

**PROFITABILITY AND EFFICIENCY OF THE BROILER INDUSTRY IN
TASIKMALAYA**

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TABLE OF CONTENTS

SUMMARY	3
I. INTRODUCTION	4
1.1. Background.....	4
1.2. Objectives	5
II. METHOD OF RESEARCH	6
2.1. Time and Site Selection	6
2.2. Method of Data Collection.....	6
2.3. Analytical Framework: The Policy Analysis Matrix	6
2.4. Calculating the PAM Elements.....	7
Private Budgets	7
Social Budgets	7
2.5. Economies of Scale.....	8
III. DISCUSSION OF RESULTS	9
3.1. Profitability and Efficiency of Broiler Industry in Tasikmalaya	9
Revenues	9
Tradable Inputs	10
Domestic Factors	12
Profitability	12
3.2. Profitability and Efficiency of the Four Production Systems	13
Private Profitability	13
Social Profitability	14
3.3 Effects of Simulated Changes in Tradable Input Costs and Broiler Revenues on Profitability and Efficiency.....	14
Effect of Change in DOC Price on Private Profitability.....	14
Effect of Changes in DOC and Feed Prices on Private Profitability	15
Effect of Change in Live Broiler Price on Private Profitability.....	15
Effect Of Change In Tradable Input And Output Prices On Private Profitability .	16
IV. CONCLUSIONS AND RECOMMENDATIONS	17
REFERENCES	18
APPENDICES	19

SUMMARY

The key priority of the Indonesian government for the livestock sector is the expansion of the poultry industry, in particular the broiler industry. In 1997, about 816 million broilers were produced on Indonesian farms, 30 times the number in 1981. The production of both broilers and layers grew over 16% per annum compared to 5.2% for indigenous chickens and 4.4% for ducks. Policy makers see the broiler industry as an important source of animal protein. In comparison with cattle, poultry are efficient converters of feed grains into meat.

The research area is Tasikmalaya, a broiler production area in West Java with a great potential for expansion. This study is focused on both partnerships and autonomous firms, using profitability and efficiency to measure competitiveness.

Policy Analysis Matrices (PAMs) based on primary data were constructed for the different production systems. The scale of production was also taken into account. In the larger systems, farmers produced more than 2000 birds per production cycle.

The study found that broiler production in Indonesia is an efficient industry and can exist without any protection. The partnerships and the larger farmers enjoy more profit relative to the autonomous firms and the smaller ones. Levels of efficiency and profitability are influenced by the prices of feed and chicks as well as broiler output.

To increase the profit and efficiency of broiler farmers in Tasikmalaya, several recommendations follow from the results of the study:

1. The government needs to be proactive in reducing inefficiencies in input marketing, especially of day-old chicks (DOC).
2. To provide DOC at appropriate costs, investments to build local hatcheries managed by the local farmers are important.
3. Extension programs are needed, especially to help autonomous farmers reduce mortality.
4. The farmers, especially autonomous farmers, should be provided with better access to credit facilities.

I. INTRODUCTION

1.1. Background

Chickens are an important domestic fowl worldwide, especially for nutritious flesh as a source of food. There are two kinds of crossbred chickens of importance in Indonesia – chicken broilers and chicken layers. The advantage of crossbred chickens compared to local chickens is that their productive age is shorter; only 45 days are needed to reach a weight of 1.25 kg as opposed to 4 to 5 months for local chickens. Crossbred chickens yield 200 to 250 eggs per year compared with local chickens that produce 40 to 60 eggs per year (Whendrato and Madyana, 1992).

In Indonesia, the use of crossbred chickens began about 1960. By 1970, with the introduction of foreign investments in feed industries, hatcheries, DOC (day-old chicks), and chemicals, the business of crossbred chickens had become an important agro industry that provided job opportunities, generated income, and was a source of food and eggs. In 1995, broilers accounted for 62 percent of national total meat production. The growth of broiler production was over 20 percent per year until 1993/1994. Thereafter, the annual growth rate has been approximately 12 percent.

The growth of the crossbred chicken industry dropped off by 50 to 60 percent during the economic and monetary crisis from 1997 to 1999 (Buletin Agroekonomi, 2000). The remarkable decline affected the entire chicken industry including farming, feed industries, breeders, and institutions involved in marketing.

The focus of development in the sixth Five-Year Development Plan is on agro industries that are market oriented, highly competitive, have a comparative advantage, and are sustainable. Temporary policies, such as the subsidy of production materials, soft loans, and the protection of similar products, are envisaged to encourage farmers to increase their production. The policies of production enhancement are aimed at reducing dependence on imported feed and raw materials. Efforts to increase production are also focused on technology improvements and on creating an environment conducive to investment.

The government has promoted the crossbred-chicken broiler industry through government regulations. Since 1980, the government of Indonesia has limited the scale of output. Government regulation (Keppres) No 50/81 stated that no farmer can rear more than 5,000 chicken layers, or 750 chicken broilers per period of production, and no large-scale production is permitted (Yusmichad Yusdja and Effendi Pasandaran, 1999).

Keppres No. 22/70 permits rearing as many as 15,000 chicken layers and 2,500 chicken broilers per production period. The regulations permit large-scale producers to operate with either domestic or foreign investments provided production is for export and is done in partnership with small-scale firms (Saptana and Suhartini, 1995; Amirudin Syam, 1998; and Yusmichad Yusdja and Effendi Pasandaran, 1999). In partnerships, the large firms supply working capital and technology and sell the product of the small producers (Yusmichad Yusdja and Effendi Pasandaran, 1999).

Studies indicate that the domestic livestock industry needs to be more efficient in using domestic raw materials, and it must improve quality if it is to compete with imported products. Research has been carried out in a number of areas: (1) work on the

horizontal and vertical relationships of broiler agro business (Amirudin Syam, 1998); (2) partnerships of crossbred-chicken layer and broiler business in West Java (Saptana and Suhartini, 1996); and (3) the role of feed factories in the national poultry industry (Yusmichad Yusdja and Effendi Pasandaran, 1999). These studies all point to the potential for expanding poultry production.

This paper examines the development of the broiler industry in a leading broiler production area in West Java. Between 60 and 70 percent of the broilers produced in the area are marketed in Jakarta. The study is focused on two types of business – partnerships and autonomous firms. Profitability and efficiency are used to measure the level of competitiveness.

1.2. Objectives

The objectives of this research are to evaluate whether the existing production systems are profitable and economically efficient. There are two types of business organizations in the Tasikmalaya regency broiler industry – partnerships and autonomous firms. The autonomous operation handles all kinds of activities and input provisions (feed, birds, and medicine) and is free to buy and sell inputs and outputs. The partnership operation carries out business in collaboration with a poultry shop (PS). The inputs (feed, birds, and medicine) are supplied by the PS, and the PS buys the output.

The results of the research are expected to provide solutions to the problems that exist in the small-scale broiler industry in Tasikmalaya regency. Of particular interest will be activities that will enable small producers to deal more effectively with credit, health, and marketing constraints.

II. METHOD OF RESEARCH

2.1. Time and Site Selection

Four sub-districts of Tasikmalaya regency – Sukaratu, Leuwisari, Kawalu, and Pagerageung – have a high potential for increased broiler production. They have a large broiler population and many farmers are engaged in the broiler industry. Research on the area's potential was carried out in September-October 2002. Field data on production costs, operational costs, marketing costs, revenues, and benefits were collected.

2.2. Method of Data Collection

Primary and secondary data collected were both qualitative and quantitative. Data were collected by directly recording inputs, outputs, costs, and revenue for one production cycle/period during July, August, and September 2002.

The farmers interviewed consisted of 66 broiler producers in the four sub-districts who own and operate autonomous or partnership broiler operations. There were 54 partnership broiler producers (36 producers raising more than 2000 birds and 18 producers raising less than 2000 birds) and 12 autonomous producers (4 producers raising more than 2000 birds and 8 producers raising less than 2000 birds). The criteria used to select the sample of autonomous farmers were (1) individuals must have had at least two years experience in the broiler industry, and (2) they must have been raising broilers in July 2002.

The primary data needed at the farm level are production/operation volume, operational cost, revenue, and net profit. The operational costs at the farm level are equipment, tools, and material costs, i.e., stable, land rent, feeding tray, drinking bowls, heater/stove, electricity, kerosene, feed, DOC, litter, chemicals and vitamins, and labor.

The primary data needed at the trader or poultry shop (PS) level and processor (slaughter) are buying and selling volumes, operational cost, revenue, and profit. The operational costs are transportation, labor, and equipment costs. Two processors (slaughterers) were interviewed along with 10 poultry shops.

Secondary data were collected from the Central Bureau of Statistics, Customs, Department of Agriculture, the Directorate General of Husbandry, Bureau of Livestock, Fishery and Marine of Tasikmalaya, and various research papers.

2.3. Analytical Framework: The Policy Analysis Matrix

The Policy Analysis Matrix (PAM) introduced by Monke and Pearson (1989) is used as the tool of analysis. The PAM matrix is shown in the following table:

		Costs		
	Revenues	Tradable inputs	Domestic factors	Profits
Private prices	A	B	C	D ¹
Social prices	E	F	G	H ²
Divergences	I ³	J ⁴	K ⁴	L ⁶
¹ Private profit, D = A-B-C		⁵ Factor transfers, J = B-F		
² Social profit, H = E-F-G		⁶ Net transfers, L = D-H, or L = I-J-K		
³ Output transfers, I = A-E		Source: Monke and Pearson (1989)		

The first line in the PAM is derived from an analysis of private budgets. Costs of tradable inputs and domestic factors, based on prices observed in local markets, are subtracted from revenues, also derived from locally observed market prices. Private profitability is a measure of the incentives farmers have to produce the commodity being analyzed.

The second row of the PAM is derived from social budgets. Costs of tradable inputs are based on import parity prices, calculated from prices in international markets. These world prices are further adjusted for the price of freight and insurance as well as domestic handling and transportation costs between the port and the farm gate. Positive social profits indicate that the country has a comparative advantage in producing the commodity and that resources are being used efficiently.

The third row is obtained by subtracting the second row (social budget) from the first row (private budget). The differences reflect government policy interventions or market failures. A positive entry in the revenue column (E), for example, means that farmers are receiving more than the import parity (international) price for their product. A negative sign on the revenue element in row three would indicate that farmers are being taxed instead of subsidized. The final element (L) measures the net divergences that occur between private and social revenues and costs for all elements of the two budgets.

2.4. Calculating the PAM Elements

Private Budgets

The revenue component of the private budget is the output obtained from the Input-Output table times the Output price obtained from the private prices table. Farmer responses to the survey were cross-checked with the poultry shops to which the broilers were sold.

The tradable input components in raising broilers in Tasikmalaya were feed, DOC, vitamins, electricity, and heater fuel. Again, the budget elements were computed by multiplying input-output coefficients by the corresponding elements in the Private prices table.

The domestic factor costs are labor, capital (buildings, feeding trays/troughs, drinking bowls/troughs, heaters, and land rent. When computing private budgets, prices for these elements reflect what farmers actually paid. Data were obtained from responses to the survey and from observations in local markets.

Social Budgets

Social Price of Output

The social value or import parity price of broiler output was based on data taken from the poultry industry outlook summary presented by USDA 2002 .

Social Price of Inputs

The import parity price of imported inputs of feed and DOC was multiplied by the exchange rate to convert international prices to domestic currency. Indonesian exchange

rate policy was assumed to be well-managed, so there is no divergence between the actual foreign exchange rate and the equilibrium exchange rate.

The competitiveness of Indonesia's rural labor market was studied by Naylor (1991) who concluded that labor markets were operating with reasonable efficiency. Therefore, no divergence was assumed between private and social labor costs in the analysis.

The interest rate used to calculate working capital and capital recovery costs has different values in private and social prices. The real private interest rate (i_p) was calculated from the nominal interest rate (r), 18 percent per annum, and the inflation rate (i), 10 percent per annum. The formula is as follows:

$$i_p = \frac{(1+r)}{1+i} - 1$$

Calculation of capital recovery costs of buildings and fixtures was based on information on the cost of recovering capital from an investment. These included the initial costs of buildings, tools, useful life, and their salvage value. The net costs are the initial costs minus the present value of the salvage value. The useful life of buildings was estimated as 10 years, while the lifetimes of the heater and other tools were 5 and 3 years, respectively.

The net cost is equal to the initial cost minus the present value of salvage value. The annual recovery cost is the product of the recovery ratio and net cost.

2.5. Economies of Scale

The two business systems (autonomous and partnership) were also distinguished by size, i.e., those that raise less than 2000 DOC birds and those that raise more. There are thus two PAMs in each system of broiler production and four PAMs in total. Each of these business units was investigated in detail.

1. Autonomous firms raising fewer than 2000 birds;
2. Autonomous firms raising more than 2000 birds;
3. Partnership raising fewer than 2000 birds; and
4. Partnership raising more than 2000 birds.

III. DISCUSSION OF RESULTS

3.1. Profitability and Efficiency of Broiler Industry in Tasikmalaya

Revenues

Table 3.1 shows the revenues and costs for the two types of broiler production at the two scale levels. The highest revenue for private prices is attained by the partnership system with more than 2000 birds. This is followed by the autonomous system with more than 2000 birds. The lowest revenue is gained by the autonomous system with a scale of less than 2000 birds. Although the revenues from the business units do differ, the results are very similar, especially between the small and large-scale operations. Obtaining conclusive evidence on scale economies, however, would require a range of the data greater than that collected.

Table 3.1 PAM tables of broiler industry in Tasikmalaya

Policy Analysis Matrix: Autonomous Raising scale LESS than 2000 birds					
	Tradables		Domestic Factors		Profits
	Output	Inputs	Labor	Capital	
Private	10,049,684	8,155,014	420,526	350,074	1,124,070
Social	11,045,227	7,799,377	420,526	267,986	2,557,338
Divergences	-995,543	355,637	0	82,088	-1,433,267

Policy Analysis Matrix: Autonomous Raising Scale MORE than 2000 birds					
	Tradables		Domestic Factors		Profits
	Output	Inputs	Labor	Capital	
Private	10,175,020	8,184,299	480,136	214,000	1,296,585
Social	11,182,980	7,862,252	480,136	192,541	2,648,051
Divergences	-1,007,959	322,047	0	21,459	-1,351,466

Policy Analysis Matrix: Partnership Raising Scale LESS than 2000 birds					
	Tradables		Domestic Factors		Profits
	Output	Inputs	Labor	Capital	
Private	10,509,103	8,581,227	464,493	222,650	1,240,732
Social	11,550,157	8,191,191	464,493	222,650	2,671,823
Divergences	-1,041,054	390,036	0	0	-1,431,090

Policy Analysis Matrix: Partnership Raising Scale MORE than 2000 birds					
	Tradables		Domestic Factors		Profits
	Output	Inputs	Labor	Capital	
Private	10,811,968	8,628,576	466,315	191,202	1,525,875
Social	11,883,025	8,231,594	466,315	191,202	2,993,913
Divergences	-1,071,057	396,982	0	0	-1,468,038

Comparing the private and social revenues yields a negative divergence for all types of production. It appears from the calculations that farmers receive less actual revenue for broilers than they would if broilers were valued at import parity prices. The size of the private-social revenue divergence in the PAM was large, almost 10 percent.

The source of this difference, however, is unclear. It cannot be due to an import tariff because the government does not intervene in the broiler market. Nor is there any evidence for a market failure in broiler output.

The divergence between private and social broiler prices may result from some type of statistical aberration. For example, it may have been caused by an unusual fluctuation in domestic prices during the period in which the research was conducted. Figure 3.1 shows live broiler prices in Tasikmalaya during 2001 and 2002. Wide month-to-month fluctuations in private prices are commonplace. The actual prices used in the PAMs were obtained during the period September to October 2002.

It is also possible that international prices used to compute the import parity prices for boilers did not exactly reflect the comparable grades for domestic broilers. The poultry outlook summary for 2002 published by the USDA is not a substitute for actual world market prices of chickens that are being imported to Indonesia. (Accurate marketing and transportation costs needed for the parity price calculation are also difficult to obtain.)

Lastly, it is possible that the Rp/\$ exchange rate depreciated heavily during this period. Currency depreciation would result in an increase in the calculated import parity price. Whatever the source of the revenue differences in Table 3.1, in normal periods, the private and social prices for broiler prices at the farm gate should be approximately the same.

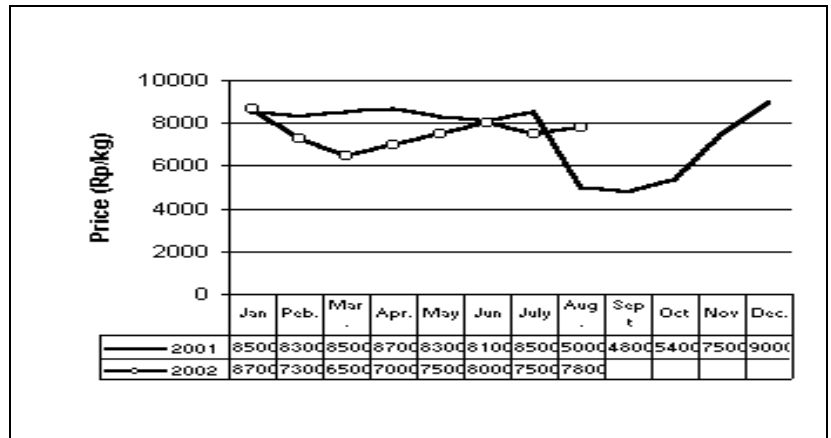


Figure 3.1 Price of live broilers in Tasikmalaya

Tradable Inputs

According to the calculations in Table 3.1, farmers have had to pay more for inputs than they would have if these inputs were valued at social prices. Table 3.2 provides a breakdown of inputs used in broiler production showing that DOC and feed are far and away the most important components of the input category.

Chicks produced for the broiler industry are a domestically produced nontradable, and hence their social price is a function of domestic supply and demand. According to the PPAN (*Perhimpunan Peternak Ayam Nasional*, National Poultry Farmers Union), the

production cost of DOC is approximately Rp 1,600. They suggest that the long-term equilibrium supply price should be between Rp 1,700 and Rp 2,000 per bird. At the time the research was done, the private price of DOC's was substantially higher than that, in the neighborhood of Rp. 2,800 per bird.

There are several possible explanations for the high DOC price. One is that there is a significant market failure in DOC marketing. Monopolistic practices by large entrepreneurs in the livestock sector have been reported by Yusmidjad Yusja and Effendi Pasandaran (1999). At present, 70% of the broiler businesses are owned by large enterprises that also supply the DOC to smaller broiler producers. The remaining 30% of the broiler businesses are small enterprises (owned by small poultry farmers, or *peternak rakyat*) that do not breed DOCs. Although it is difficult to prove that there is a manipulation in price of DOC, the large breeding farms dominate the DOC production sector and could control the supply of chicks if they chose to do so.

Table 3.2. Cost Structure of Broiler Production in Tasikmalaya

Cost Components	Proportion (%)	Average (%)
DOC	30.07 - 31.42	30.73
Feed	56.66 - 58.04	57.35
Medicine & vitamin	0.98 - 2.69	1.99
Kerosene	1.07 - 0.68	0.83
labor	4.70 - 5.39	5.02
Litter	0.12 - 0.49	0.26
Electricity	0.46 - 1.40	0.85
Working Capital	2.14 - 0.45	0.98
Capital recovery	2.60 - 2.25	2.41
Miscellaneous	0.15 - 0.13	0.14
Land	0.12 - 0.08	0.07
Total Cost	100.00	

Another explanation of the high DOC price is that, at the time the research was being conducted, the broiler market was in disequilibrium. Substantial fluctuation in broiler prices have been documented and if these prices were on the upswing, short-term increases in chick prices could also be expected. Chick hatcheries involve substantial investments and considerable lead time, and it would not be unusual for large broiler producers, in the presence of increased broiler demand, to withhold more chicks from their hatcheries as an input into their fattening operations. At the same time, smaller producers, facing the same increase in broiler prices, could be expected to bid actively for the smaller number of chicks that were available. The result would be a significant demand-driven increase in chick prices.

These two explanations lead to a substantial difference in PAM interpretation. In the case of the market failure explanation, the social price would be on the order of Rp. 1,800 per chick. In the case of the increased demand explanation, the social price would be Rp. 2,800, the same as the private price. Table 3.1 incorporates the market failure explanation although the evidence on this point is scanty.

Feed costs are approximately 57 % of the input category. The private price of feeds was 14.9% lower than its social price. The government was providing a substantial subsidy to chicken feed and to the broiler industry.

Domestic Factors

There are no divergences in the rural labor markets in Tasikmalaya. Unskilled wages in the broiler industry were not different from the surrounding laborers' wages. Therefore, it is assumed that labor's social price was no different than its private price.

The capital divergences show that private capital costs for autonomous businesses were higher than their social interest rates. The higher the private interest rate, the larger this divergence. Autonomous farmers were found to be very dependent on poultry shops as source of "credit". Farmers obtained feeds, DOCs, and equipment in advance and paid for them later after harvesting. The interest rate charged to autonomous farmers was above 6% per annum. For partnerships, private capital costs were estimated to be equal to social costs, 18% per annum.

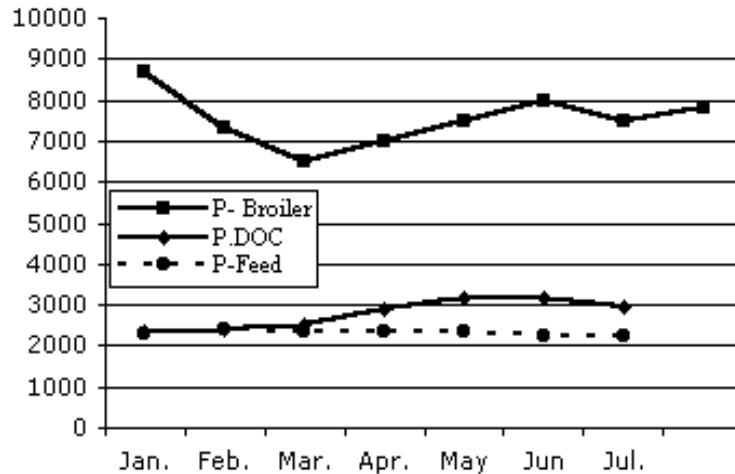
Profitability

Both autonomous and partnership enterprises, and both large and small production systems, are privately profitable. The social rows for all farmers also show positive profitability, indicating that broiler industries in Tasikmalaya are efficient. Broiler production systems in Tasikmalaya can compete with imported broilers and have a potential for export.

The profit divergence (net transfer) of all broiler systems is significantly negative, 49% to 56% (Table 3.1). The negative divergence among all raising regimes indicates the existence of a net tax paid by the farmers in every production cycle. The largest contributor to this tax is the high price of tradable inputs such as DOCs combined with low price of output (live broilers) at the farm gate.

As noted earlier, both of these figures have problems in their estimation and further research is needed to support the arguments that have been advanced. However, the estimates appear to be robust enough to support the conclusion that boiler production is privately and socially profitable.

The analysis also suggests improvements that might be made in the workings of the domestic broiler economy. For example, the efficiency of DOCs' marketing can be enhanced through fairer competition among the operators, breeders, and farmers and the elimination of cartel practices. Better marketing and cold storage facilities would also help small growers. Output prices were relatively good during the study but were still below world prices. Figure 3.2 shows that the feed prices were stable, whereas the DOC and live broiler prices fluctuated a great deal. As noted earlier, the DOC's price follows the broiler price indicating that the prices of DOCs are a response to fluctuating broiler prices. Chicken prices will drop significantly when broilers are harvested and the oversupply results in significantly lower prices for all suppliers.



Source: Fisheries and Livestock Agency Tasikmalaya (2002)

Figure 3.2 Trend on A live Broiler, Feed and DOC Prices (2002)

3.2. Profitability, Efficiency, and Production Organization

Private Profitability

Both autonomous firms and partnerships are profitable businesses. However, the profit divergences between the two are significant. For a production scale less than 2000 birds, farmers in partnerships profited 10% more compared with autonomous farmers (Figure 3.3). For the production scale of more than 2000 birds, farmers in partnerships profited 18% more than farmers in the autonomous pattern. Farmers with a production scale of more than 2000 birds, in both autonomous and partnerships patterns, had higher profits than farmers producing less than 2000 birds. Autonomous profits were 24% and partnerships earned 31%.

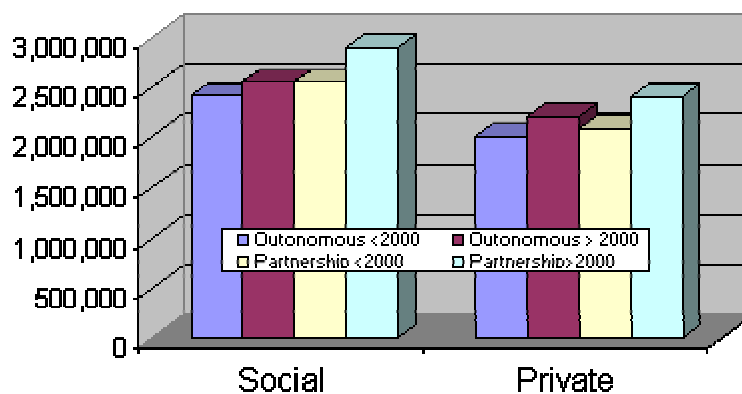


Figure. 3.3 Profitability of the broiler industry with different production systems in Tasikmalaya

The profit (return to management) gained by the farmers in autonomous firms is lower than that of the farmers in partnerships pattern because the number of broilers raised is less. The autonomous farmers in the less than 2000 category raise 950 birds broiler on average, whereas the partnerships farmers raise 1,549 birds. Therefore, the cost per unit of output (live broilers) is higher, especially capital costs. While the proportion of capital in total costs is small (2.4%), the capital costs divergences paid by the autonomous farmers in the production scale of less than 2000 is 18% more than similar costs paid by partnerships farmers.

The survival rate of broilers is another problem faced by autonomous farmers. The broiler survival rate of autonomous farmers is lower than that of partnerships farmers because of lack of capital and technical knowledge. The partnership farmers receive vaccines, vitamins, extension, and technical assistances from their poultry shop (PS) partners, which are not received by the autonomous farmers.

Social Profitability

Social profits measure efficiency or comparative advantage. When social profits are negative, a system cannot survive without assistance from the government.

Based on the data shown in Table 3.1, all regimes are efficient and have a strong comparative advantage. The DRCs for all four regimes are very low (0.18 to 0.21) indicating that systems use domestic resources efficiently. Minimizing the DRC is equivalent to maximizing social profits. The lowest DRC (0.18) is achieved by farmers following the partnership pattern. Farmers in Tasikmalaya have a very strong comparative advantage in producing broilers.

3.3 Effects of Simulated Changes in Tradable Input Costs and Broiler Revenues on Profitability and Efficiency

Changes in tradable input cost could have a significant effect on the efficiency level and profitability of the broiler raising industry. Some possibilities of changes, to be investigated with sensitivity analysis, are as follows:

Scenario 1: DOC price equals its efficiency price; other prices are unchanged;

Scenario 2: DOC and feed prices equal their efficiency prices; other prices are unchanged;

Scenario 3: Broiler price equals its efficiency price; other prices are unchanged; and

Scenario 4: DOC, feed, and output (broiler) prices equal their efficiency prices; other prices are unchanged.

Effect of Change in DOC Price on Private Profitability

At a DOC price of Rp 2,800 per bird, farmers receive high profits. But a decrease in the price of DOCs to their estimated efficiency price could be reached if the production of DOCs were not dominated by big companies that integrate broiler production. The research by Yusdja and Pasandaran (1999) concluded that integrated poultry agribusinesses can cause conglomerations that could raise DOC prices. To avoid this outcome, licenses should be simplified and the anti-monopoly act administered tightly.

Table 3.3 shows that if the DOC price were lowered to its efficient (social) price, Rp 1,800 per bird, the farmers would increase their private profit by 60% to 90%. In addition, due to a removal of inefficiencies in the DOC market, production costs of broiler meat would decline by approximately 28 %.

Table 3.3 Effect of Change in DOC Price on Private Profitability

Production Systems	Current Price	Estimated Efficiency Price	Increased Private Profit
	(Rp. 2800)	(Rp. 1800)	(%)
Autonomous			
<2000	1,124,070	2,416,399	90.95
>2000	1,296,585	2,302,357	77.57
Partnership			
<2000	1,240,732	2,248,558	81.23
>2000	1,525,875	2,530,437	65.84

Effect of Changes in DOC and Feed Prices on Private Profitability

If the DOC price decreases to its efficient price and the feed price increases to its efficient price, farmers' private profits increase by 33% to 48% (Table 3.4). The autonomous farmers with a production scale of less than 2000 birds gain the most, 48 %.

Table 3.4 Effect of Change in Main tradable input (DOC and Feed) Price on Private Profitability

Production Systems	Current Price	Estimated Efficiency Price	Increased Private Profit
	(Rp. 2800; Rp. 2300)	(Rp. 1800; Rp. 2515)	(%)
Autonomous			
<2000	1,124,070	1,662,143	47.87
>2000	1,296,585	1,821,331	40.47
Partnership			
<2000	1,240,732	1,747,069	40.81
>2000	1,525,875	2,022,878	32.57

Effect of Change in Live Broiler Price on Private Profitability

The data show that broiler prices fluctuate significantly. If the price assumed equals the world price and the other prices are unchanged, the broiler farmers' private profits in Tasikmalaya would be 70% to 89% higher.

Table 3.5 The effect of change of a live broiler price on income of broiler producers

Production Systems	Current Price (Rp. 7800)	Estimated Efficiency Price (Rp. 8573)	Increased Private Profit (%)
Autonomous			
<2000	1,124,070	2,120,023	88.6
>2000	1,296,585	2,304,956	77.78
Partnership			
<2000	1,240,732	2,282,211	83.94
>2000	1,525,875	2,597,369	70.22

Effect Of Change In Tradable Input And Output Prices On Private Profitability

If all factors affecting profitability and efficiency agreed with their efficient prices, the results shown in Table 3.6 would be achieved. If the DOC, feed, and output were set to their efficiency prices, a significant increase in profitability would be realized. The private profits of all systems would more than double.

Table 3.6 Effect of Change in Main Tradable Input (DOC and Feed) Prices and Output Price on Private Profitability

Production Systems	Current Price (Rp. 2800; Rp. 2300) (Rp. 7800)	Estimated Efficiency Price (Rp. 1800; Rp. 2515) (Rp. 8573)	Increased Private Profit (%)
Autonomous			
<2000	1,124,070	2,658,093	136.47
>2000	1,296,585	2,829,702	118.24
Partnership			
<2000	1,240,732	2,788,548	124.75
>2000	1,525,875	3,094,372	102.79

IV. CONCLUSIONS AND RECOMMENDATIONS

The research findings show that the broiler industries in Tasikmalaya are efficient and privately profitable. Levels of efficiency and profitability are influenced by input prices of feed and DOC as well as broiler output prices. The major research findings are:

- The broiler systems in Tasikmalaya are privately and socially profitable.
- Marketing distortions, especially of DOCs, result in a decrease of farmers' incomes and consumers' benefits.
- The partnerships pattern gives better profitability and greater efficiency compared with the autonomous pattern.
- The stratification of production scale under study did not result in significant differences, but the larger production systems tended to have higher efficiencies.

To increase the profit and efficiency of broiler farmers in Tasikmalaya, several recommendations follow from the results of the study:

- The government needs to be proactive to reduce inefficiency of input marketing, especially of DOCs.
- To provide DOCs at appropriate costs, investments to build local breeder hatcheries managed by the local farmers are important.
- Extension programs are needed, especially to help autonomous farmers reduce mortality.
- The farmers, especially autonomous farmers, should be provided with better access to credit facilities.

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APPENDICES

I-O	Quantities	Autonomous		Partnership	
		<2000	>2000	<2000	>2000
Tradable					
	DOC(head)	950	3,675	1,549	2657
	Feed(kg)	2,203.2	2,224	2,314	2,350
	Medicine & Vitamin (Number of DOC)	1,000	1,000	1,000	1,000
	Kerosene (Liter)	94	112	76	75
Factors					
	Haired Labor (Rp/a live broiler)	841	960	929	933
	Litter (kg)	50.53	78.37	49.71	48.17
	Electricity (KWH)	105	82	260	176
	Capital				
	Working Capital (Rp/ha)	9,029,654	2,360,534	5,842,264	3,425,667
	Stable (m2)	100	400	160	270
	Heater	1	4	2	3
	Feed jar	20	80	25	45
	Drinking jar	20	80	25	45
	Miscellaneous	1	1	1	1
	Land (ha)	0.01	0.04	0.02	0.03
Output	a live broiler (kg)	1,288	1,304	1,347	1,386

P-Prices	Private Prices	Autonomous		Partnership	
		<2000	>2000	<2000	>2000
Tradables					
	DOC (head)	2,800	2,800	2,800	2,800
	Feed (Rp/kg)	2,300	2,300	2,300	2,300
	Medicine & vitamin (Rp/birds)	144	88	250	248
	Kerosene (Rp/liter)	850	850	850	850
Domestic	Labor (Rp/broiler head))	500	500	500	500
	Litter (Rp/kg)	550	550	550	550
	Electricity (Rp/Kwh)	250	250	250	250
	Capital				
	Working Capital (%)	2.1%	2.1%	1.2%	1.2%
	Stable (Rp/ha/1000 birds)	1,252.2	323.7	768.0	447.7
	Heater (Rp/cycle/1000 birds)	7,432.24	1,921.26	4,558.18	2,657.37
	Feed jar (Rp/cycle/1000 birds)	665.62	172.07	408.23	237.99
	Drinking jar (Rp/cycle/1000 birds)	628.65	162.51	385.55	224.77
	Miscellaneous			12,146.77	

P-Prices	Private Prices	Autonomous		Partnership	
		<2000	>2000	<2000	>2000
		12,682.86	13,114.25		11,974.30
	Land (Rp/ha/cycle)	263,158	68,027	161,394	94,091
Output	(Rp/kg a live broiler)	7,800	7,800	7,800	7,800

P-Budget	Autonomous		Partnership	
	<2000	>2000	<2000	>2000
Cost and Return (Rp/ha)				
DOC (head)	2,800,000	2,800,000	2,800,000	2,800,000
Feed (Rp/kg)	5,067,263	5,116,327	5,323,112	5,405,043
Medicine & vitamin (Rp/1000 birds)	144,487	87,687	249,853	247,560
Kerosene (Rp/1000 birds)	79,632	95,061	64,751	63,342
Labor (Rp/1000 birds)	420,526	480,136	464,493	466,315
Litter	11,000	44,000	13,750	24,750
Electricity (Rp/1000 birds)	52,632	41,224	129,761	87,881
Capital (Rp/cycle/1000 birds)				
Working Capital	191,538	50,072	70,815	41,523
Stable	125,218	129,477	122,874	120,882
Heater	7,432	7,685	9,116	7,972
Feed jar	13,312	13,765	10,206	10,710
Drinking jar	12,573	13,001	9,639	10,115
Miscellaneous	12,683	13,114	12,147	11,974
Land (Rp/ha/cycle/1000 birds)	2,632	10,526	3,947	7,105
Total Revenue (Rp/cycle/1000 birds))	10,049,684	10,175,020	10,509,103	10,811,968
Total Costs (excl.Land) (Rp/1000 birds)	8,940,928	8,902,076	9,284,464	9,305,173
Profit (excl.land) (Rp/1000 birds)	1,111,387	1,283,471	1,228,586	1,513,901
Net Profit (incl.land) (Rp/1000 birds)	1,108,756	1,272,944	1,224,638	1,506,795

S-Prices	revenue -cost components	Raising operation system			
		Autonomous		Partnership	
		<2000	>2000	<2000	>2000
Tradables					
	DOC (head)	1,800	1,800	1,800	1,800
	Feed (Rp/kg)	2,515	2,515	2,515	2,515
	Medicine & vitamins (Rp/birds)	116	70	200	198
	Kerosene (Rp/liter)	2,796	2,796	2,796	2,796
Domestic	Labor (Rp/head))	500	500	500	500
	Litter	550	550	550	550
	Electricity	250	250	250	250

		Raising operation system			
S-Prices	revenue -cost components	Autonomous		Partnership	
		Capital			
	Working Capital (%)	1.2%	1.2%	1.2%	1.2%
	Stable (Rp/ha/1000 birds)	1,252.18	323.69	767.96	447.71
	Heater (Rp/cycle/1000 birds)	7,432.24	1,921.26	4,558.18	2,657.37
	Feed jar (Rp/cycle/1000 birds)	665.62	172.07	408.23	237.99
	Drinking jar (Rp/cycle/1000 birds)	628.65	162.51	385.55	224.77
	Miscellaneous	12682.86305	13114.25295	12146.76596	11974.30124
	Land (Rp/ha./cycle)	263,158	263,158	263,158	263,158
Output	(Rp/kg)	8,573	8,573	8,573	8,573

S-Budget		Autonomous		Partnership	
	Cost and Return (Rp/ha)	<2000	>2000	<2000	>2000
Tradables					
	DOC (head)	1,800,000	1,800,000	1,800,000	1,800,000
	Feed (Rp/kg)	5,541,420	5,595,075	5,821,209	5,910,807
	Medicine & vitamins (Rp/1000 birds)	115,590	70,150	199,882	198,048
	Kerosene (Rp/1000 birds)	261,946	312,701	212,998	208,362
Domestic					
Factors	Labor (Rp/1000 birds)	420,526	480,136	464,493	466,315
	Litter	27,789	43,102	27,340	26,496
	Electricity (Rp/1000 birds)	52,632	41,224	129,761	87,881
	Capital (Rp/cycle/1000 birds)				
	Working Capital	109,450	28,613	70,815	41,523
	Stable	125,218	129,477	122,874	120,882
	Heater	7,432	7,685	9,116	7,972
	Feed jar	13,312	13,765	10,206	10,710
	Drinking jar	12,573	13,001	9,639	10,115
	Miscellaneous	12,683	13,114	12,147	11,974
	Land (Rp/ha/cycle/1000 birds)	2,632	10,526	3,947	7,105
Output	Total Revenue (Rp/cycle/1000 birds))	11,045,227	11,182,980	11,550,157	11,883,025
	Total Costs (Rp/1000 birds)	8,503,204	8,558,569	8,894,428	8,908,191
	Profit (excl.land) (Rp/1000 birds)	2,544,655	2,634,936	2,659,676	2,981,939
	Net Profit (incl.land) (Rp/1000 birds)	2,542,023	2,624,410	2,655,729	2,974,834

Annual Capital Recovery Cost	Private Prices				Social Prices			
	Stable	Heater	Feeding jar	Drinking jar	Stable	Heater	Feeding jar	Drinking jar
Initial Cost (Rp/100m2)	5,000,000	150,000	9,000	8,500	5,000,000	150,000	9,000	8,500
Useful Life (years)	10	5	3	3	10	5	3	3
Salvage Value (Rp)	100,000	0	0	0	100,000	0	0	0
Interest Rate (% per year)	7%	13%	13%	13%	7%	7%	7%	7%
Present Value of Salvage Value (Rp)	49,557	0	0	0	49,557	0	0	0
Net Cost (Rp)	4,950,443	150,000	9,000	8,500	4,950,443	150,000	9,000	8,500
Recovery Ratio (%)	14%	28%	42%	42%	14%	25%	38%	38%
Annual Recovery Cost (Rp)	713,744	42,364	3,794	3,583	713,744	36,851	3,447	3,255
Total of raising cycle per year	600	6	6	6	600	6	6	6
Recovery per Cycle of raising (Rp/Cycle) ^{*)}	1,190	7,061	632	597	1,190	6,142	574	543

*) for stable Rp/cycle/r m2

Assumption Table	Rate
Macro-Economic Assumptions:	
Nominal Interest Rate (%) ^{*)}	13%
Social Interest Rate (%) ^{*)}	7%
Official Exchange Rate (Rp/\$)	9000
Exchange Rate Premium (%)	0%
Percent Devaluation (%)	0%
Commodity Policies:	
DOC Tariff (%)	0%
Broiler meat	0%
Feed	0%
Medicine/Vitamins (tariff)	20%
Kerosene (subsidy)	%
Electricity (subsidy)	%
Domestic Tax	

PPN	10%
PPh	2.5%
*) adjusted 10% inflation rate	