

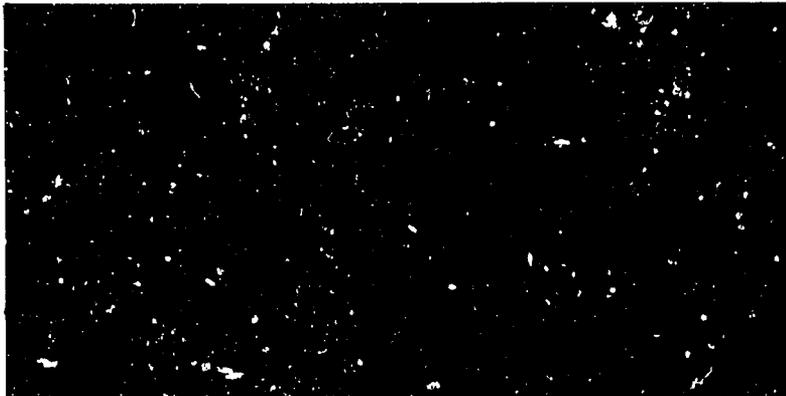
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THE PRODUCTIVITY OF SMALL RUMINANTS
IN WEST JAVANESE FARMING SYSTEMS

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PREFACE

This report is based on the results of survey work carried out in West Java, Indonesia in late 1981. The purpose of the study was to collect information about the productivity of small ruminants under village conditions to serve as a guide for identification of productivity problems and the orientation for the biological research programs which were being formulated at that time. The study used rapid assessment methods which focused specifically on productivity levels of small ruminants using villager recall of monthly animal inventories, inventory changes and acquisition plus disposal of animals.

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 work reported here is carried out by the SR-CRSP Socio-Economics Program with cooperation from the BPT Farming Systems Program.

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1. INTRODUCTION

Although there is a growing knowledge about the productivity of small ruminants on Java under research station conditions (Obst, et al. 1980) and under controlled village conditions (Winantea et al., 1981), there is a lack of information about the productivity of sheep and goats under smallholder conditions. In cropping systems research, where the farming systems research approach has been practiced, it is known that a large gap exists between productivity levels found under experiment station conditions and those found under local farming conditions. Our interest was in estimating these productivity "gaps" as they apply to small ruminants and in examining these gaps in terms of the small ruminant producer. In addition, there is an urgent need to estimate village productivity parameters for small ruminants since a number of development projects that include an important sheep and/or goat component are already in progress.

This paper presents the partial findings of a small ruminant farming systems survey conducted by the socio-economic component of the Small Ruminant-Collaborative Research Support Program (SR-CRSP) project at the Animal Research Institute (BPT) in Bogor, Indonesia.

2. RESEARCH METHODS

The objective of the study was the rapid assessment of the productivity of small ruminants in West Java. Therefore, a one-visit survey was carried out at three locations in West Java: One upland location (Garut), one lowland location (Cirebon), and one upland rubber estate location (Ciburuy, near Bogor).

Sheep and goats are an important capital asset of the farmers in West Java. It was therefore possible to use a recall procedure during the survey. The farmers were asked to report the monthly changes in the size and the composition of their flocks during the one year period preceding the interview (October 1980 - October 1981). This recall method proved to be generally satisfactory.

In preparation of the survey, a preliminary inventory of all sheep and goat farmers in each location was conducted. On the basis of their land holdings, farmers were stratified as follows:

1. Landless 0 - 0.02 ha
2. Subsistence 0.02 - 0.15 ha
3. Smallholder 0.15 - 0.30 ha
4. Mediumholder 0.30 - 1.00 ha
5. Largeholders larger than 1.0 ha

As the number of participating farmers in Cirebon and Ciburuy decreased during successive surveys, the number of farmers per strata in these locations became too small for meaningful conclusions. The detailed results are reported in Appendix Tables I-IV. Appendix I gives summary data on birth rates, lamb mortality, female adult mortality, stocking rates, flock composition, selling rates, and buying rates. Appendix II presents the data for animal categories including adult males (AM), adult females (AF), young males (YM), young females (YF), and lambs (L) or kids (K). Appendix III gives the summary of the economic returns per farm size strata and per animal category. Appendix IV summarizes the animal flows by category and the average period of use by animal category.

A complication during the analysis resulted from the initiation of animal dropping schemes in the Cirebon and Garut locations during the survey recall period. Dropping of sheep and goats (provision of animals on credit) occurred during April and August 1981 in Cirebon and during August 1981 in Garut. The strong effect of inventory changes makes the interpretation of the survey results somewhat difficult. On the other hand, some of the immediate impact of the dropping schemes were observed.

3. RESULTS

3.1. Physical Environment

Environmental parameters that characterize each of the three locations are presented in Table 3.1. In the lowland area, two villages in the District of Cirebon (Kabupaten Cirebon), Purwanangan and Kertasura were surveyed. In the upland District of Garut (Kabupaten Garut) the two villages selected were Tenjonagara and Sindangratu. In the District of Bogor (Kabupaten Bogor), the survey was conducted in one village, Ciburuy, on the border of a rubber plantation.

Lowland farming is typically rice-based, where paddy bunds provide an important feed source. As shown in Table 1, the village in the Cirebon area contains some public pastures. They are located along the seashore between fish ponds. Animals are also grazed on rice fields during the period between harvest and the land preparation for the next crop (Mawi, forthcoming).

Garut, on the other hand, is an area where secondary crops (palawija) such as maize, several varieties of beans, and tree crops are important. The crop residues are also an important feed source for small ruminants (Ashari et al., 1982). It is generally believed that rubber estates provide a good base for ruminant production as understory forages are usually abundant. Sheep and goats are often kept by rubber estate employees who benefit from easy access to this feed source.

Table 3.1. Environment and Land Use Parameters of Three Locations in West Java.

	Cirebon	Ciburuy	Garut
elevation (m)	0-4	450	600-700
topography	level	undulating	hilly
soil texture	silt loam	n.a.	sandy
rainfall (mm/yr)	1,128	4,500	2,000
average temp (°C)	28	23	25
cultivated land (ha)	811	n.a.	1,495
uncultivated land (ha)	269	n.a.	679
rainfed rice fields (ha)	755	127	259
dry land (ha)	56	13	1,236
estate (ha)	0	46	0
communal pasture (ha)	14	16	0
forest (ha)	0	0	433

n.a. - not available at time of survey.

Source: SR CRSP-BPT Survey.

The three locations thus cover a substantial diversity of farming systems. The small size of the farms and the low level of capital assets is a common feature of all villages, however.

3.2. Reproduction Rates

Reproduction rates are presented in Table 3.2. These indicate a high variability in average birth rate (number of lambs/kids per adult female per year).

Obst, et al., (1980) have shown that the reproduction potential for Javanese Thin-Tail Sheep under research station environments is slightly over 3 lambs per ewe per year. A high lamb mortality during the experiment reduced this ratio to only 2 preweaned lambs per ewe per year. In view of these results, the reproduction rate for sheep in Ciburuy is excellent. Sheep reproduction rates in Garut and Cirebon confirm findings by the previous Center for Animal Research and Development, (PPT, presently BPT-Ciawi) showing 0.8 weaned lambs per ewe (Annual Report, 1979).

Annual goat reproduction rates at the same research institution reached 2.03 (Berita PPPT, 1979). The 1967 census data for goats presented by Kartadihardja (1979) shows an average village reproduction rate of 1.14 kids per year. In the light of these two findings, the reproduction rates for goats in Cirebon and Ciburuy are quite good.

Table 3.2. Production Parameters at Three Locations in West Java.

	N (farmers)	Birth rate (lambs or kids/female adult/yr)	Lamb/kid mortality (%)	Female adult mortality (%)	Stocking rates*				
					AM	AF	YM	YF	K/L
Cirebon (sheep)	30	0.97	13	12	0.18	3.33	0.32	0.62	0.83
(goats)	49	1.50	12	7	0.20	1.70	0.20	0.40	0.50
Ciburuy (sheep)	33	2.09	10	4	0.38	2.55	0.64	0.88	1.22
(goats)	30	1.66	10	1	0.34	2.48	0.36	0.86	1.20
Garut (sheep)	135	0.96	10	2.5	0.37	2.07	0.37	0.58	0.74

*AM = adult male YM = young male K/L = kid or lamb
 AF = adult female YF = young female Stocking rate = number of animals per category per farmer.

Table 3.3. Flock Composition Ratios at Three Locations in West Java.

	N (farmers)	Flock composition			
		AM/AF	YM/AF	YF/AF	L or K/AF
Cirebon (sheep)	30	0.06	0.10	0.19	0.25
(goats)	49	0.14	0.12	0.26	0.28
Ciburuy (sheep)	33	0.15	0.25	0.34	0.48
(goats)	30	0.14	0.14	0.35	0.48
Garut (sheep)	135	0.18	0.18	0.28	0.36

Table 3.4. Average Sales Price (Rp/head) at Three Locations in West Java.

	Adult males		Adult females		Young males		Young females		Lambs/kids	
	n*	price	n*	price	n*	price	n*	price	n*	price
Cirebon (sheep)	8	19,500	11	16,000	3	14,700	3	12,300	4	6,250
(goats)	14	29,800	28	27,500	10	15,000	20	17,400	4	6,250
Ciburuy (sheep)	4	23,000	31	17,400	14	15,400	31	11,200	15	8,800
(goats)	7	22,100	14	20,900	9	15,200	25	12,500	11	7,200
Garut (sheep)	46	34,800	93	27,700	40	19,800	49	19,000	50	6,800

*n = number of observations.

Estimates of litter size were not recorded in this survey. In the SR-CRSP baseline survey (1982) it was found that the average litter size for sheep in Cirebon, Ciburuy and Garut was respectively 1.28, 1.74, and 1.69. Under intensive research station management, Obst, et al., (1980) obtained 1.7 lambs per parturition. These findings confirm that, particularly in Garut, a major reason for the low reproduction rate is due to the low number of parturitions per ewe per year rather than litter size.

This survey showed that 24% of the farmers in Garut, representing 22% of the surveyed ewes, did not report any lambing at all during the entire recall period. Kartadihardja (1979) presents 1967 livestock census data indicating that 24% of the female adult flock in Indonesia did not give birth during the census year. It is not yet known if this is a result of inherent infertility or of breeding management by farmers. The stocking rates in Table 3.2 indicate that most farmers do not have their own rams/bucks. The Cirebon sheep, which are grazed, are the only group where mating occurs freely. For all the other animals, mating is arranged by the farmer. Preliminary data from the village monitoring survey (September 1981 - February 1982) indicates that as high as 60% of the ewes did not give birth during this six month period. Therefore, reproduction management and assessment of the reasons why farmers appear to place little emphasis on high reproduction stand out as critical research questions for the cooperative program.

Mortality rates for lambs and adult female sheep are highest in Cirebon. This may be caused by the extensive system of sheep grazing. Goats in Cirebon, which are kept confined in pens and hand fed (cut and carry system), exhibit lower mortality rates. However, goats as well as sheep in Cirebon show higher mortality rates than in the other two locations. As the loss of adult females is particularly detrimental to the profitability of the small ruminant enterprise, the cause of these higher mortality rate in lowland locations needs investigation.

A drawback of the questionnaire was the absence of a specific question concerning the number of aborted and still-born lambs/kids. In view of some of the low lambing/kidding rates reported, it is suspected that some farmers might not have reported lambs/kids that were still-born or died immediately after birth.

3.3. Herd Size and Structure

Average stocking rates (animals/farmer) do not differ much from location to location. The one noteworthy difference is the larger sheep numbers per producer in Cirebon, which is again due to the more extensive grazing system practiced at that location. Flock size is not strongly correlated with farm size strata. Only in Cirebon is there a correlation between land holdings and herd size. Farmers in the lowest two strata (less than 0.15 ha) have fewer sheep than more affluent farmers (more than 0.3 ha).

From the flock figures in Table 3.3 the relative composition of adult males, adult females, and young stock can be derived:

Cirebon	(sheep)	4% males, 62% females, 34% young stock
	(goats)	8% males, 55% females, 37% young stock
Ciburuy	(sheep)	7% males, 45% females, 48% young stock
	(goats)	7% males, 47% females, 45% young stock
Garut	(sheep)	9% males, 50% females, 41% young stock

As expected, the young stock/female ratio is a reflection of the reproduction rate of each of the categories. The relative low percentage of young stock for Cirebon goats (in view of the 1.50 birth rate) is explained by the high disposal rate of kids in Cirebon (selling and sharing-out, see Appendix II).

The herd structure data for Ciburuy are nearly identical to those found in a rubber plantation study in Malaysia (Peters et al., 1979) which found a young stock/adult female ratio of 1.07, compared with 1.07 for Ciburuy sheep and 1.02 for Ciburuy goats.

The same study in Malaysia revealed an average of 14.6% adult males per village flock, which is about twice as high as the male stocking rates derived from this survey. In uncontrolled breeding one male can service up to 25 females (P.C.A.R.R., 1977); thus the Cirebon male stock might be optimal although under controlled mating conditions where a ram/buck is able to serve more females (P.C.A.R.R., 1977). This study finds that in the most intensive management system the male/female ratio seems to increase rather than decrease.

The optimal number and duration of use of rams/bucks is determined by two factors: one is the risk of inbreeding by using one male for a small flock for an extended period while the other is the cost of maintaining a stud. Strata data in all locations indicate that the number of males per flock increases in successive strata, indicating that the cost of maintaining studs is carried by medium and large farmers. This aspect of breeding management also requires further research.

The flock composition table should be interpreted with some care, as the classification of young and adult stock has been done without recourse to accurate animal ages. The herd structure is therefore dependent on the age classes as perceived by the farmers and as interpreted by enumerators. For example, Appendix IV shows the average periods for which animals in different age categories are held by the farmers. For Cirebon sheep, the short period for which young stock are held is not caused by the disposal of lambs but mainly by the young age at which stock is considered adult. The result is visible in the average sales price for these animals (Table 3.4).

Average herd size in West Java seems to be about 5 animals. As the small ruminant population in West Java is estimated at slightly over 2.5 million, it is estimated that more than 0.5 million households raise sheep or goats.

3.4. Economic Contribution

The economic contribution of a herd/flock can be calculated by multiplying its physical production by the market value of the animals. Table 3.4 suggests differences in the physical condition of sheep between the locations. The sheep in Cirebon and Ciburuy belong to the same Javanese thin-tail breed. Tillman (1981) and Mason (1978) argue that the Priangan or Garut sheep also belong to this breed. However, in view of the slower pace by which young stock reach maturity (Appendix IV) and the higher weights for all young and mature animals (see higher market values in Table 3.4), this point can be argued. To determine the physical production, inventory changes and all acquisition or disposal channels must be accounted for.

In this study, six production parameters can be distinguished: net inventory change, selling rate, sharing-out rate, consumption rate, other disposal (barter, pay-back) rate, buying rate, and sharing-in rate. All rates are calculated in yearly number of animals acquired or disposed of per annual average herd/flock size. The sharing-out rate, for example, is the total number of animals that are distributed to other farmers under a sharing arrangement during the one year recall period, divided by the average (monthly) stock of this farmer. Barter and pay-back (of shared animals) are included in one "other disposal" rate which includes all animals disposed of in ways other than selling, sharing-out, or consumption. The sum of these parameters provides us with a production rate per class (Table 3.5).

The production rates are dependent on the reproduction rate of the flock, and the age at which animals are disposed of. For example, Garut and Cirebon sheep have the same birth rate. However, the offtake of the average young stock in Cirebon is much lower than that in Garut. This is caused not only by the higher lamb mortality in Cirebon, but also by the fact that Cirebon farmers sell their animals at a later age (higher offtake rates for adult animals). Inventory changes per age category (see Appendices II and IV) make further interpretation of the production rates per age class hazardous.

Production rates have an important impact on the gross income that a farmer derives from his flock. Average gross returns per average flock and per location are presented in Table 3.6. The value of manure production is not included in this analysis.

Table 3.5. Production Rates per Age Class at Three Locations in West Java.

Location		Age class					Average young stock
		AM	AF	YM	YF	L/K	
Cirebon	(sheep)	2.56	0.42	0.86	0.32	0.28	0.49
	(goats)	1.26	0.38	1.67	0.59	0.69	0.98
Ciburuy	(sheep)	0.55	0.17	1.04	1.54	1.44	1.34
	(goats)	0.59	0.25	0.65	0.93	1.06	0.88
Garut	(sheep)	0.65	0.33	0.37	0.57	1.03	0.66

Table 3.6. Annual Return (Rp*) to Small Ruminant Herd/Flocks in Three Locations in West Java.

Location		Return/farmer	Return/A.U.	Return/adult animal	Value per adult animal
Cirebon	(sheep)	39,302	46,900	11,200	16,000
	(goats)	36,547	77,760	19,240	27,500
Ciburuy	(sheep)	53,233	66,630	13,550	17,400
	(goats)	40,104	53,760	14,220	20,900
Garut	(sheep)	41,466	66,880	15,080	27,700

*1 US = Indonesian Rupiahs (Rp) 650.

Table 3.7. Contribution of Animals in Different Age Classes to the Total Return from Small Ruminants at Three Locations in West Java.

Location		Return/A.U.	% contribution to total return				
			MA	FA	YM	YF	L or K
Cirebon	(sheep)	46,900	23	57	10	6	4
	(goats)	77,760	21	48	14	11	6
Ciburuy	(sheep)	66,630	9	14	19	29	29
	(goats)	53,760	11	32	9	25	23
Garut	(sheep)	66,880	20	46	7	15	12

The average return per adult animal per location correlates with the value of the breeding stock. The gross return to invested capital in breeding stock is therefore relatively constant.

The shares of each of the animal age classes in total small ruminant income are quite different between locations. Young stock contribute about half of the farmer returns in the Ciburuy small ruminant enterprises. In Cirebon, this contribution is only about 20% for sheep and 30% for goats. In Garut, the young stock contributes only 34% of the total gross return (Table 3.7). The high income share of Ciburuy young stock is related to the high reproductive performance of the breeding stock. It implies that for this amount of income, relatively less labor is utilized as the animals are generally disposed of at a younger age.

3.5. Total Contribution of Small Ruminants to Farm Income

The average annual income in 1980 for farmers in the Garut area was estimated to be around Rp. 300,000 (U.S. \$460) per household, while in the Cirebon area the average annual family income was estimated to be Rp. 220,000 (U.S. \$338) per household (Van Santen, 1980). Gunawan et al. (1979) conducted a comprehensive study in the same eastern part of West Java, which includes Cirebon as well as Garut, and distinguished three income classes of farmers: destitute, poor, and non-poor farmers. In the lowland area, destitute farmers showed a yearly income that was 74% of the income of poor farmers and only 46% that of wealthier farmers. In the upland region, these figures were respectively 60% and 21%. By classifying Strata I and II as "destitute", Stratum III as "poor" and Strata IV and V as "non-poor", income shares of small ruminant production in total smallholder income can be estimated (for farmers who keep sheep and goats) using Van Santen's total income figures. Table 3.8 presents the estimated share of sheep and goat income in the total income of the lowland and upland small ruminant farming systems surveyed. As reference data for Ciburuy are not available, the analysis for that location is not yet possible.

Table 3.8 indicates the importance of small ruminants, especially for the lower income group, i.e., the landless and near landless of Stratum I and II. Note, however, that the income figures are derived for small ruminant holders only. As the percentage of farmers that keep sheep or goats is about twice as high in the upland areas as in the lowland area (about 60% versus 30%, Van Santen, 1980), the small ruminant share in total agricultural production is higher in the upland regions than in the lowland regions.

The important implication of this analysis is that small ruminants provide a vehicle to improve the income of poor and destitute farmers. Research in village small ruminant production will have a relatively

Table 3.8. Estimated Share of Small Ruminant (SR) Income to Total Income for Sheep and Goat Holders at Two Locations in West Java.

Location	N (farmers)	Estimated annual income/farm*	SR income	SR income as % of total income
<u>Cirebon (lowland)</u>				
Strata I + II	44	146,693	31,688	21.6
III	2	200,906	26,938	13.4
IV + V	33	318,899	43,038	13.5
Average	(79)	220,000	36,309	16.5
<u>Garut (upland)</u>				
Strata I + II	30	95,114	21,502	22.6
III	31	158,376	35,207	22.2
IV + V	74	442,391	45,692	10.3
Average	(135)	300,000	37,909	12.6

*Based on Van Santen's (1980) estimates and assumptions made in text.

larger impact on landless and subsistence farmers than on medium and large size farms. There is thus a strong social justification for the further allocation of resources for research on small ruminant production.

3.6. Sharing Arrangements

Sharing (gadohan) is common in all villages in Java, as well as on Sumatra (Mink, 1982). Animals are lent by owners to neighbors, relatives or friends in return for a share of the offspring. The specific conditions regarding the number of lambs/kids to be returned, and the time of payment differs from location to location. The extent of sharing is difficult to estimate, but certainly shared animals constitute an important part of the flock of landless and subsistence farmers (Sabrani et al., 1982). The higher sharing-in rates in Garut and Cirebon were caused by the distribution of adult animals by an external agency (BPT and SR-CRSP). In each location about 100 animals were dropped. As it is the objective of such schemes to increase the average flock per farmer, it is interesting to see how successful this dropping scheme has been.

In Cirebon, sharing-in rates and sharing-out rates are virtually equal, indicating that at least part of the received animals are shared "forward" to other farmers or existing animals are shared-out to other farmers when the distributed animals enter the herd/flock. Furthermore, the high selling rate for female adult goats (35%) indicates that certainly some of these animals are also sold. The total village sheep flock, however, has expanded by 35 animals (Appendix IV) indicating that only the sheep farmers have been able to absorb the additional animals distributed on their farms. This could be due to the extensive grazing system that may allow for some expansion in flock size. Further research seems warranted.

The adult female village flock size in Garut increased by only 28 head (Appendix IV), while the selling rate for adult females was as high as 46%. Such a high selling rate cannot be maintained over a longer period and is undoubtedly caused by farmers selling their own stock following receipt of the distributed animals.

4. CONCLUSIONS

The major findings of this study are: (a) there is a great variety of reproduction rates for Javanese small ruminants, especially sheep; (b) in view of reported litter sizes per location and calculated reproduction rates, long lambing intervals occur in Cirebon as well as in Garut; (c) the share of income from the sheep and goat enterprise in total farming systems income is higher as the farmers' resource base, espe-

cially land, becomes more limited; and (d) the impact of animal distribution schemes for confined small ruminants may be small.

Areas of further research include: (a) the causes for high mortality rates among grazing sheep in lowland areas, (b) the impact of farmers' breeding management on lambing rates and (c) the long-term impact of animal distribution schemes on smallholder herds/flocks, particularly where grazing areas are available.

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Appendix Table 1.1. Productivity Parameters by Farm Size Strata for Sheep in Cirebon.

Productivity Parameters	Farm Size Strata					
	I	II	III	IV	V	I-V
N (farmers)	5	11		11	3	30
birth rate (lambs/adults F)	1.75	1.02		0.70	1.37	0.97
lamb mortality (%)	21	6		12	25	13
female adult mortality (%)	12.5	6		15	17	12
<u>Stocking rates</u>						
male adults/farmer	0	0.15		0.3	0.3	0.18
female adults/farmer	1.6	3.0		4.3	3.9	3.33
young males/farmer	0.1	0.3		0.4	0.4	0.32
young females/farmer	0.4	0.6		0.8	0.3	0.62
lambs/farmer	0.5	0.9		0.9	1.0	0.83
<u>Flock composition</u>						
adult males/adult females	0	0.05		0.06	0.08	0.06
young males/adult females	0.05	0.1		0.1	0.1	0.10
young females/adult females	0.2	0.2		0.2	0.1	0.19
lambs/adult females	0.3	0.3		0.2	0.2	0.25
<u>Annual selling rate</u> (# sold per average flock size)						
adult males	--	1.9		1.4	2.0	1.64
adult females	0.5	0		0.15	0.17	0.13
young males	0	0.3		0.4	0	0.32
young females	0	0.1		0.2	0	0.16
lambs	1.5	0		0	0	0.16
<u>Annual buying rate</u> (# bought per average flock size)						
adult males	--	0		0	0	0
adult females	0	0.15		0.02	0	0.06
young males	0	0		0	0	0
young females	0	0		0	0	0
lambs	0	0		0	0	0

Source: SR CRSP-BPT Survey.

Appendix Table 1.2. Productivity Parameters by Farm Size Strata for Goats in Cirebon.

Productivity Parameters	Farm Size Strata					
	I	II	III	IV	V	I-V
N (farmers)	11	17	2	14	5	49
birth rate (kids/adult F)	1.5	1.2	1.3	1.6	2.0	1.5
kid mortality (%)	8	18	0	11	13	12
female adult mortality (%)	19	4	0	7	0	7
<u>Stocking rates</u>						
male adults/farmer	0.2	0.2	0	0.3	0.3	0.2
female adults/farmer	1.5	1.6	1.2	2.0	1.5	1.7
young males/farmer	0.2	0.2	0.2	0.2	0.1	0.2
young females/farmer	0.4	0.4	0.4	0.6	0.3	0.4
kids/farmer	0.4	0.3	0.2	0.8	0.5	0.5
<u>Herd composition</u>						
adult males/adult females	0.12	0.13	0	0.16	0.18	0.14
young males/adult females	0.16	0.13	0.13	0.11	0.08	0.12
young females/adult females	0.37	0.24	0.29	0.29	0.14	0.26
kids/adult females	0.37	0.18	0.17	0.38	0.34	0.28
<u>Annual selling rate</u> (# sold per average herd size)						
adult males	1.1	1.1	0	1.6	1.4	1.3
adult females	0.1	0.5	0	0.25	0.8	0.4
young males	0.4	0.5	2.9	1.3	1.7	1.0
young females	1.0	1.1	0	0.8	0.7	0.9
kids	0.5	0.2	0	0	0.4	0.2
<u>Annual buying rate</u> (# bought per average herd size)						
adult males	0	0.3	0	0	0	0.09
adult females	0	0	0	0	0.4	0.05
young males	0	0	0	0	0	0
young females	0	0.5	0	0.12	0	0.19
kids	0	0	0	0	0	0

Source: SR CRSP-BPT Survey.

Appendix Table 1.3. Productivity Parameters for Goats and Sheep in Ciburuy.

Productivity Parameters	Goats	Sheep
N (farmers)	30	33
birth rate (kids/adult F)	1.66	2.09
lamb/kid mortality (%)	10.4	10.0
female adult mortality (%)	4	1
<u>Stocking rates</u>		
adult male/farmer	0.34	0.38
adult female/farmer	2.48	2.55
young male/farmer	0.36	0.64
young females/farmer	0.86	0.88
lamb or kids/farmer	1.20	1.22
<u>Herd/Flock composition</u>		
adult male/adult female	0.14	0.15
young male/adult female	0.14	0.25
young female/adult female	0.35	0.34
lamb or kids/adult females	0.48	0.48
<u>Annual selling rate</u> (# sold per average herd/flock size)		
adult male	0.59	0.31
adult female	0.28	0.40
young male	1.02	0.57
young female	0.93	1.14
lambs/kids	0.31	0.42
<u>Annual buying rate</u> (# bought per average herd/flock size)		
adult male	0.40	0
adult female	0.24	0.14
young male	0.37	0.14
young female	0.12	0.28
lambs/kids	0	0.10
<u>Annual sharing-in rate</u> (# received on shares per average herd/flock size)		
adult male	0.20	0.31
adult female	0.04	0.19
young male	0.09	0.09
young female	0	0.10
lambs/kids	0	0.07

Source: SR CRSP-BPT Survey.

Appendix Table 1.3 (cont'd). Productivity Parameters for Goats and Sheep in Ciburuy.

Productivity Parameters	Goats	Sheep
<u>Annual sharing-out rate</u>		
<u>(# put out on shares per average herd/flock size)</u>		
adult male	0	0
adult female	0.07	0.12
young male	0	0
young female	0.08	0.17
lambs/kids	0	0.15
<u>Annual consumption rate</u>		
<u>(# consumed per average herd/flock size)</u>		
adult male	0.30	0.08
adult female	0.03	0
young male	0.09	0.28
young female	0.08	0.03
lambs/kids	0	0
<u>"Other disposal" rate</u>		
<u>(# bartered or paid back per average herd/flock size)</u>		
adult male	0.10	0
adult female	0.24	0.05
young male	0.19	0.09
young female	0.19	0.10
lambs/kids	0.14	0.15
<u>Changes in yearly inventory (%)</u>		
adult male	0.20	0.47
adult female	-0.09	-0.07
young male	-0.19	0.33
young female	-0.23	0.48
lambs/kids	0.61	0.89

Source: SR CRSP-BPT Survey.

Appendix Table 1.4. Productivity Parameters by Farm Size for Sheep in Garut.

Productivity Parameters	Strata							
	I	II	I + II	III	IV	V	IV + V	I - V
N (farmers)	9	21	30	31	68	6	74	135
birth rate (lambs/adult female)	0.66	1.33	1.03	1.14	0.92	0.34	0.88	0.96
lamb mortality (%)	7	0	2	6.5	15	0	15	10
female adult mortality (%)	4	0	2	2	3	0	3	2.5
<u>Stocking rates</u>								
male adults/farmer	0.05	0.27	0.20	0.37	0.41	0.70	0.43	0.37
female adults/farmer	2.49	1.47	1.77	1.75	2.35	1.93	2.32	2.07
young male/farmer	0.18	0.24	0.22	0.49	0.32	0.90	0.37	0.37
young female/farmer	0.17	0.49	0.39	0.62	0.64	0.70	0.64	0.58
lambs/farmer	0.40	0.82	0.69	0.75	0.79	0.32	0.75	0.74
<u>Stock composition</u>								
adult male/adult female	0.02	0.18	0.11	0.20	0.18	0.36	0.14	0.18
young male/young female	1.04	0.50	0.57	0.80	0.50	1.29	0.57	0.63
lambs/adult female	0.16	0.56	0.39	0.43	0.34	0.16	0.33	0.36
<u>Annual selling rate</u> (# sold per average herd size)								
adult males	0	1.07	0.98	1.13	1.04	0.95	1.02	1.04
adult females	0	0.39	0.23	0.41	0.54	0.52	0.54	0.46
young males	0.61	1.57	1.34	0.72	1.14	0.37	0.99	0.95
young females	0	0.78	0.67	0.42	0.73	0.48	0.71	0.63
lambs	0.83	0.46	0.53	0.60	0.50	0	0.49	0.52
<u>Annual buying rate</u> (# bought per average herd size)								
adult males	^	0	0	0.17	0.39	0	0.34	0.26
adult females	0.04	0	0.02	0.06	0.08	0.09	0.08	0.05
young males	0	0.20	0.15	0.26	0.50	0	0.40	0.32
young females	0	0	0	0.10	0.21	0	0.19	0.14
lambs	0	0	0	0.30	0.30	0	0.13	0.11
<u>Annual sharing-in rate</u> (# received on shares per average flock size)								
male adults	2.0	0.18	0.33	0.26	0.36	0	0.31	0.30
female adults	0.63	0.71	0.68	0.55	0.27	0.52	0.29	0.41
young males	0	0.20	0.15	0.13	0.18	1.1	0.35	0.26
young females	0	0.29	0.34	0.16	0.32	0	0.29	0.27
lambs	0.56	0.29	0.34	0.30	0	1.52	0.05	0.14

Source: SR CRSP-BPT Survey.

Appendix Table 1.4 (cont'd). Productivity Parameters by Farm Size for Sheep in Garut.

Productivity Parameters	Strata							
	I	II	I + II	III!	IV	V	IV + V	I - V
<u>Annual sharing-out rate</u>								
<u>(# put out per average flock size)</u>								
male adults	0	0.18	0.16	0.43	0.04	0	0.03	0.14
female adults	0.31	0.06	0.17	0.13	0.18	0.17	0.17	0.16
young males	0	0.20	0.15	0.20	0.18	0.37	0.22	0.20
young females	0.64	0.19	0.25	0.16	0.09	0.48	0.13	0.17
<u>Annual consumption rate</u>								
<u>(# consumed per average flock size)</u>								
male adults	0	0.18	0.17	0.09	0.11	0	0.09	0.10
female adults	0	0.03	0.02	0	0.04	0.26	0.05	0.03
young males	0	0	0	0.07	0.09	0	0.07	0.06
young females	0	0	0	0	0	0	0	0
lambs	0	0	0	0	0.02	0	0.02	0.01
<u>"Other disposal" rate</u>								
<u>(# bartered or paid pack per average flock size)</u>								
male adults	0	0.18	0.17	0.44	0.04	0.48	0.09	0.18
female adults	0.18	0.10	0.13	0.06	0.02	0	0.02	0.05
young males	0.62	0	0.15	0	0.09	0	0.07	0.06
young females	0	0.29	0.26	0.05	0.05	0	0.04	0.08
lambs	0	0	0	0.12	0	0	0	0.03
<u>Changes in yearly inventory (%)</u>								
adult males	4.00	-1.25	-0.82	-0.09	-0.25	0	-0.22	-0.25
adult females	0.36	0.19	0.26	0.22	0.02	-0.09	0.01	0.10
young males	-0.61	0.20	0	-0.65	-0.18	-0.37	-0.22	-0.32
young females	0.64	-0.49	-0.34	-0.31	0.16	-0.19	0.04	0.10
lambs	0.82	0.70	0.72	0.78	0.63	2.63	0.70	0.72

Source: SR CRSP-BPT Survey.

Appendix Table 2.1. Annual Changes in Inventory Categories and Offtake per Animal Class for Cirebon Sheep (%).

Stratum	Animal Class*	Inventory	Sales	Sharing-out	Consumption	Purchases	Sharing-in	Offtake
I	AM	0	0	0	0	0	0	0
	AF	0.38	0.5	0	0.13	0	0.5	0.51
	YM	2.50	0	0	0	0	0	2.50
	YF	0.56	0	0.56	0	0	0	1.12
	L	1.15	1.5	0	0	0	1.15	1.5
II	AM	0.63	1.9	0.63	0	0	0	1.26
	AF	0.78	0	0.24	0	0.15	0.36	0.51
	YM	0.65	0.3	0	0.30	0	0	1.25
	YF	0.88	0.1	0	0	0	0	0.88
	L	0.31	0	0	0	0	0.21	0.10
IV	AM	0	1.4	0	0.30	0	0	1.70
	AF	0.15	0.15	0.45	0	0.02	0.30	0.43
	YM	0	0.4	0.64	0.23	0	0.85	0.42
	YF	-1.28	0.2	0.44	0	0	0.11	-0.75
	L	-0.93	0	0.41	0	0	0	-0.52
V	AM	0	2.0	2.0	0	0	0	4.0
	AF	-0.09	0.17	0.26	0	0	0.17	0.17
	YM	0.77	0	0	0	0	0	0.77
	YF	-1.00	0	0	0	0	0	-1.00
	L	2.07	0	0	0	0	0	2.07
I-V	AM	0.18	1.64	0.55	0.19	0	0	2.56
	AF	0.35	0.13	0.31	0.01	0.06	0.32	0.42
	YM	0.43	0.32	0.32	0.21	0	0.42	0.86
	YF	0	0.16	0.21	0	0	0.05	0.32
	L	0.12	0.16	0.20	0	0	0.20	0.28

*AM = adult males, AF = adult females, YM = immature males, YF = immature females, L = lambs
 Source: SR CRSP-BPT Survey.

Appendix Table 2.2. Annual Changes in Inventory Categories and Offtake per Animal Class for Cirebon Goats (%).

Stratum	Animal Class*	Inventory	Sales	Sharing-out	Consumption	Other disposals	Purchases	Sharing-in	Offtake
I	AM	-0.53	1.07	0.53	0.5	0	0	0	1.57
	AF	-0.25	0.12	0.25	0	0.12	0	0.12	0.12
	YM	0.80	0.40	0.40	0	0	0	0	1.60
	YF	-0.49	0.99	0.49	0	0	0	0.24	0.75
	K	0.24	0.49	0	0	0.27	0	0	1.00
II	AM	0.57	1.14	0	0	0	0.29	0	1.42
	AF	0.11	0.5	0.22	0.04	0.04	0	0.43	0.48
	YM	0.27	0.53	0	0	0	0	0	0.80
	YF	-0.30	1.10	0.30	0	0	0.50	0.30	0.30
	K	-0.40	0.20	0.20	0	0	0	0	0
III	AM	0	0	0	0	0	0	0	0
	AF	0	0	0.42	0	0	0	0	0.42
	YM	-6.67	6.67	0	0	0	0	0	0
	YF	0	0	1.43	0	0	0	0	1.43
	K	0	0	2.5	0	0	0	0	2.50
IV	AM	-0.89	1.6	0.22	0.24	0	0	0	1.17
	AF	-0.07	0.25	0.42	0.07	0	0	0.18	0.49
	YM	1.29	1.29	0	0	0	0	0	2.58
	YF	-0.24	0.8	0.48	0	0	0.12	0	0.90
	K	0.09	0	0.19	0	0	0	0	0.28
V	AM	0	1.42	0	0	0	0	0.71	0.71
	AF	0.26	0.79	0	0	0	0.39	0.39	0.27
	YM	0	1.7	0	2.0	0	0	0	3.7
	YF	-1.42	0.71	0	0.71	0	0	0.71	-0.71
	K	1.15	0.4	1.54	0	0	0	0	3.09
I-V	AM	-0.27	1.33	0.18	0.20	0	0.09	0.09	1.26
	AF	-0.01	0.35	0.28	0.04	0.04	0.05	0.27	0.38
	YM	0.49	0.98	0.10	0.10	0	0	0	1.67
	YF	-0.38	0.87	0.43	0.05	0	0.19	0.19	0.59
	K	0.13	0.17	0.35	0	0.04	0	0	0.69

*AM = adult males, AF = adult females, YM = immature males, YF = immature females, K = kids
 Source: SR CRSP-BPT Survey.

Appendix Table 2.3. Annual Changes in Inventory Categories and Offtake per Animal Class for Garut Sheep (%).

Strata	Animal Class*	Inventory	Sales	Sharing-out	Consumption	Other disposals	Purchases	Sharing-in	Offtake
I	AM	4.00	0	0	0	0	0	2.0	2.0
	AF	0.36	0	0.31	0	0.13	0.04	0.63	0.18
	YM	-0.61	0.61	0	0	0.62	0	0	0.62
	YF	0.64	0	0.64	0	0	0	0.64	0.64
	L	0.82	0.83	0	0	0	0	0.56	1.09
II	AM	-1.25	1.07	0.18	0.18	0.18	0	0.18	0.18
	AF	0.19	0.39	0.06	0.03	0.10	0	0.71	0.06
	YM	0.20	1.57	0.20	0	0	0.20	0.20	1.57
	YF	-0.49	0.78	0.19	0	0.29	0	0.29	0.48
	L	0.70	0.46	0	0	0	0	0.29	0.87
I-II	AM	-0.82	0.98	0.16	0.17	0.17	0	0.33	0.33
	AF	0.26	0.23	0.17	0.02	0.13	0.02	0.68	0.11
	YM	0	1.34	0.15	0	0.15	0.15	0.15	1.34
	YF	-0.33	0.67	0.25	0	0.25	0	0.34	0.50
	L	0.72	0.53	0	0	0	0	0.34	0.91
III	AM	-0.09	1.13	0.43	0.09	0.44	0.17	0.26	1.57
	AF	0.22	0.41	0.13	0	0.06	0.06	0.55	0.21
	YM	-0.65	0.72	0.20	0.07	0	0.26	0.13	-0.05
	YF	-0.31	0.42	0.16	0	0.05	0.10	0.16	0.06
	L	0.78	0.60	0	0	0.12	0.30	0.30	0.90
IV	AM	-0.25	1.04	0.04	0.11	0.04	0.39	0.36	0.23
	AF	0.02	0.54	0.18	0.04	0.02	0.08	0.27	0.45
	YM	-0.18	1.14	0.18	0.09	0.09	0.50	0.18	0.64
	YF	0.16	0.73	0.09	0	0.05	0.21	0.32	0.50
	L	0.63	0.50	0	0.02	0	0.30	0	0.85
V	AM	0	0.95	0	0	0.48	0	0	1.43
	AF	-0.09	0.52	0.17	0.26	0	0.09	0.52	0.25
	YM	-0.37	0.37	0.37	0	0	0	1.10	-0.73
	YF	-1.19	0.48	0.48	0	0	0	0	-0.23
	L	2.63	0	0	0	0	0	1.52	1.11
IV-V	AM	-0.22	1.02	0.03	0.09	0.09	0.34	0.31	0.36
	AF	0.01	0.54	0.17	0.05	0.02	0.08	0.29	0.42
	YM	-0.22	0.99	0.22	0.07	0.07	0.40	0.36	0.37
	YF	0.04	0.71	0.13	0	0.04	0.19	0.29	0.44
	L	0.70	0.49	0	0.02	0	0.13	0.05	1.03
I-V	AM	-0.25	1.04	0.14	0.10	0.18	0.26	0.30	0.65
	AF	0.10	0.46	0.16	0.03	0.05	0.06	0.41	0.33
	YM	-0.32	0.95	0.20	0.06	0.06	0.32	0.26	0.37
	YF	0.10	0.63	0.17	0	0.08	0.14	0.27	0.57
	L	0.72	0.52	0	0.01	0.03	0.11	0.14	1.03

*AM = adult males, AF = adult females, YM = immature males, YF = immature females, L = lambs
 Source: SR CRSP-BPT Survey.

Appendix Table 2.4. Annual Changes in Inventory Categories and Offtake per Animal Class for Ciburuy Sheep and Goats (%).

	Inventory	Sales	Sharing-out	Consumption	Other disposals	Purchases	Sharing-in	Offtake
<u>Goats</u>								
adult male	0.20	0.59	0	0.30	0.10	0.40	0.20	0.59
adult female	-0.09	0.28	0.07	0.03	0.24	0.24	0.04	0.25
young male	-0.19	1.02	0	0.09	0.19	0.37	0.09	0.65
young female	-0.23	0.93	0.08	0.08	0.19	0.12	0	0.93
kids	0.61	0.31	0	0	0.14	0	0	1.06
<u>Sheep</u>								
adult male	0.47	0.31	0	0.08	0	0	0.31	0.55
adult female	-0.07	0.40	0.12	0	0.05	0.14	0.19	0.17
young male	0.33	0.57	0	0.28	0.09	0.14	0.09	1.04
young female	0.48	1.14	0.17	0.03	0.10	0.28	0.10	1.54
kids	0.89	0.42	0.15	0	0.15	0.10	0.07	1.44

Source: SR CRSP-BPT Survey.

Appendix Table 3.1. Estimated Gross Income Generated per Animal Class and per Holding by Sheep in Cirebon.

Stratum	Animal class	Average holdings		Offtake rate per class	Value per head (Rp)	Gross revenue per class**	Gross revenue per AU (Rp)
		Herd	AU*				
I	AM	0	0	0	19,500	0	
	AF	1.6	0.32	0.51	16,000	13,056	
	YM	0.1	0.01	2.50	14,700	3,675	
	YF	0.4	0.04	1.12	12,300	5,510	
	L	0.5	0.03	1.5	6,250	4,688	
	Average/holding			0.40			26,929
II	AM	0.15	0.03	1.26	19,500	3,686	
	AF	3.0	0.60	0.51	16,000	24,480	
	YM	0.3	0.03	1.25	14,700	5,513	
	YF	0.6	0.06	0.88	12,300	6,494	
	L	0.9	0.05	0.10	6,250	563	
	Average/holding			0.77			40,736
IV	AM	0.3	0.06	1.70	19,500	9,945	
	AF	4.3	0.86	0.43	16,000	29,584	
	YM	0.4	0.04	0.42	14,700	2,470	
	YF	0.8	0.04	-0.75	12,300	-7,380	
	L	0.9	0.05	-0.52	6,250	-2,925	
	Average/holding			1.05			31,694
V	AM	0.3	0.06	4.0	19,500	23,400	
	AF	3.9	0.78	0.17	16,000	10,608	
	YM	0.4	0.04	0.77	14,700	4,528	
	YF	0.3	0.03	-1.00	12,300	-3,690	
	L	1.0	0.05	2.07	6,250	12,938	
	Average/holding			0.96			47,784
I-V	AM	0.18	0.36	2.56	19,500	8,986	
	AF	3.33	6.66	0.42	16,000	22,378	
	YM	0.32	0.32	0.86	14,700	4,045	
	YF	0.62	0.62	0.32	12,300	2,440	
	L	0.83	0.42	0.28	6,250	1,453	
	Average/holding			8.38			39,302

*1 AM = 0.2 AU, 1 AF = 0.2 AU, 1 YM = 0.1 AU, 1 YF = 0.1 AU, 1 L = 0.05 AU.

**Gross revenue = average holding per class x offtake rate per class x average value per head for that class.

Appendix Table 3.2. Estimated Gross Income Generated per Animal Class and per Holding by Goats in Cirebon.

Stratum	Animal class	Average holdings		Offtake rate per class	Value per head (Rp)	Gross revenue per class**	Gross revenue per AU (Rp)
		Herd	AU*				
I	AM	0.2	0.04	1.57	29,800	9,357	
	AF	1.5	0.30	0.12	27,500	5,004	
	YM	0.2	0.02	1.60	15,000	4,800	
	YF	0.4	0.04	0.75	17,400	5,220	
	K	0.4	0.02	1.00	6,250	2,500	
	Average/holding			0.42			26,881
II	AM	0.2	0.04	1.42	29,800	8,463	
	AF	1.6	0.32	0.48	27,500	21,120	
	YM	0.2	0.02	0.80	15,000	2,400	
	YF	0.4	0.04	0.30	17,400	2,088	
	K	0.3	0.02	0	6,250	0	
	Average/holding			0.44			34,071
III	AM	0	0	0	29,800	0	
	AF	1.2	0.24	0.42	27,500	13,860	
	YM	0.2	0.02	0	15,000	0	
	YF	0.4	0.04	1.43	17,400	9,953	
	K	0.2	0.01	2.50	6,250	3,125	
	Average/holding			0.31			26,938
IV	AM	0.3	0.06	1.17	29,800	10,460	
	AF	2.0	0.40	0.49	27,500	26,950	
	YM	0.2	0.02	2.58	15,000	7,740	
	YF	0.6	0.06	0.90	17,400	9,396	
	K	0.8	0.04	0.28	6,250	1,400	
	Average/holding			0.58			55,946
V	AM	0.3	0.06	0.71	29,800	6,347	
	AF	1.5	0.30	0.27	27,500	11,138	
	YM	0.1	0.01	3.7	15,000	5,550	
	YF	0.3	0.03	0.71	17,400	-3,706	
	K	0.5	0.03	3.09	6,250	9,656	
	Average/holding			0.43			28,985
I-V	AM	0.2	0.04	1.26	29,800	7,510	
	AF	1.7	0.34	0.38	27,500	17,765	
	YM	0.2	0.02	1.67	15,000	5,010	
	YF	0.4	0.04	0.59	17,400	4,106	
	K	0.5	0.03	0.69	6,250	2,156	
	Average/holding			0.47			36,547

*1 AM = 0.2 AU, 1 AF = 0.2 AU, 1 YM = 0.1 AU, 1 YF = 0.1 AU, 1 K = 0.05 AU.

**Gross revenue = average holding per class x offtake rate per class x average value per head for that class.

Appendix Table 3.3. Estimated Gross Income Generated per Animal Class and per Holding by Sheep in Garut.

Stratum	Animal class	Average holdings		Offtake rate per class	Value per head (Rp)	Gross revenue per class**	Gross revenue per AU (Rp)
		Herd	AU*				
I	AM	0.05	0	2.0	34,800	3,480	
	AF	2.49	0.498	0.18	27,700	12,415	
	YM	0.18	0.018	0.62	19,800	2,210	
	YF	0.17	0.017	0.64	19,000	2,067	
	L	0.40	0.020	1.09	6,800	2,965	
	Average/holding			0.653			23,137
II	AM	0.27	0.054	0.18	34,800	1,691	
	AF	1.47	0.294	0.06	27,700	2,443	
	YM	0.24	0.024	1.57	19,800	7,461	
	YF	0.49	0.049	0.48	19,000	4,469	
	L	0.82	0.041	0.87	6,800	4,851	
	Average/holding			0.462			20,915
I + II	AM	0.20	0.040	0.33	34,800	2,297	
	AF	1.77	0.354	0.11	27,700	5,393	
	YM	0.22	0.022	1.34	19,800	5,837	
	YF	0.39	0.039	1.18	19,000	3,705	
	L	0.69	0.035	0.91	6,800	4,270	
	Average/holding			0.490			21,502
III	AM	0.37	0.074	1.57	34,800	20,215	
	AF	1.75	0.350	0.21	27,700	10,180	
	YM	0.49	0.049	-0.05	19,800	-485	
	YF	0.62	0.062	0.06	19,000	707	
	L	0.75	0.038	0.90	6,800	4,590	
	Average/holding			0.573			35,207
IV	AM	0.41	0.082	0.23	34,800	3,282	
	AF	2.35	0.470	0.45	27,700	29,293	
	YM	0.32	0.032	0.64	19,800	4,055	
	YF	0.64	0.064	0.50	19,000	6,080	
	L	0.79	0.039	0.85	6,800	4,566	
	Average/holding			0.687			47,276
V	AM	0.70	0.140	1.43	34,800	34,835	
	AF	1.93	0.386	0.25	27,700	13,365	
	YM	0.90	0.090	-0.73	19,800	-13,009	
	YF	0.70	0.070	-0.23	19,000	-3,059	
	L	0.32	0.016	1.11	6,800	2,415	
	Average/holding			0.702			34,547

*1 AM = 0.2 AU, 1 AF = 0.2 AU, 1 YM = 0.1 AU, 1 YF = 0.1 AU, 1 L = 0.05 AU.

**Gross revenue = average holding per class x offtake rate per class x average value per head for that class.

Appendix Table 3.4. Estimated Gross Income Generated per Animal Class and per Holding by Goats and Sheep.

Animal class	Average holdings		Offtake rate per class	Value per head (Rp)	Gross revenue per class**	Gross revenue per AU (Rp)	
	Herd	AU*					
Goats							
adult male	0.34	0.68	0.59	22,100	4,433		
adult female	2.48	4.96	0.25	20,900	12,958		
young male	0.36	0.36	0.65	15,200	3,557		
young female	0.86	0.86	0.93	12,500	9,998		
kids	1.20	0.60	1.06	7,200	9,158		
average/holding		7.46			40,104	53,760	
Sheep							
adult male	0.38	0.76	0.55	23,000	4,807		
adult female	2.55	5.10	0.17	17,400	7,543		
young male	0.64	0.64	1.04	15,400	10,250		
young female	0.88	0.88	1.54	11,200	15,178		
kids	1.22	0.61	1.44	8,800	15,460		
average/holding		7.99			53,238	66,630	
Stratum	Animal class	Average holdings		Offtake rate per class	Value per head (Rp)	Gross revenue per class**	Gross revenue per AU (Rp)
		Herd	AU*				
IV-V	AM	0.43	0.86	0.36	34,800	5,387	
	AF	2.32	4.64	0.42	27,700	26,991	
	YM	0.37	0.37	0.37	19,800	2,711	
	YF	0.64	0.64	0.44	19,000	5,350	
	L	0.75	0.38	1.03	6,800	5,253	
	Average/holding			6.89			45,692
I-V	AM	0.37	0.74	0.65	34,800	8,369	
	AF	2.07	4.14	0.33	27,700	18,922	
	YM	0.37	0.37	0.37	19,800	2,711	
	YF	0.58	0.58	0.57	19,000	6,281	
	L	0.74	0.37	1.03	6,800	5,183	
	Average/holding			6.20			41,466

*1 AM = 0.2 AU, 1 AF = 0.2 AU, 1 YM = 0.1 AU, 1 YF = 0.1 AU, 1 L or K = 0.05 AU.

**Gross revenue = average holding per class x offtake rate per class x average value per head for that class.

Appendix Table 4.1. Annual Inventory Change for Cirebcn Sheep.

	Animal Class				
	AM	AF	YM	YF	PL
Total flock for 30 farmers	5.5	100.0	9.5	18.7	24.8
Annual inventory change	1	35	4	0	3
net sales	9	7	3	3	4
net shared-out	3	-1	-1	3	0
consumed	1	1	2	0	0
deaths	1	12	1	0	13
replaced by younger animals	15	54			
replacement rates	2.73	0.54			
transfer to older animal category			15	54	
replaced by lambs			24	60	
replacement rates			2.53	3.21	
transfer to older animal category					84
total lambs					104
replacement rate					4.19
Average period animals held:	AM = 0.37 yr = 4 months				
	AF = 1.85 yr = 22 months				
	YM = 0.40 yr = 5 months				
	YF = 0.31 yr = 4 months				
	lambs = 0.24 yr = 3 months				

Appendix Table 4.2. Annual Inventory Change for Cirebon Goats.

	Animal Class				
	AM	AF	YM	YF	PK
Total herd for 49 farmers	11.3	82.4	10.2	21.1	23.1
Annual inventory change	-3	-1	5	-8	3
net sales	14	25	10	15	4
net shared-out	1	1	1	5	8
consumed or otherwise out	2	6	1	1	1
deaths	0	6	0	0	15
replaced by younger animals	14	37			
replacement rates	1.24	0.45			
transfer to older animal category			14	37	
replaced by kids			31	50	
replacement rates			3.04	2.37	
transfer to older animal category					81
total kids					112
replacement rate					4.85
Average period animals held:	AM = 0.81 yr = 10 months				
	AF = 2.22 yr = 27 months				
	YM = 0.33 yr = 4 months				
	YF = 0.42 yr = 5 months				
	kids = 0.21 yr = 2.5 months				

Appendix Table 4.3. Annual Inventory Change for Garut Sheep.

	Animal Class				
	AM	AF	YM	YF	PL
Total flock size	52.6	279.4	49.4	78.9	99.7
Annual inventory change	-13	28	-16	-8	72
net sales	39	109	31	39	41
net shared-out	-8	-69	-3	-8	-14
consumed	5	9	3	0	1
otherwise out (pay back/ barter)	9	13	3	6	3
deaths	0	7	0	0	27
replaced by younger animals	32	97	--	--	--
replacement rates	0.61	0.35	--	--	--
transfer to older animal category			32	97	--
replaced by lambs			50	126	--
replacement rates			1.01	1.60	--
transfer to older animal category					176
total lambs					303
lamb replacement rate					3.04

Average period animals held: AM = 1.64 yr = 20 months
 AF = 2.86 yr = 34 months
 YM = 0.99 yr = 12 months
 YF = 0.63 yr = 7.5 months
 lambs = 0.4 yr = 4 months

Appendix Table 4.4. Annual Inventory Change for Ciburuy Sheep.

	Animal Class				
	AM	AF	YM	YF	PL
Total flock size	12.7	84.1	21.2	28.9	40.4
Annual inventory change	6	-6	+7	+14	+36
net sales	4	22	9	25	13
net shared-out	-4	-6	-2	2	3
consumed	1	0	6	1	0
deaths	0	1	1	2	19
otherwise out	0	4	2	3	6
replaced by younger animals	7	15	--	--	--
replacement rates	0.55	0.18	--	--	--
transfer to older animal category			7	15	--
replaced by younger animals			30	62	--
replacement rates			1.42	2.15	92
total lambs					169
replacement rate					4.18

Average period animals held: AM = 1.82 yr = 22 months
 AF = 5.56 yr = 67 months (very high)
 YM = 0.70 yr = 8.5 months
 YF = 0.47 yr = 6 months
 lambs = 0.24 yr = 3 months

Appendix Table 4.5. Annual Inventory Change for Ciburuy Goats.

	Animal Class				
	AM	AF	YM	YF	PK
Total herd size	10.1	74.5	10.8	25.8	35.9
Annual inventory change	2	-7	-2	-6	22
net sales	2	3	7	21	11
net shared-out	-2	2	-1	2	0
consumed	3	2	1	2	0
deaths	0	3	1	--	14
otherwise out	1	18	2	5	5
replaced by younger animals	6	21	--	--	--
replacement rates	0.59	0.28	--	--	--
transfer to older animal category			7	21	--
replaced by kids			15	45	--
replacement rates			1.30	1.67	--
transfer to older animal category					60
total kids					112
replacement rate					3.12

Average period animals held: AM = 1.69 yr = 20 months
 AF = 3.57 yr = 43 months
 YM = 0.77 yr = 9 months
 YF = 0.60 yr = 7 months
 kids = 0.32 yr = 4 months