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SMALL RUMINANT PRODUCTION ON SMALL
FARMS IN WEST JAVA, INDONESIA:
PRELIMINARY RESULTS OF A BASELINE SURVEY
OF UPLAND AND LOWLAND FARMING SYSTEMS

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PREFACE

This report represents one of the first collaborative efforts between the Small Ruminant CRSP and the Animal Research Institute (BPT-Bogor) in Indonesia. The objectives of the survey reported in this paper are threefold. First, the survey work was the final phase of a training program initiated during June - August, 1980. The training program was an orientation to small ruminant production and research techniques with an emphasis on collaborative research with small farmers. Second, the survey was needed to provide basic socio-economic data needed to allow an understanding of farmers conditions and operating constraints. Finally, the results were to be of value in the formulation of appropriate biological research programs at the BPT Research Stations and at the farm level.

The survey was a joint activity between the Indonesian Central Research Institute for Animal Sciences, the Animal Research Institute (BPT), the West Java Provincial Government, and the Small Ruminants Collaborative Research Support Program in Indonesia. The University of Missouri (Rural Sociology) also participated in this work; their work is reported elsewhere. The work reported here is a joint effort between the SR-CRSP Socio-Economic Program and the BPT Farming Systems Program.

The authors gratefully acknowledge the assistance of Dr. Mike Nolan, University of Missouri (Principal Investigator of the Rural Sociology project of the SR-CRSP), and Mr. Kedi Suradisastra of BPT-Bogor both of whom participated in the design and execution of the survey. Dr. Rustandi, then Director of Lembaga Penelitian Peternaken (now BPT-Bogor) helped with the administrative arrangements needed to establish the SR-CRSP in Indonesia. Henk Knipscheer assisted with preparation of an earlier draft of this paper. Dr. Ernesto Lucas of AID/Jakarta provided administrative support which was critical to establishment of the research program. Special appreciation is expressed to the participating Indonesian farmers who gave freely of their time to assist our research.

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1. INTRODUCTION

Indonesian small ruminant development depends largely upon diversified small farming systems. Approximately 80% of the Indonesian small ruminant population of 8.4 million is found on Java, a densely populated island where small farms predominate. According to the Central Bureau of Statistic (BPS, 1973) survey in 1973, there were 2.6 million households involved in small ruminant production of which 45% were on Java. The households were engaged mainly in subsistence or semi-subsistence farming. However, even within Java, substantial diversity of agro-climatic conditions leads to differences in the cropping patterns which results in a wide range of feedstuffs available for small ruminants (Tillman, 1981). This creates diversified systems of small ruminant keeping. Village socioeconomic conditions also differ from region to region, but the farming systems in all areas share common problems of small farm size and low levels of capital assets. The objective of this paper is to characterize selected small ruminant production systems and their economic role on small farms in several major agro-climatic areas of West Java. This stage of the research process is necessary for farming systems research (Norman, 1978) and is critical in research orientation in a multidisciplinary project such as the Small Ruminant CRSP in Indonesia.

The thrust of the paper concerns the resource base available to the target population of farmers and its utilization for small ruminant production. First, a comparative analysis of family labor use is carried out followed by the patterns of capital investment. The third section examines the land tenure situation and farm size distribution. The paper concludes by examining the feed and animal resources of the survey areas. Data were collected in early 1981 as part of the SR CRSP-BPT baseline survey of selected villages of West Java, Indonesia.

2. METHODOLOGY

The research was carried out in two distinct locations, an upland ecozone (Garut) and a lowland ecozone (Cirebon), both of which are representative of large areas within West Java. Two villages were selected per location.

A preinventory of all sheep and goat farmers in each location was conducted to determine the distribution of farmers in terms of land and livestock holdings. Based on this data, farms were stratified based on land holdings. Samples were then drawn from each stratum. Sample size was proportional to the variance of livestock units per stratum (Cochran, 1977). Random selection from the total population of sheep and goat holders was then carried out until each stratum was filled. A total of 100 farmers in Cirebon and 145 farmers in Garut were selected (Table 2.1). The different strata are respectively labeled "landless", "subsistence", "small holders", "medium holders", and "large holders."

Table 2.1. Number of Farmers Selected for Interview.

Land Holdings By Strata (m ²)	From Classification Based On Land Holdings	Cirebon (lowland)	Garut (upland)
0 - 200:	Landless	19	10
201 - 1500:	Subsistence	30	21
1501 - 3000:	Small Holder	2	37
3001 - 10000:	Medium Holder	35	71
> 10000:	Large Holder	14	6
TOTAL		100	145

3. RESULTS

3.1. Labor Use

The primary source of labor for the livestock holders is the family. Average family size among small ruminant holders in the Cirebon region is higher than in the Garut region with average family size of 4.45 and 3.52 persons, respectively. The majority of family members are less than 18 years of age while the age of most family heads is between 40 and 60 years. In Garut the family head performed the bulk of the activities such as tending the animals, collecting feed, feeding, bathing, and watering the animals. Sons are the main helpers (Table 3.1). In Cirebon, labor inputs by the father and the sons were about the same. The family head, however, is the principal decision maker with respect to small ruminants. Women occasionally help feed the animals in both locations while in the Cirebon location they often help with watering as well as feeding.

3.2. Land Holdings

Farm sizes of the small ruminant holders are very small, averaging 0.29 ha in both locations. Excluding the landless strata, these average farm sizes were 0.36 ha in Cirebon and 0.31 ha in Garut. Average land held per stratum is shown in Table 3.2. This table also indicates that smallholders and subsistence farms have very limited access to rental land in the Cirebon area. In the Garut region, however, additional land is often available by rent or contract (sharecropping). Of the total respondents interviewed, only 3% of the Cirebon producers and 6% of the Garut producers were classified as landless. Wide differences in the percentage of respondents who leased or rented out their lands across

Table 3.1. Frequency Distribution of Family Members Performing Selected Small Ruminant Production Tasks (%).

Family Labor Source	Tending Animal		Feed Collecting		Animal Feeding		Water Animal		Bathe Animal	
	Cirebon	Garut	Cirebon	Garut	Cirebon	Garut	Cirebon	Garut	Cirebon	Garut
Husband	78.34	12.50	57.80	51.97	58.97	58.86	83.58	41.60	68.99	48.79
Wife	1.11	9.29	5.44	12.40	10.27	10.80	0.90	18.97	0.89	9.68
Son	16.39	69.47	24.39	35.63	19.21	30.34	15.52	39.43	22.18	41.53
Daughter	4.16	0	2.85	0	2.00	0	0	0	0	0
Others	0	8.74	0.52	0	9.55	0	0	0	7.94	0
TOTAL	100	100	100	100	100	100	100	100	100	100

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locations were apparent with 5.3% of the Cirebon farmers in this category compared to 26.7% in Garut.

Average land values were reported to be higher in the Garut region than in the Cirebon region. This is probably related to the dominance of rainfed wet rice in Cirebon compared to the profitable cultivation of fruit tree crops (citrus) in the Garut uplands. Average values/ha were 8.1 million Rp/ha¹ in Garut and 7.1 million Rp/ha in Cirebon. Excluding the values from the landless strata,² the differences in land values between the regions becomes more pronounced with average land values of 7.9 million Rp/ha in Garut and 4.3 million Rp/ha in the Cirebon region.

Table 3.3 indicates the importance of goat and sheep for smallholders, subsistence and landless farmers. Slightly over one-half of animal units held as small ruminants fall in these strata. However, the most important single strata is the medium size farm with average small ruminant animal units/household of 0.48 in Cirebon and 0.57 in Garut.

3.3. Capital

An examination of the capital structure gives information on the level of investment in the production process. The two major assets, estimated on a current value basis, are land and housing (Table 3.4). The pattern of distribution of these two assets across strata in each location showed wide differences. On the average, the proportion invested in land was smaller in Cirebon (41%) than in Garut (62%). This is probably related to the difference in land values between the two regions as mentioned earlier. Investments in agricultural equipment and livestock were relatively very small if compared to those of land and house.

Most small farmers need credit to support small ruminant production activities. Even though the majority of small ruminant farmers owned the animals, the use of credit and sharing arrangement was dominant in the lower strata (Table 3.3). The majority of the farmers do not use formal banking institutions because they do not have adequate security to secure the loan.

3.4. Water and Feed Resources

Nearly all farmers surveyed (95% in both regions) obtain their water from a well next to their house. It is generally the responsibility of women to fetch water two to three times daily. Feed is obtained primar-

¹Rp 623 = US\$1.00.

²Landless was a category of producers who actually owned a house and the household land but did not own any agricultural land.

Table 3.2. Average Size of Land Owned and Farmed by Holders of Small Ruminants by Location (ha).

Strata	Cirebon			Garut		
	Owned	Farmed	N	Owned	Farmed	N
Landless	0.01	0.01	19	0.01	0.01	10
Subsistence	0.04	0.04	30	0.06	0.11	21
Small Holder	0.21	0.21	2	0.16	0.21	37
Medium Holder	0.34	0.55	35	0.38	0.53	71
Large Holder	1.12	1.92	14	1.33	1.67	6
Weighted Average	0.29	0.48		0.29	0.40	

Table 3.3. Small Ruminant Ownership by Farm Size Strata.

Farm Size Strata	Owned (%)		Combination of* Own and Share (%)		Share (%)		Average Animal Units Held as Small Ruminants Per Household (a.u.)	
	Cirebon	Garut	Cirebon	Garut	Cirebon	Garut	Cirebon	Garut
Landless	46.74	30.00	20.11	60.00	33.15	10.00	0.33	0.43
Subsistence	27.79	19.05	51.95	42.86	20.26	38.10	0.47	0.43
Small Holder	42.86	70.27	57.14	24.32	0	5.41	0.14	0.40
Medium Holder	45.70	78.57	45.25	10.00	9.05	11.43	0.48	0.57
Large Holder	95.57	100	0	0	2.43	0	0.34	1.03

*Some farmers' animals are owned and some are produced on shares.

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Table 3.4. Distribution of Assets by Investment Category.

Treatment	Agricultural and Livestock Equipment (%)		House and Utensils (%)		Small Ruminants (%)		Land (%)		Average Value of All Agricultural Assets (Rp)	
	Cirebon	Garut	Cirebon	Garut	Cirebon	Garut	Cirebon	Garut	Cirebon	Garut
Landless	5.94	13.78	61.45	54.99	2.94	11.20	29.67	20.03	708,314	316,91
Subsistence	3.36	4.02	62.28	33.43	2.24	2.26	32.12	60.29	930,160	932,47
Small Holder	4.22	3.06	44.55	30.42	5.56	2.68	45.67	63.84	720,425	1,565,38
Medium Holder	0.77	1.81	36.50	19.84	1.43	1.36	61.30	76.99	1,702,970	4,157,90
Large Holder	0.88	1.25	60.06	8.68	1.62	0.50	37.44	89.57	2,406,035	9,324,40
Weighted Average	2.6	3.3	52.4	26.5	2.1	2.5	42.8	67.8		

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ily by cut and carry systems. Occasional grazing is much more common in the lowland area (Cirebon) where sheep are allowed to graze the dry paddy fields (Table 3.5). This opportunity occurs more often during the dry season than during the wet season.

Another important difference between the two regions is found in the sources of feed. Table 3.6 shows that the main source of fodder in the

Table 3.5. Distribution of Farmers According to Seasonal Types of Small Ruminant Management.

	Garut	Cirebon
<u>Full Confinement</u>		
Dry season	88	78
Wet season	99	70
<u>Grazing/Partial Confinement</u>		
Dry season	12	22
Wet season	1	30

Garut area is the farmer's own land while in the Cirebon region it is public land. In both locations native grasses are by far the most important feed source. Table 3.7 indicates that the categories of feed are more diverse in the upland region than in the lowland region.

3.5. Animal Resources

This section does not pretend to fully describe the animal resources found in these villages. Instead, it focuses on a few traits of sheep and goats that were measurable during the baseline survey. The Garut location has almost no goats so comparison for goats between the highland and lowland sites was not possible. Data was obtained by weighings and grouping the weighed animals into age categories. The estimated growth curve of sheep in the two locations is shown in Figures 3.1 and 3.2 while the growth curve for Cirebon goats are shown in Figure 3.3. The growth curve shows a more rapid increase in bodyweight for the upland area (Garut) than in the lowland area (Cirebon). The more intensive management practice in Garut (no grazing) and the more diverse diet (see above) are among the possible explanations of this difference. A third reason might be a breed difference. In the Garut area, the main breed is the Priangan while in the coastal area the Javanese thin-tail is the dominant breed. Hardjosubroto and Astuti (1979) report a difference in weight between these two breeds of about 5 kg (30 kg for mature female thin-tails versus 35 kg for a mature female Priangan). The weighing data from the survey indicated an even larger breed difference

Table 3.6. Sources of Fodder (%).

Strata	Purchase Fodder		Cut From Own Land		Cut from Public Land or Other Farmer's Land		Barter		Total	
	Cirebon	Garut	Cirebon	Garut	Cirebon	Garut	Cirebon	Garut	Cirebon	Garut
Landless	--	--	--	64	84	36	16	--	100	100
Subsistence	3	--	9	65	67	32	21	3	100	100
Small Holder	--	--	33	70	67	30	--	--	100	100
Medium Holder	4	--	18	70	64	30	14	--	100	100
Large Holder	17	--	17	75	50	25	16	--	100	100

Table 3.7. Percentage of Farmers Using Different Types of Fodder

Fodder Type	Cirebon	Garut
1. Native Grasses	86	100
2. Banana Leaves	--	72
3. Cassava Leaves	3	22
4. Corn Tops	2	70
5. Legume Straw	1	32
6. Jackfruit Leaves	--	10
7. Rice Straw	--	13
8. Sweet Potato Leaves	--	3
9. <u>Sesbania</u> sp.	20	--
10. <u>Leucaena</u> sp.	1	1
11. <u>Elephant</u> Grass	--	1

of about 8 kg based on the estimated mature animal sizes of 17 kg for mature Javanese thin-tailed and 25 kg for mature Priangan sheep. At this stage, it is impossible to separate the sources of variation in size due to breed, nutrition, environment and management. However, the general nutritional status at the lowland site tended to be lower since a large proportion of feed intake was from poor quality grazing on rice stubble. The goats at Cirebon, on the other hand, were almost never grazed and received a wide variety of crop by-products and this may be a reason why they were considerably larger than the sheep in this village.

4. SUMMARY AND CONCLUSIONS

Preliminary results of the baseline survey indicated that small ruminants are an important part of the small farm system within the survey areas of West Java. Farm sizes are very small and this limited resource base plays an important role in limiting the numbers of small ruminants held per household. Intensive use of land limits access for grazing although farmers at the lowland site in Cirebon make some use of temporary grazing of sheep on rainfed rice stubble. Even if the feed resource base could be expanded, the farm size constrains the ability of the farm families to generate the savings needed to purchase additional animals. This is reflected in the high incidence of animal sharing arrangements, particularly among the lower three stratum. Therefore, simultaneous solution of production constraints will need to focus not only on biological variables but also on factors external to the farm such as credit and institutional arrangements for ownership and control of small ruminants.

The collaborative efforts between the SR-CRSP and the Central Research Institute for Animal Sciences focus on improving productivity of small-holder sheep and goat populations. The operational approach to carrying out this objective is multidisciplinary in nature and is best characterized as farming systems research. This approach is used because of the integral part that small ruminants play within the mix of activities that comprise the Indonesian farm-household-village complex.

The farming system research approach generally consists of four successive research stages--descriptive (diagnostic), design, testing, and technology transfer (Norman 1978). This paper represents a preliminary report on the descriptive phase. Work is continuing on the analysis of the baseline survey data to permit further diagnosis of constraints acting upon the farm as a unit and upon the small ruminant sector in particular. Specific problems at each stage of the production process are being identified through an ongoing monitoring program which is amassing data on animal performance, health problems, feeding practices, feed quality, and economics.

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Figure 3.1. Mean live weights of Garut location sheep (average weights per age category) and estimated age-weight relationship.

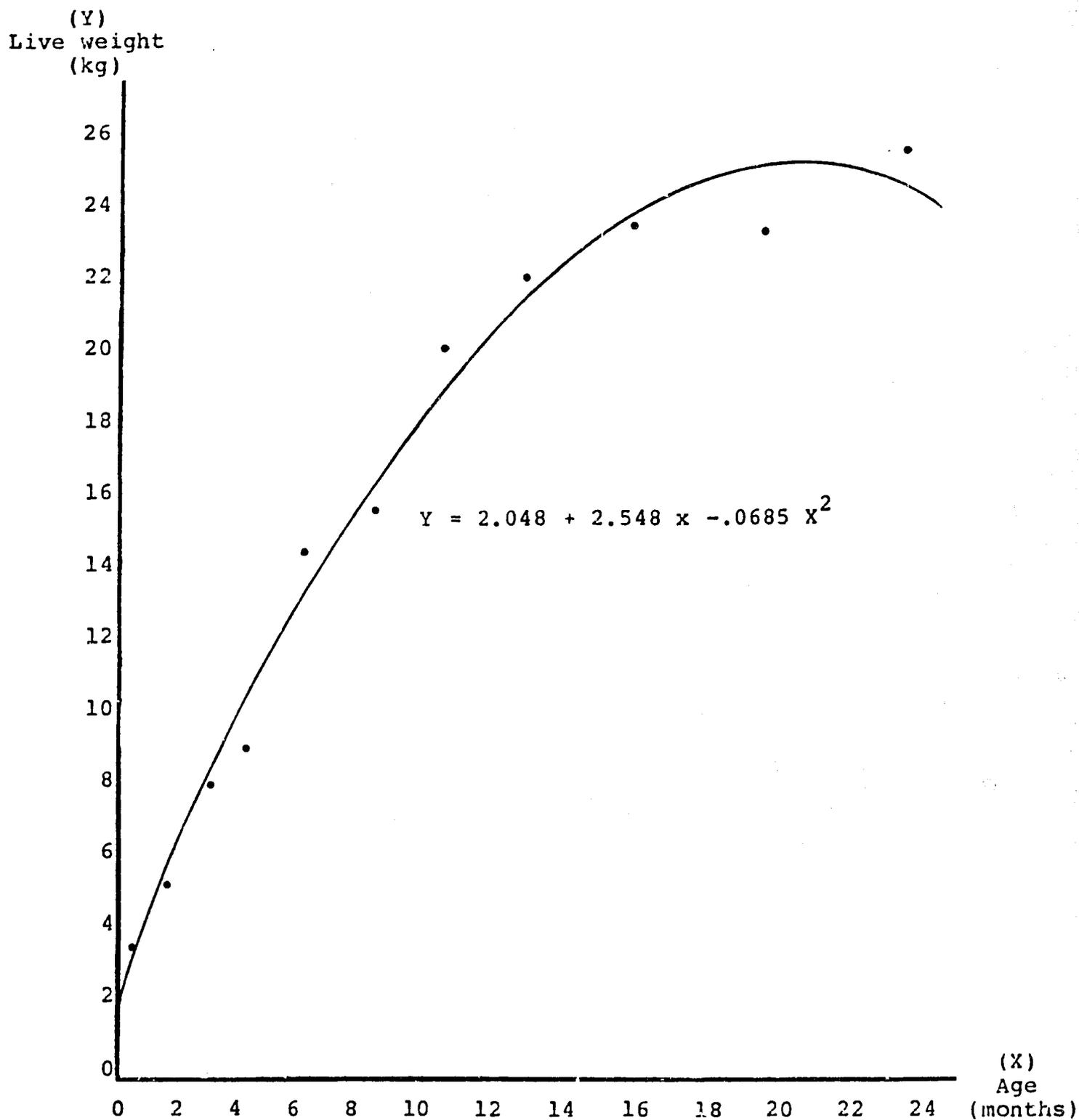


Figure 3.2. Mean live weights of Cirebon location sheep (average weights per age category) and estimated age-weight relationship.

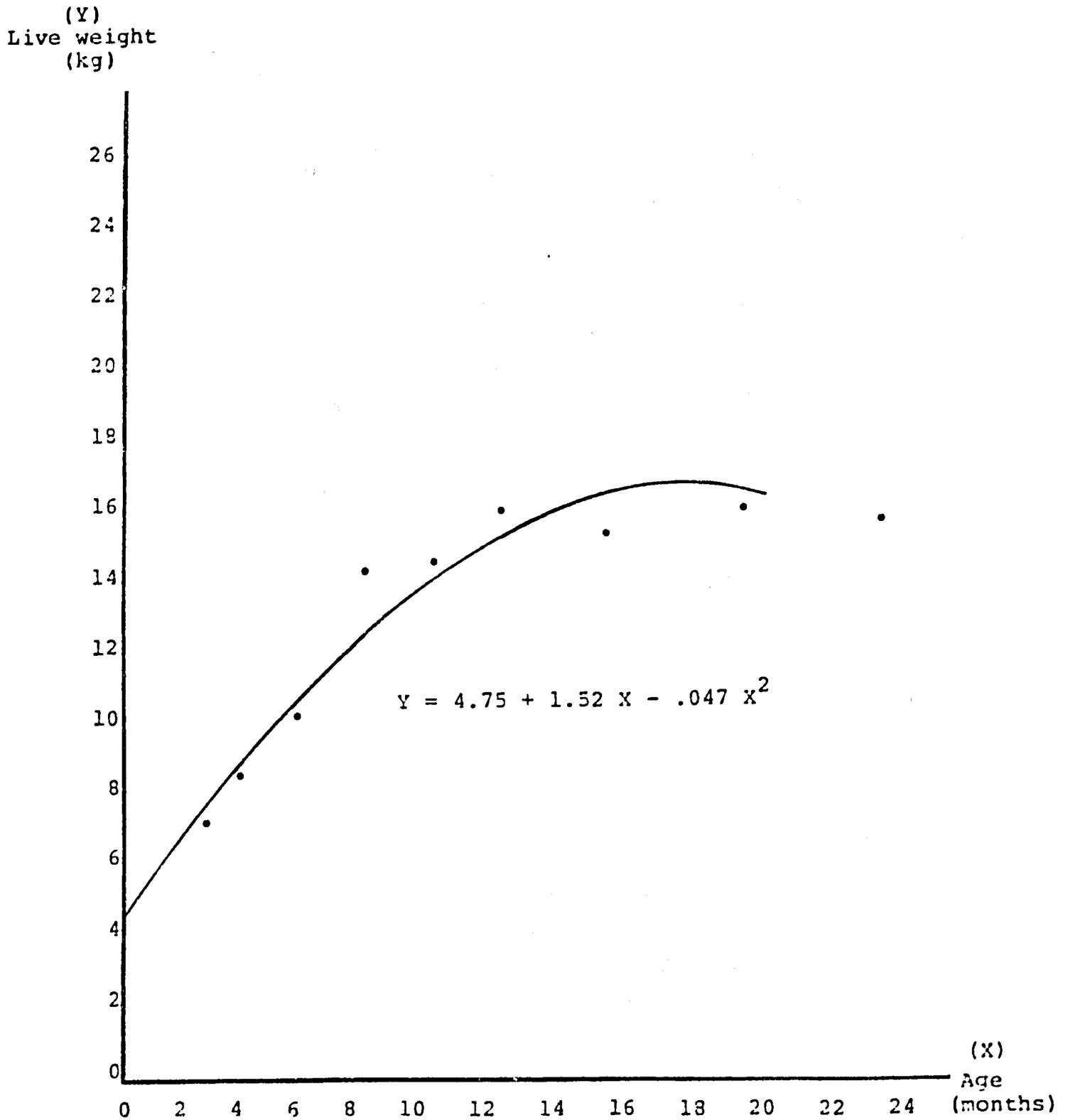


Figure 3.3. Mean live weights of Cirebon location goats (average weights per age category) and estimated age-weight relationship.

