Super insulated dome-shaped house looks promising

A newly developed type of broiler house in South Africa shows promising first results: 16% more weight per square metre, as well as better food conversion rates. The companies behind this revolutionary dome-shaped house put this down to the high level of insulation combined with a top-of-the-range management computer system.

By **Gineke Mons,**
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Nuway is the name of the newly hatched broiler house. The concept has been developed by Chemvet Steel & Fencing, a local manufacturer of pig and poultry houses, and insulation company Technopol. Their combined expertise has resulted in a revolutionary dome-shaped, highly insulated and totally computerised broiler house.
Chemvet and Technopol built the first four houses for 40,000 broilers each on their newly established farm on the highveld, some 50 km south-east of Johannesburg. "This is a novel design, so we decided to try it first, before selling it," says Technopol's Managing Director Lammie de Beer.
The companies invested a total sum of R16 million rand (US$2 mln, or €1.5 mln) in the realisation of their venture, including R3 million ($375,000, or €274, 000) to acquire the plot for the test farm in the rural Nigel area. The results, they say, show that their investments have been worthwhile. Following the small dirt road towards the Nuway farm, surrounded by dry wintry maize fields, suddenly four impressive broiler houses emerge. Their shining white dome tunnel roofs definitely stand out in the dusty red African soil.

Pleasant temperatures
A truck from Daybreak Farms, loaded with crates of broilers, drives off, leaving a trail of dust behind. The Nuway farm

Thanks to using white PVC roofing and computer controlled floor heating, temperature can be controlled precisely, offering a pleasant climate to the birds.

is just harvesting – as the South Africans say – its very first cycle of broilers. Three of the four houses have already been emptied by the catching crew. In the remaining house, the feeder line was winched up the day before. The Ross 788 broilers, nevertheless, look calm and content. They're spread very evenly throughout the surface, snug on the heated floor. Even after 35 days the litter is still fairly dry and the ammonia levels are bearable, even to the suburban nose.

Technopol's Sampie van Heerden scrapes some litter away with his shoe and points the infrared dot of his remote heat sensor on the bare concrete patch: 34.5 degrees. "This is due to the hot water system that heats the light deck concrete floor, and the polystyrene underneath," he explains. "Now compare this with our regular concrete floor in the control room next door: 8.9 degrees."

Polystyrene helpful

On South Africa's highveld, the mercury can drop several degrees below zero during winter nights. But, the Nuway broilers are blissfully unaware. While it's 14 degrees outside, the inner temperature is 23.5 degrees. Polystyrene is one of the main contributing factors to the comfy climate. The walls are made out of concrete with a polystyrene backing on the outside, cast in a panel. The free span dome roof (based on mechanically rolled IPE-beams) consists of arched polystyrene tiles, cut to a tight fit, sandwiched between PVC roof sheeting. PVC is used instead of metal, in order to eliminate the heat radiation inside. The white plastic sheeting also reflects radiation. The roof is exceptionally air-tight, according to insulation specialist Lammie de Beer: "We don't have cold air where we don't want it." The R-value of this roof is 5,7; compared to 2,5 in regular sheds, he says. The floor and the walls have an R-value of 1,8.

Computerised control

The control rooms attached to each shed harbour the heart of the Nuway house: the Danish Skov management computer system. This controls the 10 ventilators and the cross-ventilation with computerised DAs and the high pressure humidity system, depending on the outside and inside temperature. The Skov computer also keeps track of the daily feed and water intake of the chicks, and measures growth automatically with computerised scales in the house. A few button pushes show that the chicks came in at an average weight of 48 g and on day 35 have progressed to 2,098 g live weight,

Nick du Plessis and Lammie de Beer: "Because of the hi-tech level of this newly developed house, it's only feasible to build facilities with a minimum capacity of 40,000 broilers."

Steady growth in poultry production

On the world ranking of broiler meat producing countries, South Africa occupied the 15th position in 2007 with a market share of 1.3%, according to information supplied by the Southern African Poultry Association. In 2008, an average of 17.7 million broilers was slaughtered per week (average 1.72 kg live weight/1.35 kg dressed mass) of which an estimated one million per week is sold or slaughtered in the informal sector.
An additional 2.7 million broilers were imported, of which 75.8% originated from Brazil.
With the improving standard of living and the development of value-added products, the consumption of poultry meat has shown a significant increase over recent years, from 21 kg per capita in 2001 to 30.5 kg in 2008. Since 2004, the number of broilers slaughtered per week increased at an average rate of 6% per year, which accumulates to a compounded growth of 30.6% over 2004-2008. The inflow of broiler imports, though decreasing, is still substantial at 15% of total consumption, thus harming the potential expansion of chick producers, in the view of the SA Poultry Association. The global financial crisis is also expected to dampen the growth rate of the consumption of poultry meat. Nevertheless, poultry products are the main supplier of protein for South Africans, and in terms of kilogrammes, more poultry products are consumed than all other animal protein sources combined. The per capita consumption in Brazil and the US is in excess of 40 kg. As imports make up a sizeable percentage of consumption, the Southern African Poultry Association estimates that a further 50% growth in volume is possible in the future.
Source: 2008 industry report of the Southern African Poultry Association

with an average FCR of 1.63. CO_2 levels, humidity, food/water/power alarms, everything imaginable is right at hand. Van Heerden: "It's the Rolls Royce of management technology. It gives the manager peace of mind."
In South Africa, where farm labour is inexpensive and technology is costly, the high-tech Nuway concept is definitely groundbreaking as far as employment is concerned. "You would only need one general manager to run this farm, and one skilled employee per broiler house."

High investment involved

Needless to say that this savvy system comes with a price tag. One Nuway house including all equipment will set you back R2.7 million ($337,000, or €245,000). Therefore, it's only feasible to build houses with a minimum capacity of 40,000 broilers, according to Nick du Plessis, Sales Directors at Chemvet, responsible for chicken & pig housing and insulations. But, is there a market for this type of house in South Africa? Du Plessis says the market is indeed very tight now. "Farmers are conservative on new expansions. But a lot of big companies like Rainbow and Supreme have to replace old systems now. They need to make a decision, and our system gives a good return on investment," he says, adding that the main advantage of the Nuway house is the roughly 16% extra kgs per square metre. "In conventional houses you get 36-37 kgs per square metre. We're going to achieve around 43-43.2 kgs." This is combined with the improved FCR and the saving on feed costs, which shot up more than 30% last year. Preliminary results of the first round show a FCR of 1.63, where the Ross 788 normally stick around 1.82 during winter cycles on the highveld. The Nuway broilers were fed on standard industrial soy/maize pellets. Mortality rates in the first cycle were 3.6% on average, which are better than the South African benchmark of 4-6%. Du Plessis expects that the technical results of the initial trial cycle can only improve in the future. Another benefit is the low cost of keeping the house at the designated temperature. "It looks like we'll save 25-30% on average energy consumption," according to De Beer. Both Directors mention that Nuway has been approached by a 'substantial number' of interested farmers, from all over South Africa. "And this system is very suitable for other applications as well," says Du Plessis.

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