



Ventilation makes a world of difference

PHOTO: FABIAN BROCKÖTTER

In West Java Indonesia, many broiler farmers grow their birds in traditional open poultry houses. With a constant 30°C and high humidity the challenges are huge. Heat stress casts a shadow over the performance and profitability of small and medium size independent farms.

The contrast between the traditional poultry houses and the Modern Broiler Learning Center is huge. The first flock outperformed Cobb breeding standards.

By Fabian Brockötter

About 60% of the poultry meat sector in Indonesia is integrated and in the hands of large players like CP Foods and Japfa Comfeed. In modern poultry facilities with good farm managers these companies are able to compete with producers all over the world. The other 40% of broilers are produced on small and medium sized independent farms, mainly in open house systems, without too much technology involved. The Indonesian government stimulates these smaller enterprises, but a lack of knowledge, together with difficulties in financing new investments results in only a slow improvement of production results. That is the main reason why the local government, together with the Dutch department of foreign affairs started a development programme. The project DIFS-Live, which stands for Dutch – Indonesian programme on Food Security in Livestock, has the goal to develop practical solutions to guarantee a safe and sustainable food production and –at the same time- make sure independent farms are able to compete with the integrated operations. The project really comes to life at a demo farm, the Modern Broiler Learning Centre (MBLC). This farm shows that with a relative low level of investments, major improvements are

within reach. Challenges such as heat stress, disease pressure and management conditions can be improved, with immediate positive consequences for profitability, animal- and farm performance. *Poultry World* decided to have a look for itself in the town of Bandung, together with senior researcher of Wageningen University, Rick van Emous.

Challenges

Raising broilers in traditional open houses has many challenges. The houses are built with materials at hand, like bamboo and some tarps, and are all naturally ventilated. Feeding is done manually from bagged feed and in the first week the young broilers are kept warm during the night with charcoal stoves and/or gas heaters. The quality of the day-old chick isn't optimal, the feed is of inferior quality, disease pressure is high, water has a high bacterial count and management is often sub-optimal. On top of that, the chicks are constantly subjected to heat stress, every day. This together leads to a mortality of up to 20%. The one proven remedy to keeping the birds alive is through the use of antibiotics. In feed antibiotics are still a standard in Indonesia. On top of that the chicks get regular extra treatments, starting immediately upon arrival, followed by a shuffle programme until a week prior to slaughter. Mr van Emous: "The inventory of the medicine cabinet tells you the

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PHOTO: FABIAN BROCKDÖTTER

PT Medion manager Yirhan Sim believes this project will help Indonesian poultry farmers to the next level.



PHOTO: FABIAN BROCKDÖTTER

whole story. This is a nightmare scenario when it comes to over-usage of antibiotics in relation to the possible negative side effects for human health and antibiotic resistance.”

MBLC

The contrast between the traditional poultry houses and the MBLC is huge. In the rolling hills outside of the city of Bandung local project partner PT Medion has built two brand new houses. They used steel instead of bamboo as the main building material, constructed a two story system, with two pens per floor. With 15 chicks per square meter, the facility as a capacity of 16,000 birds. The houses are of the semi-closed type, the side walls are made of plastic curtain material. Ventilation is mechanical, there is a pad cooling system and the whole climate is monitored by a Sommen climate computer. One house has tunnel ventilation, the other cross ventilation, to test and learn from both systems. “The use of tarps for the side walls gives us the possibility to switch back to natural ventilation in case of power outages. There is a generator installed, but there is no guarantee that diesel fuel is available all the time. We experience power outages on an average of once or twice a week” said Mr van Emous.

On the complex there is a lot of attention paid on biosecurity, with cleaning and disinfection zones for both personnel and vehicles. Although, it is not always easy to work within standard procedures. During catching, which can stretch over a period of more than a week, several small trucks enter the facility. Besides movement and stress for the birds, the overall cleanliness of the vehicles and crates are far from ideal.

Investment makes good sense

Wageningen Economic Research Institute did a case study into the economics of closed versus open broiler houses in West Java. Better production performance leads to 11% lower production costs per kg final live weight, resulting in a payback period of the whole investment in a closed house of 4,5 years or less.

The traditional open house is based on a simple broiler house with a high roof, natural ventilation, manual feeding/water, open side walls and a slatted floor. 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.

Basic production performance data were measured at two broiler farms in West Java (*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 and closed houses were collected and analysed by Mr van Emous (DIFS-Live annual report 2016). On both farms, the broilers had a similar growing period in both systems. However, in the closed housing system on both farms the final live weight was higher, and feed conversion and mortality lower. Mr van Emous concluded that production results differ between the housing systems for these farms.

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 seven houses of eight meter wide and 80 meter long. The total ground surface area of the open house is 4.480 m². The average density is nine broilers per m² poultry house. The empty period is 28 days. On the farm with closed housing, the broilers are housed on two levels in a house of 12 meter wide and 105 meter long. The total ground surface area of the house is 1260 m². The total

surface available for the broilers is 2.520 m², because they are kept on two levels. The average density is 16 broilers per m² living area. The empty period 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 nine 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 automation. Finally, with closed housing an extra investment is needed in a generator as a backup for a situation with a electricity power cut.

Production costs

Production costs were calculated for the farms with an open and closed broiler house assuming a price of 4,500 IDR (€0.30) per day-old chick and a feed price of 7,000 IDR (€0.47) per kg. For the open housing, the depreciation period was ten years for the house and eight years for the equipment. For the closed housing, the depreciation period was 15 years for the house and eight 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 per bird, 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 1.41kg and this results in production costs of 17,190 IDR (€ 1.12) 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 (€0.99) 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. 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 (€ 1.04) per kg live weight was used. For the basic situation the payback period is 4,5 years (*Table 4*).

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 (€ 1.04 – € 1.02) 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.

By Peter van Horne, Rick van Emous, Bubun Setaiwan Hirawan.

First flock

The evaluation of the first flock of Cobb 500 birds showed that although there were some start up issues, the overall performance was good. The chicks were loaded on an average live weight of 1.97 kilogrammes on day 32, with a feed conversion of 1,50. Mortality was just 3.9%, less than could be expected with the suboptimal day-old chicks that were supplied. During

the first week the chicks performed exactly according the growth curve of Cobb and from day 14 onwards they outperformed by 5-8%. At the end of the flock the birds outperformed by 6%. "They could have done even better, but we had some software issues with the climate computer and we lacked frequency modulators on the fans. In the third week of production the chicks were too cold due to a high airspeed in the

house. We temporarily fixed the problem by opening the side walls some 10 cm.”

Further improvement

With the experience of the first flock Mr van Emous firmly believes that a step from 15 to 18 birds per square meter is feasible. “The fact that we are able to ventilate makes a world of difference. The birds in traditional houses do suffer immensely due to heat stress, that is something we prevent. To keep birds on a farm as the MBLC, with a management philosophy which incorporates all facets of poultry keeping, I am convinced that we can produce on or above breed standards, with a 70% reduction on antibiotic usage” he stated. The intention of the project is not to promote a closed housing system, but to offer a total package solution that leads to a more profitable poultry operation. The experiences of the MBLC will be shared in courses and training sessions with local farmers.

Trend towards closed housing

Local project partner PT Medion sees a slow but irreversible transformation taking place in the Indonesian poultry meat production sector, from traditional to more modern housing systems. Manager Yirhan Sim: “Ten years ago only 10% of the poultry houses were of the closed housing type. Nowadays that is 30%. Unfortunately it isn’t easy to invest in new houses at this moment in time. Banks are reluctant to finance more than 70% of the needed investments. The other 30% the farmers have to bring in, which is problematic because currently the farms are hardly making any money. Our project will prove that a modern poultry sector is profitable.” Mr Sim continues: “We want to take our poultry farms on a journey into the future. Profitability is key, but also trends in the reduction of antibiotics usage and animal health have a role to play. These themes aren’t exclusive to poultry farmers in more developed countries.”

For the economic evaluation, calculations were made for the investment on a farm with only open housing (pictured) and on a farm with only closed housing.



PHOTO: RICK VAN EMOUS

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

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.

	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

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

	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

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