>
<td>0.0002</td>
<td>-0.0696</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>(0.1473)</td>
<td></td>
<td>(0.107)</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td>0.4015</td>
<td>0.0002</td>
<td>-0.195</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>(4.0722)</td>
<td></td>
<td>(2.760)</td>
<td></td>
</tr>
<tr>
<td>Empathy</td>
<td>1.0680</td>
<td>0.0314</td>
<td>-0.114</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.8415)</td>
<td></td>
<td>(0.608)</td>
<td></td>
</tr>
<tr>
<td>Media Exposure</td>
<td>-0.0372</td>
<td>0.0009</td>
<td>0.540**</td>
<td>0.163</td>
</tr>
<tr>
<td></td>
<td>(0.1644)</td>
<td></td>
<td>(0.135)</td>
<td></td>
</tr>
<tr>
<td>Economic Motivation</td>
<td>0.2972</td>
<td>0.0154</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(0.3545)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Size</td>
<td>0.0903</td>
<td>0.0016</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(0.3406)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard Size</td>
<td>0.2254</td>
<td>0.0007</td>
<td>0.800</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>(1.1259)</td>
<td></td>
<td>(1.221)</td>
<td></td>
</tr>
</tbody>
</table>

\( R^2 \)  
Rural: 0.22  
Urban: 0.18

Multicollinearity effect 0.165  
\( F \) Value 1.40 M

** Significant at 1 per cent level of probability.  
* Significant at 5 per cent level of probability.  
Figures in parentheses indicate standard errors.
None of the other antecedent variables yielded significant 'r' values, the result of path analysis however further indicated that the variable empathy contradicts the finding reported in case of rural dairy owners. Its direct path coefficient though negative was found to be very small which can even be ignored. Interestingly the variable empathy was found to have moderately substantial indirect effect which was mainly found to channelise indirect effect of media exposure. It is understandable since the respondents' having high empathy could possibly get enough opportunities to put them in others situation through contact with extension workers and various other sources of communication. It is, therefore, natural that their knowledge of modern technology would be high than those who had low level of empathy.

A mention may be made here that all the variables included in the regression analysis in case of rural setting accounted for 22 per cent variation as compared to 25 per cent variation in case of urban setting in explaining knowledge of the dairy technology. As indicated by the value of variance ratio for $\chi^2$, the above mentioned contributions in the variability of technological knowledge of the respondents were found to be significant only in case of urban setting.
Out of the eight variables in respect of rural setting and seven variables in case of urban setting studied as antecedents of gain in knowledge of the technology only two variables in rural and one in urban setting were found to have significant relations with knowledge level of the respondents. In rural setting, these variables are empathy and economic motivation. On the basis of this, it may be inferred that those farmers who had higher empathy and predisposition to achieve some thing excellent in terms of their economy were found to be knowledgeable about the dairy technology. In case of urban setting, the important variable is media exposure which indicates that these urban cattle owners who were significant consumers of mass media could demonstrate their influence in gain in their knowledge about the dairy technology.

4.3.2.0 Dependent Variable

4.3.2.1 Adoption

Adoption has been operationally defined as the extent to which dairy innovations pertaining to breeding, feeding and disease control have been adopted by the cattle owners of the area under study. Four aspects namely heat cycle, time of insemination, pregnancy diagnosis and postpartum coverage were considered under breeding whereas balanced feeding and vaccination were taken for
consideration under feeding and disease control.

This section of the findings presents the relationship between eleven independent variables and adoption as a dependent variable. A mention may be made here that the five intervening variables i.e., media exposure, empathy, herd size, economic motivation and knowledge of dairy technology discussed earlier in this chapter were also treated as independent variables along with six antecedent variables. The data were then subjected to statistical like correlation, regression and path analyses. These statistical analyses were employed to the data obtained from rural and urban respondents separately, the results of which are presented below.

Rural Setting

A perusal of Table 4.21 reveals that out of eleven independent variables taken as antecedents to adoption of the dairy technology only four were found to be significantly related to adoption. Three of them that is, occupation, economic motivation and price of milk were related with adoption of the technology at .05 level of probability whereas 'knowledge of the technology' was found to be related at .01 level of probability.

The correlation analysis brings only degree of association to light, it does not indicate the extent of contribution made by them to adoption of the technology.
Table 4.23
Multiple Regression Analysis of Farmers' Adoption of Dairy Technology with some selected independent variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>NURSAL Regression coefficient</th>
<th>NURSAL Incremental contribution</th>
<th>URBAN Regression coefficient</th>
<th>URBAN Incremental contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family size</td>
<td>0.455 (0.504)</td>
<td>0.011</td>
<td>0.975 (0.861)</td>
<td>0.012</td>
</tr>
<tr>
<td>Family education</td>
<td>0.171 (0.936)</td>
<td>0.000</td>
<td>0.026 (0.088)</td>
<td>0.004</td>
</tr>
<tr>
<td>Occupation</td>
<td>2.184 (1.549)</td>
<td>0.009</td>
<td>2.760 (2.340)</td>
<td>0.014</td>
</tr>
<tr>
<td>Empathy</td>
<td>-0.517 (0.590)</td>
<td>0.004</td>
<td>-0.147 (0.502)</td>
<td>0.001</td>
</tr>
<tr>
<td>Media Exposure</td>
<td>-0.033 (0.065)</td>
<td>0.001</td>
<td>-0.145 (0.225)</td>
<td>0.011</td>
</tr>
<tr>
<td>Economic Motivation</td>
<td>-0.077 (0.128)</td>
<td>0.008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm size</td>
<td>-0.259* (0.128)</td>
<td>0.020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herd size</td>
<td>-0.019 (0.100)</td>
<td>0.002</td>
<td>0.232 (1.000)</td>
<td>0.001</td>
</tr>
<tr>
<td>Price of milk</td>
<td>-10.63 (10.361)</td>
<td>0.007</td>
<td>6.448 (11.340)</td>
<td>0.003</td>
</tr>
<tr>
<td>Mode of milk</td>
<td>-1.50 (1.372)</td>
<td>0.004</td>
<td>0.185 (2.394)</td>
<td>0.006</td>
</tr>
<tr>
<td>Marketing Innovations</td>
<td>0.579** (0.911)</td>
<td>0.012</td>
<td>0.379** (0.091)</td>
<td>0.170</td>
</tr>
<tr>
<td>Knowledge</td>
<td>0.612 (0.063)</td>
<td>0.612</td>
<td>0.379** (0.091)</td>
<td>0.170</td>
</tr>
</tbody>
</table>

R² = 0.810 0.230

Multicollinearity effect 0.132 0.008

*p* value 14.21** 2.60*

** Significant at 1 per cent level of probability.
* Significant at 5 per cent level of probability.

Figures in parentheses indicate standard errors.
It was, therefore, proposed to put the data to regression analysis, the results of which are reported in Table 4.23.

The data reported in Table 4.23 reveal that out of the four independent variables found significantly correlated with adoption of dairy technology only one i.e., knowledge of the technology was found to yield significant regression coefficient. Interestingly, the variable 'farm size' which failed to show a significant correlation with adoption of dairy technology yielded a significant regression coefficient though in negative direction. Even the incremental contribution of these two variables were found to be quite substantial providing further support to the inference that they are important to induce adoption of dairy technology in the respondents under study. The remaining nine variables, however, showed non-significant contribution to adoption of dairy technology. A perusal of Table 4.23 further reveals that all the eleven independent variables taken together for the regression analysis accounted for 81 per cent of variation in the adoption of the technology. The multicollinearity effect in this case was, however, moderately substantial (0.132) but the variance ratio was significant at 0.01 level of probability. Thus, the results show that the variables under study explained quite a substantial amount of variation in the dependent variable.
Similar results were obtained by Shama and Nair (1974) in a study of adoption of improved rice farming. They found size of holding, knowledge, economic motivation, use of mass media, contact with extension agency to have explained 96 per cent of variation in the farmers' adoption behaviour. Singh and Singh (1970) in another study on adoption of improved wheat technology reported that farm size followed (in order of importance) by knowledge of practices, family education, economic motivation, risk orientation and mass media exposure, explained 82.75 per cent of the variation in adoption behaviour. Supe and Singh (1972) studying farmers' rationality in decision making selected five, out of sixteen independent variables, which explained 73.96 per cent of the variation in the rational behaviour of farmers. The variables, in descending order of their contributions were economic motivation, risk preference, scientific orientation, adoption and socio-economic status.

Bhalwal (1970) studying factors affecting adoption of agricultural practices selected 14 variables which explained 96 per cent variation in adoption behaviour. Out of this about 46 per cent variation was explained by only five variables namely, educational level, social participation, past experience, farm knowledge and innovations adoption potentiality. Malhotra, Joshi and Bae (1974) identified member's participation and knowledge as most important factors accounting for 66.26 per cent variation in predicting innovativeness.
The results of correlation and regression analyses reported above showed that there were some variables which yielded significant correlation coefficient but not significant regression coefficient. Consequently, there was at least one variable (size of holding) which yielded significant regression coefficient but not correlation coefficient. The results, thus, clearly indicate that accompanying independent variables play a significant role in producing this type of incoherent results. It was, therefore, proposed to put the data to path analysis so that the impact of the accompanying independent variables could be traced and the contribution of the variables unaffected by other independent variables could be established.

The data of path analysis reported in Table 4.24 reveal that the variables occupation, mode of milk marketing and knowledge of the technology had positive and substantial direct effects on adoption of the dairy technology, whereas the variables 'empathy' and 'media exposure' showed substantial negative direct effects. The total indirect path coefficient in case of empathy was found to be greater in magnitude as compared to its direct path coefficient, the result of which is that the 'r' value in this case was found to be positive though non-significant.

The data related to the substantial indirect effect channelled through other variables indicated
Table 4.24  
Path analysis of Independent Variables with 'Adoption' of dairy technology as dependent variable.

<table>
<thead>
<tr>
<th>Variable</th>
<th>( R )</th>
<th>Direct effects</th>
<th>Indirect effects</th>
<th>Substantial indirect effects through</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Family size (1)</td>
<td>.087</td>
<td>0.036</td>
<td>0.051</td>
<td>0.040(4)</td>
</tr>
<tr>
<td>Family size (2)</td>
<td>.125</td>
<td>0.119</td>
<td>0.006</td>
<td>0.186(11)</td>
</tr>
<tr>
<td>Occupation (3)</td>
<td>.284*</td>
<td>0.311</td>
<td>-0.027</td>
<td>0.355(11)</td>
</tr>
<tr>
<td>Empathy (4)</td>
<td>.197</td>
<td>-0.358</td>
<td>0.555</td>
<td>0.416(11)</td>
</tr>
<tr>
<td>Media Exposure (5)</td>
<td>-.003</td>
<td>-0.227</td>
<td>0.224</td>
<td>0.201(10)</td>
</tr>
<tr>
<td>Economic Moti. (6)</td>
<td>.256*</td>
<td>-0.037</td>
<td>0.333</td>
<td>0.427(11)</td>
</tr>
<tr>
<td>Farm size (7)</td>
<td>-.028</td>
<td>-0.100</td>
<td>0.072</td>
<td>0.106(11)</td>
</tr>
<tr>
<td>Hard size (8)</td>
<td>.111</td>
<td>-0.128</td>
<td>0.239</td>
<td>0.184(11)</td>
</tr>
<tr>
<td>Price of milk (9)</td>
<td>.246*</td>
<td>-0.077</td>
<td>0.323</td>
<td>0.378(11)</td>
</tr>
<tr>
<td>Mode of milk (10)</td>
<td>.191</td>
<td>0.471</td>
<td>-0.280</td>
<td>-0.097(5)</td>
</tr>
<tr>
<td>Knowledge (11)</td>
<td>.85*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>( R )</th>
<th>Direct effects</th>
<th>Indirect effects</th>
<th>Substantial indirect effects through</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Family size</td>
<td>.131</td>
<td>0.142</td>
<td>-0.011</td>
<td>-0.038(2)</td>
</tr>
<tr>
<td>Family size</td>
<td>.009</td>
<td>0.133</td>
<td>-0.124</td>
<td>-0.057(10)</td>
</tr>
<tr>
<td>Occupation</td>
<td>.135</td>
<td>-0.071</td>
<td>0.064</td>
<td>0.239(11)</td>
</tr>
<tr>
<td>Empathy</td>
<td>.097</td>
<td>0.144</td>
<td>-0.047</td>
<td>-0.075(5)</td>
</tr>
<tr>
<td>Media Exposure</td>
<td>.080</td>
<td>-0.307</td>
<td>0.397</td>
<td>0.222(11)</td>
</tr>
<tr>
<td>Hard size</td>
<td>.118</td>
<td>0.082</td>
<td>0.136</td>
<td>0.056(11)</td>
</tr>
<tr>
<td>Price of milk</td>
<td>.023</td>
<td>-0.262</td>
<td>0.285</td>
<td>0.095(10)</td>
</tr>
<tr>
<td>Mode of milk</td>
<td>.141</td>
<td>0.228</td>
<td>-0.067</td>
<td>0.109(9)</td>
</tr>
<tr>
<td>Knowledge</td>
<td>.418**</td>
<td>0.549</td>
<td>-0.130</td>
<td>-0.125(5)</td>
</tr>
</tbody>
</table>

** Significant at 1 percent level of probability, * Significant at 3 percent level of prob.
DIRECT EFFECT | SUBSTANTIAL INDIRECT EFFECT | first indirect effect | second indirect effect | third indirect effect

LEGEND
- DIRECT EFFECT
- SUBSTANTIAL INDIRECT EFFECT
- TOTAL INDIRECT EFFECT
- FIE: FIRST INDIRECT EFFECT
- SIE: SECOND INDIRECT EFFECT
- TIE: THIRD INDIRECT EFFECT
that the variables like knowledge of the technology channelled the indirect effects of eight variables, occupation, those of seven variables and empathy those of eight variables.

The correlation, regression and path analyses indicated that variables like knowledge, farm size, occupation, economic motivation, empathy and media exposure emerged as important variables influencing adoption of dairy technology under rural setting. The findings related to these variables are discussed in detail as under, highlighting their implications to dairy development programmes undertaken in the ICAR Kurnool.

Knowledge:

The variable knowledge of the technology has demonstrated positive and highly significant correlation coefficient, regression coefficient and quite substantial direct path coefficient with the adoption of dairy technology. In addition, it also channelled the indirect path coefficients of eight of the eleven variables under study quite substantially. This further adds to the significance of this variable in influencing the respondents' adoption of dairy technology. Thus it can be safely inferred that increase in knowledge of dairy innovations leads to higher adoption of dairy technology by dairy farmers. This finding is in conformity with that of Hess and Millar (1954) in their study on "Factors influencing Dairyman- Action and Success", ...

The result, thus, clearly implies that the dairy farmers' knowledge about dairy innovations should be promoted by the change agency in order to promote adoption of technology by the clients. For this, higher exposure to the dairy innovations by employing various media of communication ranging from interpersonal to mass could be employed, but mere exposure to these media is probably not likely to produce the best results unless the significant correlates of knowledge as reported in this chapter of the present dissertation are taken into account. It may be recalled that farmers' empathy with change agency and change agents and their level of economic motivation made a significant contribution to their gain in knowledge. Fortunately, media exposure was found to have significant influence on building empathy with the change agent and the agency (Table 4.16); thus the higher exposure to innovations as suggested earlier will take care of increasing the farmer's empathy with change agent and agency, leading to higher gain of knowledge; but for improving the level of economic motivation of the respondents some additional efforts are needed to be made. Institutes like I.G.R.I., Agricultural Universities, Small Industry Extension Training Institute, Management Institute which have expertise in the area of motivation
development should come to the aid for this purpose. Such institutions can undertake training programmes to inculcate a desire of achieving excellence in economic ventures in the dairy farmers of the area which will prompt them to acquire knowledge of dairy technology to which they will be exposed by the change agency leading to a higher adoption of the innovations. Thus it may be suggested that an intensive communication programme along with motivation development oriented training programmes should be carried out to promote the level of dairy technology and their adoption at large.

Occupations

The variable occupation has demonstrated a positive and significant relationship with adoption level of the respondents but it has failed to contribute significantly as indicated by the regression coefficient (Table 4.23). However, it was found to exert a substantial direct effect on respondents' adoption of technology. It is quite interesting to note that the total indirect effect of occupation was quite meagre but its indirect effect channelled through only one variable, that is knowledge of the technology (0.365) was found to be not only highly substantial but also greater than its direct effect in magnitude (0.311). But other variables like empathy and economic motivation, etc. also channelled somewhat substantial direct path coefficient of this variable
in negative direction which cancelled the entire amount of effect channelled by knowledge and made the total indirect effect in negative quantity (-0.027). This indicates that those having heavily weighted occupation like agriculture had a greater knowledge of technology to help adoption of the same, but they also had higher level of empathy and economic motivation which retarded the adoption of technology cancelling each other's effects. The reasons why empathy and economic motivation should retard adoption of dairy technology have been explained while discussing the variables in detail under this section of the report. Thus the respondents scoring high on occupation, that is, farmers, tend to have better adoption of dairy innovations. But the finding reported earlier that those who had larger farm size had lower level of adoption may give rise to some confusion. It can therefore, be mentioned here that 73 per cent of the respondents were agriculturists in this study and out of them about 67 per cent were only small and marginal land holders. Thus greater size of holding could not play its role because of being in minority.

**Economic Motivations**

The variable economic motivation has shown a positive and significant relationship with adoption level of the respondents. This finding is in line with some of the studies conducted in crop cultivation like those of
Rae and Moulik (1966), Singh (1969), Nair (1969) and Suthe (1969). But the regression analysis revealed that this variable made a non-significant contribution to adoption of the technology and that too in negative direction. The direct path coefficient of this variable towards adoption of dairy technology was also found to be negative though meagre in magnitude. The total indirect effect was, however, found to be substantial and positive due to substantial positive direct effects being channelled through knowledge of the technology and occupation etc. It may further be mentioned here that empathy channelled a substantial but negative indirect effect of this variable which is quite in keeping with the previous findings. Empathy was found to be a significant antecedent of economic motivation (Table 4,16) and it was found to have negative direct effects on adoption of dairy technology for the reasons discussed above. However, the direct path coefficient of economic motivation being negative, but not substantial, can be taken to provide only a weak tendency to retard adoption of dairy technology. This also may be explained in terms of the occupation of the respondents which was agriculture in majority of the cases (72 per cent). Thus farmers having high economic motivation would naturally pay greater attention to farming rather than dairying which is only auxiliary and so will probably not go for improved dairy technology to any appreciable extent.
Price of Milk

The correlation coefficient indicated in Table 4.24 points out that the variable price of milk was positively and significantly related with the adoption of dairy innovation whereas the regression coefficient was found to be negative and non-significant. As far as path analysis results are concerned, it further indicated negative but meager direct effect on adoption level. The total indirect effect of this variable was found to be substantial and it was mainly channelled through the variable knowledge of the technology and occupation meaning thereby that the respondents having high score on price of milk were those who secured high score on knowledge of dairy innovations and occupation. This result is also substantiated through the correlation coefficient between the knowledge and price of milk which was found to be significant (0.368). However, the variable price of milk on its own does not seem to have any effect on the adoption of technology.

The remaining variables namely family size, family education and herd size yielded varying magnitude of correlation .057, .125 and .111 respectively and regression coefficients which however contradicts the findings of Bakshi (1970) and Sinha and Sinha (1971) who have reported that the family size and herd size
were found to have much influence on milk production. But the findings got support from the research conducted by John (1974) and Singh and Dubey (1978) according to them family size, herd size, and size of holding were not found to be associated with respondents' level of adoption.

**Empathy**

The variable empathy has shown a positive but non-significant correlation with adoption level of farmers. But its regression as well as direct path coefficients were found to be negative. The direct path coefficient was substantial too. However, the total indirect effect in this case was even more substantial (0.555) than direct path coefficient (0.358). This has resulted in bringing the correlation coefficient positive but below the level of significance. Fortunately the respondents having better empathy with the change agency also had better knowledge of the technology, had farming as occupation and marketed their milk through organised sector which channelled their substantial positive indirect effects making the total indirect effect highly substantial and positive. However, a baffling question remains to be answered as to why empathy should have a substantial negative direct path coefficient indicating thereby, that it retarded adoption of improved dairy technology? As mentioned above that respondents who had better empathy.
with the change agency, had farming as their main occupation and probably took dairying only as an auxiliary occupation primarily to meet their family milk requirements. May be that farming being their major concern, they might have exploited their empathy with the change agency to adopt farm technology rather than dairy technology. On the other hand those dairy farmers who did not have farming as their main occupation might be treating dairying as an occupation to earn livelihood and as such they might have adopted improved dairy technology (of course to varying extent) even though they could not have established better empathy with the change agency. This seems to be the probable reason for obtained negative effect of empathy on adoption of dairy technology.

Mode of Milk Marketings

The relational analysis presented in Table 4.23 and 4.24 indicated that there existed a positive and non-significant relationship between mode of milk marketing and adoption level of the respondents. The regression coefficient was found to be negative but non-significant.

The results of path analysis reported in Table 4.24 indicate that the variable mode of milk marketing has exerted quite substantial direct effect and substantial
but negative indirect effect in relation to the adoption of technology. It, therefore, seems that the variable 'mode of milk marketing' failed to attain the level of significance in case of correlation coefficient due to substantial and negative total indirect effect channelled by the variables like media exposure and empathy etc. It can, thus, be inferred from the results reported above that mode of milk marketing on its own is a strong antecedent to adoption of dairy technology. This appears to be quite logical because marketing of milk through organized sector would bring the dairy owner in contact with the change agents of milk marketing, cooperatives etc., which will increase their knowledge of dairy technology and provide inducement to adopt it to improve their earnings. It is obvious that those who market milk could be interested in increasing their receipts from the sale of milk and thus would like to increase the production by adopting improved dairy technology.

Media Exposure:

The correlation and regression coefficients of media exposure were found to be non-significant though negative in direction, but they may be ignored due to the meagre magnitude of the coefficients. However, its direct path coefficient as reported in Table 4.24 is
obviously not negligible even though it is not highly substantial. As already found in case of the media exposure taken as intervening variable (Table 4.16) these having farming as their major occupation were found to have greater access to communication sources. This again leads to the conclusion here that the farmers having better communicability perhaps made use of this in improving farming— their main occupation— rather than dairying which is considered only secondary and this is the probable reason that media exposure yielded negative direct path coefficient. The above findings contrasted with the researches conducted by Mikkilineni (1976) and Rath (1977) who reported significant and positive relationship of media exposure with the adoption behaviour of cattle owners.

Farm Size:

The relational analysis showed that the variable farm size was negatively and non-significantly related with the level of adoption of the respondents. The result of path analysis also indicated negative but meagre direct path coefficient. However, the beta value of this variable was found to be significant but again negative in direction. It, therefore, points out that the farmers' having large land holdings would have lower level of adoption of dairy innovations. This finding apparently looks to be contradicting to the earlier findings like Sinha and Sinha (1971),
Kakaty (1975), Mandal (1976), Mikkilineni (1976),
singh (1976) and Rath (1977). The investigator's experience
of the area under study is that big farmers in general
consider farming as the main enterprise and dairying just
a means of meeting the milk requirements of the family.
They obviously do not take dairying as an economic
enterprise and so it is logical that they had not gone for
adoption of improved dairy technology.

Urban setting:

In the urban setting also, the relationship between
the adoption of the dairy innovations and antecedent
variables were established by using correlation, regression
and path analyses and are presented in Tables 4.23 and 4.24.

The regression analysis indicated that the independent
variables explained only 23 per cent of variation in adoption
of dairy technology in case of urban setting. The computed
'7' value of $\eta^2$ was however found to be significant, at .05
level of probability. The multicollinearity effect was found
to be meagre (0.008).

As indicated earlier all the variables were able
to explain 61 per cent of the variation in the farmers'
adoption behaviour in rural setting. A comparative study
between rural and urban setting in this respect poses a
question as to why the variables could not explain more than
23 per cent of variation in adoption behaviour of urban
respondents? The researcher's experience suggests that
the cattle owners in urban areas mostly keep cattle either for meeting their domestic milk requirements or procure cross-bred cows from adjacent rural areas in order to sell them at higher rates to the buyer from adjoining states. They are available in plenty since GHARAUNDA and PANIPAT have become known for the availability of cross-bred cows and are serving as a market for the adjoining areas. Therefore these people seem to be less interested in adopting modern know how with regards to animal husbandry practices and are mainly interested in trading cross-bred cows, which fetches them lucrative profits. Rural dairy owners on the other hand, maintain dairy solely for the purpose of milk production either for home consumption or for sale or for both. This basic difference in the objective of maintaining cattle in the two groups of respondents clearly suggests that different sets of antecedent variables operate under the two conditions. It is therefore, quite logical that a common set of antecedent variables should yield varying degrees of multiple regression coefficients.

As reported in Table 4.23 only one that is knowledge out of nine variables was found to be significantly correlated with the level of adoption of technology by the urban respondents. But other eight variables showed a positive but non-significant relationship. If only one variable has made a significant contribution as revealed by regression analysis explaining variation in adoption of the technology then what happened to the effects of other
independent variables? To trace it out critically, the data were further subjected to path analysis, the results of which are reported in Table 4.24.

The results reported in Table 4.24 indicated that knowledge of the technology had a highly substantial direct effect on adoption of the dairy technology. The other two variables namely media exposure and price of milk were found to have substantial direct effect though negative in direction. The variable mode of milk marketing was also found to exert moderately substantial direct effect.

A perusal of the findings of the correlation, regression and path analyses reported in Table 4.23 and 4.24 suggested that knowledge of the dairy technology was the most dominant variable leading to adoption of the technology. Its correlation coefficient, regression coefficient were significant and direct path coefficient for adoption of technology was quite substantial in case of the respondents under study. In addition, it also channelled substantial indirect effect of five of the nine variables of the respondents as evident from the Table 4.24. Therefore, it appears that increase in knowledge of the dairy farming would increase the adoption of the technology even in case of the urban dairy owners.

Knowledge as a factor affecting adoption behaviour has been studied by Hans and Miller (1954), Williams (1950),
Hoffer and Stangland (1958), Hobbs (1960), Reddy (1962), Moulik (1965), Nair (1969) and Ramachandran (1974) and they reported a positive association between knowledge and adoption. The present findings are in line with the research conducted by Ratha (1977) who made a study of ICPP Cuttack (Orissa) and found knowledge of technology significantly and positively associated with the respondents level of adoption.

The variable mode of milk marketing had a positive but non-significant correlation and regression coefficients. The direct coefficient (0.228) of this variable was substantial, but this escaped the level of significance for its \( r^2 \) value because of its negative indirect effect.

Further, it may be mentioned here that the variable mode of milk marketing was found to be positively and significantly correlated with price of milk obtained by the respondents. This suggests that the respondents scoring high on mode of milk marketing were also found to score high on price of milk (\( r^2 \) value between the two being 0.418) but even then they failed to go for adoption of modern dairy technology, to an appreciable extent. The result of path coefficients of media exposure and price of milk indicate that they could exert substantial and negative direct effects on adoption of dairy technology. The results are similar to those found in case of rural respondents possibly due to a similar reason. As explained earlier too, dairying is not the main economic enterprise for majority of the urban dairy owners.