

Economics of closed versus open broiler houses in West java.

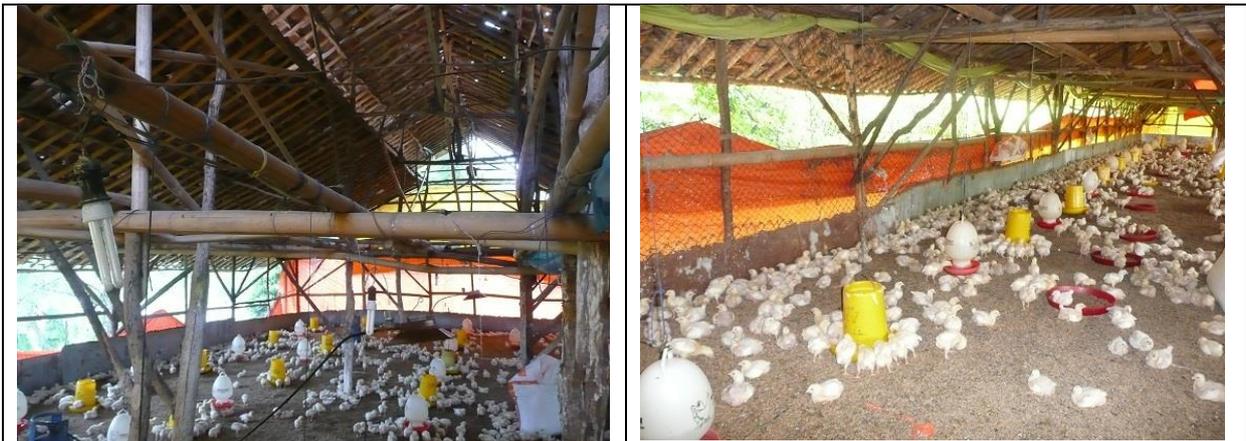
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Introduction

In West Java in Indonesia, broiler farmers grow broilers mainly in traditional open poultry houses. Some broiler farmers invest in modern closed housing with climate control. In these closed houses, performance of the birds is improved, but investments are much higher. Is this investment economical feasible in West Java? What are the production costs in both systems? And what is the payback period for investments in a closed poultry house? In the DIFS live project, production performance and economic data were collected on 2 broiler farms in West Java, that had both open and closed houses on their premises. Based on these data, an economic calculation was made to assess the production costs of both systems and the payback period of an investment in closed broiler housing.

Description and production results of the two systems

The traditional open house is based on a simple broilers house with a high roof, natural ventilation, manual feeding/water, open side walls and a slatted floor (Picture 1). The closed house has two floors with a low ceiling, mechanical tunnel ventilation, automatic feeding/water, (semi) closed side walls (with plastic curtains) and closed floors with litter (Picture 2).



Picture 1: Traditional open broiler house with a high roof, natural ventilation, open side walls and manual feeding.



Picture 2: Closed broiler house with two floors with a low ceiling, tunnel ventilation, (semi) closed side walls (with plastic curtains) and automatic feeding.

Basic production performance data were measured at two broiler farms in West Java, Indonesia (Table 1). Both farms had a traditional house and a closed house for broilers. The closed houses were built in 2016. Production performance data of the open en closed houses were collected and analysed by van Emous (DIFS-Live annual report 2016). On both farms, the broilers have a similar growing period in both systems. However, in the closed housing system on both farms the final live weight is higher, and feed conversion and mortality are lower. Van Emous concluded that production results differ between the housing systems for these farms.

Table 1. Production performance data in open and closed broiler housing: average, farm A en farm B.

	average		farm A		farm B	
	open	closed	open	closed	open	closed
Growing period (days)	30.3	30	30.1	29.6	30.5	30.5
Final Live weight (kg)	1.53	1.66	1.60	1.67	1.46	1.65
Mortality (%)	7.9	3.2	6.8	3.3	9	3.2
Feed conversion	1.6	1.42	1.54	1.39	1.67	1.45

Investments

For the economic evaluation, calculations were made for the investment on a farm with only open housing and on a farm with only closed housing. We assume that on both farms 40,320 broilers are kept. On the farm with open housing, these broilers are kept in 7 houses of 8 meter wide and 80 meter long. The total ground surface area of the open house is 4,480 m². The average density is 9 broilers per m² poultry house. The average empty period between flocks is 28 days. On the farm with closed housing, the broilers are housed on 2 levels in a house of 12 meter wide and 105 meter long. The total ground surface area of the house is 1,260 m². The total surface available for the broilers is 2,520 m², because they are kept on 2 levels. The average density is 16 broilers per m² living area. The average empty period between flocks is 28 days.

Table 2 gives the investment in the poultry houses and equipment for a farm with the open and a farm with the closed housing system. The total investment on a farm with closed housing is almost 9 times higher than that on a farm with open housing. With closed housing, higher investments per m² are needed for the electricity installation (mechanical ventilation and automatic feeding). Furthermore, the investment for equipment per m² with closed housing is higher as a result of the higher density and a higher level of automatization. Finally, with closed housing an extra investment is needed in a generator as a backup for a situation with a electricity power cut.

Table 2. Investment (IDR per m² ground surface area) for building, electricity, equipment and generator on a broiler farm with open and closed housing and total investment (IDR).

	open	closed
Poultry house, building	125,000	700,000
Poultry house, electricity	5,000	300,000
Equipment	40,000	400,000
Generator	0	100,000
Total	170,000	1,500,000

Production costs

Production costs were calculated for the farms with an open and closed broiler house assuming a price of 4,500 IDR per day-old chick and a feed price of 7,000 IDR per kg. For the open housing, the depreciation period was 10 years for the house and 8 years for the equipment. For the closed housing, the depreciation period was 15 years for the house and 8 years for the equipment. The total production costs per broiler houses were almost equal in both housing systems (Table 3). For closed housing, the variable costs for feed and electricity were higher and variable costs for heating and animal health lower. Fixed costs for housing and equipment were clearly higher for closed housing. This was partly compensated by lower labour costs for the closed housing.

Although the total production costs in the two systems are quite similar, the production costs per kg broiler meat produced per broiler housed are different. This is because the technical production data differs between the two systems. The amount of meat per broiler housed produced in the closed house system is higher than in the open housing system, because of a higher final live weight and a lower mortality. For the open housing, the total production per broiler housed is 1.41 kg and this results in

production costs of 17,190 IDR per kg final live weight. For the closed housing, the total production per broiler housed is 1.61 kg and this results in production costs of 15,276 IDR per kg final live weight. Production costs per kg final live weight are thus about 11% lower on a farm with a closed housing system compared to a farm with an open housing system.

Table 3. Production costs (in IDR per broiler housed and per kg live weight) for open and closed broiler housing in West Java, Indonesia.

	open	closed
Day old chick	4,500	4,500
feed	15,782	15,972
electricity	100	400
heating	700	400
animal health	600	450
other variable costs	1,040	1,040
total variable costs per broiler housed	22,722	22,762
poultry house	369	629
equipment	138	484
general costs	35	35
labour	958	636
total fixed per broiler housed	1,501	1,784
total costs per broiler housed	24,223	24,546
production in kg live weight per broiler housed	1	2
total costs per kg live weight	17,190	15,276

Payback period of investment in closed broiler housing

The payback period is calculated taking the total investment for the closed house divided by the annual cash flow. To estimate annual cash flow, a farm gate price of 16,000 IDR per kg live weight was used. For the basic situation the payback period is 4.5 years (Table 4).

Table 4. Payback period for a closed house at different production results and prices.

	years
closed housed average situation	4.5
farm 1 production results	3.6
farm 2 production results	6.1
lower revenue price (16,000 to 15,750)	6.0
lower feed price (7,000 to 6,500)	2.7
Higher price day old chicks (4,500 to 5000)	6.5

Sensitivity analysis

Many factors influence the payback period, of which the most important are the production results, revenue prices, and costs of feed and day-old chick. Table 4 also provides an overview of the impact of changes in these factors. When production performance in the closed housing was above average (production performance of farm A), the payback period was reduced to 3.6 years. At lower than average production results (farm B), the payback period was longer: 6.1 years. Slightly lower revenue prices (from 16.000 to 15.750 IDR per kg live weight) resulted in a longer payback period of 6.0 years. A lower feed price resulted in a shorter payback period, whereas a higher price of day-old chicks in a longer payback period. It can be concluded that good production results are an important condition for a short payback period and the payback period is highly dependent on input and output prices.

Discussion

Before a farmer can invest in closed housing for broilers, some conditions have to be met. First, a location has to be available with a good connection to the electricity network. Access to reliable electricity is essential for climate control in the closed house with mechanical ventilation. In case of power cuts, a back-up system is necessary, such as a generator.

Second, the farmer has to realize that better qualified workers are needed to manage the poultry house. These workers need the knowledge and skills to control the climate and to use the other automated

equipment. In most cases, a higher payment is needed for a part of the workers to attract these qualified workers.

Third, investments in closed housing are high. Therefore, most farmers will need a loan. Generally, 70 to 80% of the total investment can be financed by a loan, 20 to 30% should be funded by the farmer. Banks in Indonesia have strict conditions for loans in the poultry sector. Showing good production results and keeping record of technical data and financial results of several previous years (usually 3) is often needed to convince the bank of the potential of the investment. Some banks have special programmes for investments in closed housing.

Conclusion

The production costs per kg final live weight on a farm with closed broiler housing in West Java, Indonesia, were 11% lower than on a farm with open broiler housing, because of better production performance. With the same growing period, a farm with closed housing has higher final live weight, lower feed conversion, and lower mortality. The payback period of an investment in closed housing was estimated at 4.5 years on average. On a farm with good production performance, the payback period can be even shorter than 4.0 years. The payback period is highly dependent on the farm gate revenue price, feed price and day-old chicks price.