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# Socio-Economic Factors Affecting Decisions of Traditional Farmer on Investment in Livestock in Sharkia Governorate

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## Introductory Background

The plans for agriculture and rural development in Egypt envision considerable emphasis on livestock development. Though past and current plans have been heavily oriented toward specialized modern livestock enterprises, it has been realized that an integrated approach incorporating production enhancement on traditional farms will be necessary for sustained growth in livestock production. This shift in emphasis is an outcome of the realization that most cattle and buffalo are produced by traditional rural households. The success or failure of Egypt's livestock development programs depends upon their ability to influence traditional smaller farmers' decisions on investment in livestock.

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Studies in a number of countries have indicated that farmers' investment decisions in agriculture are influenced by various factors: profitability, equipment requirements, length of investment period, crop rotation, and subjective time preference factors. Social factors such as the prestige associated with large herds are also identified as possible influences on farmers' choices.

It has been proven in India that the percentage of total income invested increases with the size of the farm, level of mechanization and amount of education of the family head (1, 2). Purchase and improvement of land account for a major share of farm investment. Investment in farm machinary and irrigation structures were the second most important items. The investment pattern varied according to the size of the holdings. The small farmers attached importance to extending irrigation facilities making this their greatest investment category. Farmers with medium size holdings concentrated on increasing the size of operational holding. Investment in farm machinary accounted for the largest proportion of the farm investments made by the large farmers.

While some studies are available on farmers' general investment pattern in agriculture, very few studies concentrate specifically on investments in livestock. A study of investment patterns of dairy farms in Jabal-Pur region of India indicate that the average investment varies from Rs. 3,828 for farmers with 5-10 animals to Rs. 49,540 for farmers with more than 23 animals (3). Recently, cross-section data of

selected farmers from six villages in Ahmed-Abad in India, have considered the investment pattern in dairy farming (4). The number of dairy animals and the amount invested in dairying were explained by several factors. Both the number of milk cattle and the amount invested in dairying were found to be independent of age and education of the family head. Family size and the number of milk cattle varied with the occupation of the family head. The average area operated by the families with different sized milk herds remained more or less the same.

## Objectives and Methodology

The primary objective of the study is to analyze the traditional farmers' decisions on investment in livestock, particularly cattle and buffalo since they are the major sources of milk and meat in Egypt. The study will attempt to relate investment in cattle and buffalo with the following factors: (1) size of land holding, (2) cropping pattern, (3) availability of family labor, (4) family consumption requirements. (5) education of the family head, and (6) age of the family head.

In a broad sense, one could argue that livestock enterprise decisions at the farm level are related to a number of other decisions. This is especially true when cattle and buffalo are considered as activities competing for resource allocation at the farm level. In order to analyze livestock decisions in this broad sense, it is necessary to consider the entire range of farming decisions. Though this broad sense is recommended, it is beyond the scope and capacity of this article to do so. The present study tests only the role of some social and demographic variables on livestock investment, in comparison with some major economic farming variables.

Availability of family labor and family consumption requirements as factors affecting livestock investments are represented by several demographic variables: household size, household members sharing in farming work, number of adult females, and number of children in the household. The latter two variables are introduced to test the

hypothesis that women and children provide most of the labor that serve livestock. However, though the size and structure of the household may represent the labor availability on farm, they also may indicate consumption requirement for animal products.

Farm size is a variable that reflects the aggregate scale of the agriculture enterprise availability of investment funds, and the ability to adopt new technology such as mechanization. An additional hypothesis to be tested is that the smaller the operated area the stronger the desire to invest in livestock as a form of vertical expansion. Cropping pattern is represented as the percentage of area under fodder crops. This is the operated area allocated entirely to livestock, particularly cattle and buffalo.

Investment in livestock enterprises is represented in this study as a physical variable: holdings in head of cattle and buffalo. These two types represent the extent of dairy and fattening activities within the traditional farming household.

Goodness of fit analysis, using the chi-square test, is applied to test a null hypothesis that the social and economic variables are independent of the decision to invest in livestock. The alternative hypothesis, of course and what is anticipated, is that they are not independent. Observed and expected joint frequencies of the farmers under each tested relation are calculated. Two-way contingency tables

are presented for each relation (Tables 1-10). A contingency coefficient was derived for each relation to indicate the magnitude of the relation between livestock investment and each economic and social factor.

Comparison of the expected value of each investigated factor with corresponding livestock holding size class is used to show the trend of the relation where present.

## Field Sample and Sampling

It is possible that factors influencing livestock farming decisions vary from region to region. Therefore, any generalization about livestock farm decision making can be made only with data from a cross-section of farmers from different regions. While this would have been most desirable for achieving the objectives of the study, it was not possible to present the entire data collected from the four regions (Governorates), including nine villages in this article, due to a lack of time and space.[1] It was decided to test all hypotheses for each region in a separate study in which regional comparison will be presented to test the hypothesis of specialization.

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[1] The data were collected and processed from a questionaire implemented in lower Egypt in summer of 1981 to cover the agricultural season 1980/1981. It was a cross-section sample survey of livestock activities on traditional farms.

The survey implementation and data processing were financed by the AID Egypt-California project for Agricultural Development Systems in Egypt.

This article deals with the livestock investment decision-making of 123 households in Sharkia Governorate. The sampling technique was stratified random sampling of four villages from three districts of Sharkia. Sharkia has 22% of Egypt's livestock population and is a production leader.

It was a purposive sampling procedure based upon the following considerations: (1) the four villages should come from areas at varying distnaces from a central point, Zagazig City. (The villages are from three districts: Fakous, Abo-Kebeer and Zagazig.); (2) the sample should include some villages with high density of livestock; and (3) selection of farmers from each village should be stratified. The strata are farm size, livestock holdings of landless household, reform and regular farmers, and size of livestock holdings or berseem area which is available.

Investigated variables within the sample showed the following distributions: 50% of the farmers are between 40 to 60 years old; 49% of the farmers are illiterate; 80% of the family heads have farming as their sole source of income; 70% of the households are of six persons or more; 57% of the households have 3-4 children and above; 91% of the households have 1-3 adult females; 49% of households are without members that share in farm work, aside from the farmer; and 42% have 1-2 members that share in farm work, along with the farms.

With respect to the distribution of land holdings the following was found: 5% of households are landless but with livestock holdings; 51% of the households are with less than 3 feddans. Cattle and buffalo distribution of the sample is: 10% with one head; 16% with two head; 18% with three head 16%; with four head; 40% with five head and above.

## Results and Implications

Results are presented according to the concerned socio-economic and demographic factors that may affect the household decision on investment in cattle and buffalo. The entire sample size was 123 households; however, in the tables households with no cattle or buffalo heads were excluded. The total frequency not always equal to the sample size because some units did not fit into each classification.

1. Education of the head of the household: The average education score of the head of households included in the study was 0.62 (Table 1). This implies that the average education level of the farmers with in the sample was less than primary school. The education level was lowest, about 0.4, for farmers with less than three head of cattle and buffalo. This indicates that the farmers with higher education level tend to keep larger number of livestock. The chi-square analysis (Table 11) indicates that the education level of the head of household and the number of cattle and buffalo are related.

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1) Education score was calculated using the following weights attached to the education level: illiterate (0) primary school (1), middle school (2), high school (3), college (4).

Table 1: Distribution of Farmers According to Education Level and Livestock Size

| Number of Cattle and Buffalo (Head) | Number of Farmers With Education Level | | | | | | Average Education Level Score [a] |
|---|---|---|---|---|---|---|---|
| | Illiterate | Primary | Middle | High | Colloge | Total | |
| 1 | 8 | 3 | 1 | 0.0 | 0.0 | 12 | 0.42 |
| 2 | 12 | 8 | 0.0 | 0.0 | 0.0 | 20 | 0.40 |
| 3-4 | 18 | 21 | 0.0 | 2 | 1 | 42 | 0.74 |
| 5-9 | 18 | 12 | 0.0 | 5 | 1 | 36 | 0.86 |
| 10 & above | 3 | 3 | 0.00 | 4 | 1 | 11 | 1.78 |
| Total | 59 | 47 | 1 | 11 | 3 | 121 | 0.62 |
| Percent in Category | 48.8% | 38.8% | 0.8% | 9.1% | 2.5% | 100% | |

Source calculated from: a stratified random sample of a purposive survey in Sharkia governrate. The entire sample size was 123 households.

[a] Based on 0 for illiterate, 1 for primary, 2 for middle school, 3 for high school and 4 for college.

2. Size of the household: The average household size was about 6.8 members (Table 2). The average household size was about 5 members for households with one head of cattle or buffalo. The average household size was 7.75 members for households with 2 cattle or buffalo. Household size declined for farms with larger nembers of livestock. Thus, there does not appear to be any simple relationship between number of animals and household size.

3. Age of the head of the household: The average age of the household head was about 51 years. It ranged between 44.8 years for households with 10 heads and above and 54.8 year for households with two or less head (Table 3). Based on a chi-square test (Table 11) one would reject the hypothesis that the age of the head of the household is independent of the number of cattle and buffalo. It is clear that there is no simple linear relationship among these variables. It is perhaps most interesting that the heads of household for the largest herd sizes (over 10 heads) are younger, on average, that those with smaller herd size.

4. Occupation of the head of the household: Cultivation was the only occupation of about 80% of the sample households; 0.8% of the household members were unemployed; and the rest of households had members with other non-agricultural jobs (Table 4). The chi-square test supported the null hypothesis indicating that the number of cattle and buffalo was independent of the occupation of the head of the family. It is

Table 2: Distribution of Farms According to Size of Household and Livestock Holding Size

| Number of cattle and Buffalo (Head) | Number of households with members | | | | | Average size of Household |
|---|---|---|---|---|---|---|
| | less than 5 | 5-7 | 8-10 | above 10 | Total | |
| 1 | 5 | 6 | 1 | - | 12 | 5.08 |
| 2 | 3 | 8 | 6 | 3 | 20 | 7.75 |
| 3-4 | 4 | 18 | 16 | 5 | 43 | 6.86 |
| 5-9 | 7 | 13 | 15 | 1 | 36 | 6.81 |
| 10 & above | 5 | 2 | 1 | 3 | 11 | 6.73 |
| Totals | 24 | 47 | 39 | 12 | 122 | 6.80 |

Table 3: Distribution of Households According to Age of the Head of Household and Livestock Holding Size.

| Number of cattle and Buffalo (head) | Age of the Head of The Household in Years | | | | Average Age (Years) |
|---|---|---|---|---|---|
| | 20-39 | 40-59 | 60 & above | Total | |
| 1 | 3 | 6 | 3 | 12 | 48.4 |
| 2 | 1 | 12 | 7 | 20 | 54.8 |
| 3-4 | 8 | 21 | 14 | 43 | 49 |
| 5-9 | 4 | 16 | 16 | 36 | 54.2 |
| 10 & above | 5 | 5 | 1 | 11 | 44.8 |
| Total | 21 | 60 | 41 | 122 | 51.05 |

Table 4: Distribution of farms according to the occupation of the household head and livestock holding size

| Number of cattle and Buffalo (Head) | Number of farmers according to occupation | | Percent with some non-agricultural Activity |
|---|---|---|---|
| | Agriculture | Agriculture & non-agriculture | |
| 1 | 11 | 1 | 8.3% |
| 2 | 17 | 2 | 10.5% |
| 3-4 | 33 | 9 | 21.9% |
| 5-9 | 31 | 5 | 13.9% |
| 10 & above | 6 | 5 | 45.5% |
| Total | 98 | 22 | 81.7% |

nevertheless intersting that a relatively high portion (45%) of the large herd holders (10 head or more) had some form of non-farm income.

5. Number of the children of the household: The average number of children in a household was about 2.5. The range of expected number of children did not show any observed trend with the number of cattle and buffalo (Table 5). Based on the chi-square test (.05 level of significance) we could not reject the null hypothesis that the distribution of cattle and buffalo is independent of the number of children members of the household.

6. Number of adult females of the household: The sample average was about 1.8 (Table 6). The chi-square test provided evidence that the number of adult females of the household was also independent of the number of household cattle and buffalo.

7. Number of the family members who share in farm work: The number of persons of a household that share in farm operations (in addition to the farmer himself) is a direct indicator of on farm labor availability. This number includes family members as well as permanant labor. The average number of persons of a household that share in farm operations was about 0.79 persons (Table 7). From this table it is clear that either the investment in livestock increases with the number of persons who share with or help the farmer, or that more help is required as the number of heads increases.

Table 5: Distribution of Households according to number of children and livestock holding size

| Number of cattle and Buffalo (Head) | Number of households with children | | | | | Average number of children per household |
|---|---|---|---|---|---|---|
| | none | 1-3 | 4-6 | 7 & above | Total | |
| 1 | 2 | 8 | 2 | - | 12 | 1.6 |
| 2 | 3 | 10 | 6 | 1 | 20 | 2.75 |
| 3-4 | 5 | 22 | 10 | 6 | 43 | 3.02 |
| 5-9 | 3 | 26 | 7 | - | 36 | 2.31 |
| 10 & above | 5 | 3 | 2 | 1 | 11 | 2.00 |
| Total | 18 | 69 | 27 | 8 | 122 | 2.54 |

Table 6: Distribution of households according to number of adult females members and livestock holding size

| Number of cattle and Buffalo (Head) | Number of households with adult females | | | | Average number of adult females per household |
|---|---|---|---|---|---|
| | none | 1-3 | 4 & above | Total | |
| 1 | - | 12 | - | 12 | 1.42 |
| 2 | - | 19 | 1 | 20 | 2.2 |
| 3-4 | 1 | 39 | 3 | 43 | 1.84 |
| 5-9 | 1 | 34 | 1 | 36 | 1.78 |
| 10 & above | 1 | 8 | 2 | 11 | 1.55 |
| Total | 3 | 112 | 7 | 122 | 1.8 |

Table 7: Distribution of households according to family members sharing in farm operations and livestock size

| Number of cattle and Buffalo (Head) | Number of persons who share in farm work | | | | | Average number of persons sharing in farm operations |
|---|---|---|---|---|---|---|
| | 0.0 | 1-2 | 3-4 | 5 & above | Total | |
| 1 | 9 | 3 | 0.0 | 0 | 12 | 0.25 |
| 2 | 10 | 8 | 2 | 0 | 20 | 0.4 |
| 3-4 | 26 | 14 | 2 | 0 | 42 | 0.64 |
| 5-9 | 11 | 22 | 3 | 0 | 36 | 1.11 |
| 10 & above | 3 | 5 | 2 | 1 | 11 | 1.64 |
| Total | 59 | 52 | 8 | 1 | 121 | 0.79 |

According to chi-square test the null hypothesis of independency between the two distributions in Table 7 should be rejected at a significance level less than 1%.

8. Landholding size: The average operating area was found to be 4.68 feddans. A strongly positive relation was found between farm size and livestock holdings (Table 8). That is, investment in livestock increases with the average size of land holding. While the average land holding of farmers with one head of cattle or buffalo was 1.19 feddans, it increases to 11.31 feddans for farmers with cattle and buffalo herd of 10 or more heads (Table 8). The chi-square test (Table 11) supports the hypothesis that land holding and livestock holding are dependent at significance level less than 1%.

Area under fodder crops: About 37.13% of the total operating area of the sample was under fodder producing crops, usually long-season berseem (Table 9). There was no significant area under darawa (green maize used for fodder).

This proportion did not vary substantially among farmers with different numbers of livestock, except for those with only one head. For these small farmers, the proportion of fodder area was about 60 percent of the operating area. From Table 8, we see about two thirds of the households with only one head of cattle and buffalo held less than one feddan. They therefore must cultivate more than half of their operating area to feed their herds. Chi-square tests and contingency coefficients, shown in Table 11 indicate that the proportion of the

Table 8: Distribution of farmers according to landholding size and livestock holding size

| Number of Cattle and Buffalo (Head) | Number of farms according to farm size | | | | | | | Average farm size in feddans |
|---|---|---|---|---|---|---|---|---|
| | Landless | 1 feddan | 1 to 3 feddans | 3 to 5 feddans | 5 to 10 feddans | 10 feddans & above | Total | |
| 1 | - | 7 | 4 | 1 | - | - | 12 | 1.19 |
| 2 | - | 7 | 10 | 1 | 1 | 1 | 20 | 2.68 |
| 3-4 | 1 | 3 | 17 | 11 | 8 | 2 | 42 | 4.02 |
| 5-9 | 1 | 2 | 6 | 8 | 11 | 8 | 36 | 6.48 |
| 10 & above | 4 | - | 1 | 2 | 1 | 3 | 11 | 11.31 |
| Total | 6 | 19 | 38 | 23 | 21 | 14 | 121 | 4.68 |

Table 9: Distribution of farms according to relative fodder area and livestock holding size

| Number of Cattle and Buffalo (Head) | Number of farms with (fodder area/operating area) | | | | | Average relative area of fodder |
|---|---|---|---|---|---|---|
| | none | less than $\frac{1}{3}$ | $\frac{1}{3}$-$\frac{1}{2}$ | $\frac{1}{2}$ and above | Total | |
| 1 | 2 | 1 | 3 | 6 | 12 | 59.7 % |
| 2 | 4 | 6 | 5 | 5 | 20 | 38.3 % |
| 3-4 | 4 | 16 | 14 | 7 | 41 | 33.6 % |
| 5-9 | 1 | 19 | 13 | 2 | 35 | 32.9 % |
| 10 & above | - | 3 | 2 | 2 | 7 | 36.0 % |
| Total | 11 | 45 | 37 | 22 | 115 | 37.13% |

area under berseem was independent of cattle and buffalo investment. It should be mentioned here that the relative proportion of the area under fodder crops is different from the absolute area under fodder crops in feddans.

Table 10 indicates that the relative proportion of the area under fodder crops decreased as the total operating area increased. Chi-square tests (Table 11) indicate that proportion of the fodder area was independent of livestock numbers.

Comparison of the analyses of Tables 8-10 raises some hypotheses to be tested concerning fodder area and herd size: (1) large land holdings with consequent larger animal holdings show economies of scale in berseem feeding utilization, or (2) larger enterprises have enough funds to increase the proportion of purchased feeds, diminishing the proportion of home produced feeds, particularly fodder crops; or, (3) the operating decision of the small farmer with less than one feddan and with only one head of livestock is to provide more fodder feeds to his animal so as to raise milk production. Each of these three hypotheses has different policy dimensions.

## Summary and Conclusion

The success or failure of livestock development programs depends upon the ability of the program to influence farmers' decisions on investment in livestock activities. While some studies are available on farmers' investment pattern in agriculture, very few have analyzed the investment pattern in livestock. This study make an attempt to

Table 10: Distribution of households according to total operating area and proportion of the area under fodder crpos

| Total operating area | Proportion of the area under fodder crops of | | | | | Avr.% of the area under fodder crops |
|---|---|---|---|---|---|---|
| | none | less $\frac{1}{3}$ than | $\frac{1}{3}$ - $\frac{1}{2}$ | $\frac{1}{2}$ & above | Total | |
| less 1-feddan | 5 | - | 3 | 11 | 19 | 55.11 % |
| 1 to 3-feddans | 5 | 11 | 11 | 11 | 38 | 37.13 % |
| 3 to less 5 feddans | 1 | 7 | 13 | 2 | 23 | 33.91 % |
| 5 to less 10 feddans | - | - | 2 | 2 | 20 | 27.01 % |
| 10 feddans & above | - | 11 | 11 | 4 | - | 28.47 % |

Table 11: Chi-Square test statistic for A Null Hypothesis of Independency between Socio-Economic Variables and investment decision in livestock.

| Null Hypothesis: Independency between the distribution of cattle and buffalo holding size (Head) &: | Calculated chi square | degrees of freedom | significance level | contingency coefficient | conclusion |
|---|---|---|---|---|---|
| 1- Education level of the head of the household | 30.78 | 16 | .02 | .450 | Not independ. |
| 2- Size of the household | 23.46 | 12 | .01 | .406 | Not independ. |
| 3- Age of the head of the household | 23.56 | 8 | .01 | .402 | Not independ. |
| 4- Occupation of the head of the household | 7.72 | 4 | .11 | .246 | Independent |
| 5- Number of the children members of the household. | 20.03 | 12 | .08 | .376 | Doughtful |
| 6- Number of the adult females of the household. | 7.69 | 8 | .45 | .244 | Independent |
| 7- Members of the household sharing in farm work | 28.80 | 12 | .03 | .4385 | Not independ. |
| 8- Land holding size | 53.36 | 16 | .01 | .563 | Not independ. |
| 9- % of area occupied by fodder crops | 16.60 | 12 | .15 | .355 | Independent |

identify the factors influencing the farmers' decisions on investment in livestock on traditional farms. The empirical analysis of this study is based on a sample of 123 farmers selected from Sharkia governorate. These farmers belonged to four villages and were selected from each village on basis of a stratified random sampling procedure, using a purposive sampling survey.

The number of cattle and buffalo owned by farmers was not independent of the structural economic variables: these were the total operating area, the availability of household labor and household consumption requirements, and, in terms of size of the household, the number of children in the household and the number of household members who share in the farm work.

The cropping pattern, in terms of the proportion of total operating area fodder crops and the number of livestock head per household, indicates that there are either economies of scale in utilization of the fodder area or that the larger farms with larger livestock holdings reduce the proportion of home produced feed. This indicates that to emphasize investment in livestock by larger farms may save some berseem for alternative uses. Or it could raise the demand for off-farm feed. The policy implications are incomplete without analysis of returns to livestock among herd size classes.

Some social variables were also identified as factors affecting decisions on investment in livestock. It was demonstrated that heads of household with higher education level and younger age had more

livestock. The number of adult females in the household and off farm employment were independent of livestock investment. Contingency coefficients of each relationship indicate that the magnitudes of the influences of socio-economic variables on farmers decisions on investment in cattle and buffalo were as follows: operating area (56%); education level (45%); (households) members who share in farm work (44%); size of the household (41%), age of head of the household (40%); number of children with a household (38%).

## References

1- Nadal, D.S. "Patterns of Income, Investment, Expenditure and Savings of Demonstration Farms in Haryana," Indian Journal of Agricultural Economics, 27 (4), P.11-19, (1972).

2- Kahlor A.S. et al:"Savings and Investment Pattern of Farm Families in the Punjab,"Indian Journal of Agricultural Economics, 27 (4), (1972).

3- Pant, S.P. & S.V. Karanjkar:"Economics of Dairy Enterprise in Jabal-pur with special Reference to the Scale of Enterprise,"Indian Journal of Agricultural Economics, 20 pp.116-121, (1965).

4- George P.S. & S.N. Chokshi:"Dairy Development Decisions at Farm Level, Center for Manegement in Agriculture," Indian Institute of Management, Ahmedahad Jan., (1977).