

## Windstreek Broiler House: Plukon Food Group & Nijkamp



### BACKGROUND

The Windstreek broiler house is the product of six years of development work and the vision of Robert Nijkamp, a poultry farmer based near Zwolle, in the Netherlands. The idea for the Windstreek broiler house originated from a Wageningen University research project, "Pluimvee met Smaak/Broilers with Taste", funded by the Dutch Ministry of Economic Affairs, Agriculture and Innovation<sup>1</sup>. The project, which Mr Nijkamp was involved in, explored possible solutions for sustainable broiler production and consumption and produced an initial concept design for the Windstreek broiler house.

After the research project's conclusion, Mr Nijkamp was determined to see the Windstreek broiler house become a reality on his farm. He set about pulling together key stakeholders to develop the concept further and eventually realise the design.

### THE WINDSTREEK BROILER HOUSE

The development of the Windstreek broiler house is a bold project, and the end result incorporates a whole range of innovative features and examples of best practice for animal welfare and the environment.



The house, which measures 95m by 22m, and reaches 11m at its highest point, accommodates 26,000 broilers at a maximum stocking density of 25kg/m<sup>2</sup>. Broiler production in the house meets the higher welfare standards required by the Dutch Beter Leven assurance scheme, at the 1 Star level<sup>2</sup>.

The house produces 145,600 birds per annum across 5.6 flocks per year, with the birds taken to slaughter at 8 weeks of age and 2.4kg liveweight. The product is currently being processed and marketed by Plukon Food Group and sold by Dutch supermarket Albert Heijn, mostly as fresh portioned chicken.

The initial Windstreek broiler house inevitably cost more to build than a typical broiler house due to development costs and extra back-up features added as an insurance policy in case the design did not function as expected. For example, the initial house includes the capacity for underfloor heating in case the motherhood heating was insufficient or the natural ventilation did not adequately keep the litter dry and friable. In practice, the underfloor heating has not been required. The final design of the Windstreek broiler house could be replicated for a comparable cost to other higher welfare indoor broiler houses and the cost of production is comparable to standard production, with the higher feed cost being offset by the energy savings. Plukon Food Group hopes to see the Windstreek broiler house replicated through its supply base and is actively seeking farmers interested in building the design on their farms.

## KEY FEATURES



### Natural light

Natural light provides broilers with a source of enrichment via its variation in levels throughout and between days. In broiler houses that provide birds with natural light, the window provision is typically equivalent to 3% of floor space. In the Windstreek broiler house, the window provision is equivalent to 50% of floor space. The Windstreek broiler house is brilliantly lit by an 11m tall window running the full length of the North-facing side of the house.

The window provides a gradient of light across the shed, allowing the birds choice of their preferred environment.

### Motherhoods

A distinctive innovation of the Windstreek broiler house is the use of the 'motherhoods' – these are covered areas that provide refuge and warmth for the chicks, like dark brooders, but which also remain in the broiler house throughout production. The motherhoods contain infra-red heaters, LED lighting, a water line and perch. Manure belts are used to remove the litter that collects under the motherhoods.



The motherhoods are the only part of the house that is artificially heated – contributing significantly to the 80% reduction in energy use of the Windstreek broiler house, when compared to a conventional broiler house. The motherhoods, by virtue of being a relatively small space, also capture the body warmth of the birds, further lessening the requirement for artificial heating.

Initially simulating the safety and warmth of being under a mother hen, the broiler chickens continue to make use of the motherhoods up until the end of the production cycle. The temperature and ventilation under the motherhoods is automatically controlled in response to sensors installed inside. To increase ventilation and decrease the temperature under the motherhoods, the whole unit is mechanically raised by a few centimetres, sufficient to increase the airflow entering from the sides.





### Enrichment

The birds are provided with a variety of sources of enrichment throughout the production cycle. The abundance of natural light, with its hourly and daily fluctuations, is an enrichment in itself<sup>3</sup>. Both the natural light and natural ventilation provide a gradient of conditions across the shed, creating different functional areas, and the lower stocking density allows the birds to choose their preferred environment.

Mr Nijkamp explained that providing the birds with a choice of different environmental conditions needs to go hand-in-hand with a different approach to stockmanship. Compared to the management of a standard broiler house, where the aim is to achieve an even spread of birds across the floor, the Windstreek broiler house requires a more laissez-faire approach to managing the birds.

The house contains multiple raised platforms, straw bales and perches, so that the birds can explore and perch at different levels within the shed. Straw is provided on the raised platforms once the birds start to explore them, typically when the birds reach four weeks of age. This encourages the birds to use the platforms and allows them opportunity to display scratching and dustbathing behaviour. To further encourage the birds to explore their surroundings and display natural foraging behaviour, wheat is scattered from spreaders suspended from the roof once a day, at a rate of 2g per bird.

### Air quality

The impression on entering the Windstreek broiler house is that the air is very fresh. The house is naturally ventilated, providing the added advantage that the house is very quiet, without the usual noise from fan motors. The use of natural ventilation does however require more subtle management, attuned to the specific location of the house, the local climate and the daily and hourly variation in conditions.

Mr Nijkamp explained: "We struggled with the ventilation with the first flocks because it is a totally different system using natural ventilation if you compare it to a traditional house with mechanical ventilation. Moisture control especially was one we had to struggle with but now we have made some new formulas to improve the automatic control of conditions inside the house. We measure outside conditions of temperature and moisture and inside conditions and we let a computer calculate the required ventilation."



Careful management of the ventilation is particularly important for ensuring good litter quality. Without the ability to artificially heat the whole house, maintaining low moisture levels by means of a higher ventilation rate is essential. As a result, the house also has roughly half the carbon dioxide levels found in a standard broiler house (1250ppm CO<sub>2</sub> in the Windstreek broiler house compared to 2500ppm CO<sub>2</sub> in a standard house).

The fortnightly removal of litter from underneath the motherhoods results in greater than 60% reduction in ammonia production within the house and more than 80% reduction in fine dust concentration within the house. Data on the environmental conditions within and outside the house continue to be collected in order to further improve the automatic control of the ventilation.



### Litter

As already mentioned, careful management of the ventilation is key to keeping the litter dry and friable in the Windstreek broiler house. Unlike standard broiler houses, there is not a heating system available to heat the whole house to keep the litter dry. To maintain the litter in good condition requires good understanding and management of the ventilation of the house.

The litter that collects under the motherhoods is dried by the warmer conditions created by the infra-red heat panels, and sits on a manure belt which automatically removes the litter approximately fortnightly throughout production, improving both cleanliness and air quality within the house.

### Breed and health

On Mr Nijkamp's farm, a slower growing breed of broiler chicken is used: the Hubbard JA 757 (average growth rate 43g/d over the production cycle). The use of a slower growing breed is a key requirement of the Beter Leven scheme at the 1 Star level. The birds are kept until 8 weeks of age, with a finished liveweight of 2.4kg. To date, there have not been any significant health issues with the flocks reared in the house and there has been no need for any antibiotic use so far.

### Environment

The use of natural ventilation and the absence of artificial heating, except for underneath the motherhoods, means that the house has low energy needs. The Windstreek broiler house uses 20% of the energy of a comparable higher welfare indoor broiler house. Solar panels provide this minimal need, resulting in an overall neutral energy consumption.



In terms of air pollution, ammonia emissions from the house have been reduced by more than 60%, and air particulate matter emissions reduced by 85%, compared to standard broiler houses. This is due largely to the fortnightly removal of dirty litter from under the motherhoods throughout the production cycle. Proportionally more faecal matter builds up under the motherhoods compared to the rest of the house as this area is frequently visited by the birds for food, water and shelter throughout production. Frequent removal of the litter from under the motherhoods therefore has a disproportionately great impact on air quality.



## Marketing

At the end of production, the broilers from the Windstreek system are slaughtered and processed by Plukon Food Group, one of the largest producers and suppliers of poultry meat serving supermarkets in The Netherlands, Germany, France and Belgium. The product is currently being sold through the Dutch supermarket Albert Heijn.

Plukon Food Group communicated widely on the launch of the Windstreek broiler house and gained significant press coverage as a result. The company has also developed special packaging featuring an image of the Windstreek broiler house and a QR code which connects consumers to a webpage providing information about the system. Additionally, there is a more technical, industry-facing website dedicated to the Windstreek broiler house, which contains more detailed information, images and videos of the system.

## SUMMARY OF SUSTAINABILITY FEATURES

The following table produced by Wageningen Livestock Research<sup>4</sup> summarises the key sustainability features and results from the design of the Windstreek broiler house.

	Feature	Result
<b>Animal Welfare</b>	Animal behaviour	Broiler can perform full behavioural repertoire and can move well during its whole life (gait score = 0)
	Thermal comfort and climate	Always good air quality, providing individual choice for broiler to choose optimal climate
<b>Animal Health</b>	Foot pad dermatitis and breast blisters	FPD-score < 40 (Berg 1998 scoring system <sup>5</sup> )
	Use of antibiotics	More than 98% production is antibiotic free
<b>Environment and Labour Conditions</b>	Ammonium emission	>60% reduction
	Fine dust emission	>85% reduction
	Fine dust concentration in house	>80% reduction
	Emission greenhouse gasses	Reduction of 2.34kg CO <sub>2</sub> per animal per year from gas and electricity use reduction and 1.29kg CO <sub>2</sub> per animal per year from the design of the house
	Fossil energy use exploitation	No use of fossil energy
<b>Landscape</b>	The aesthetic design of the system contributes to landscape	
<b>Transparency</b>	Maximum openness reinforces consumer-realisation of the origin of the product	

## KEY LEARNINGS AND TAKE HOME MESSAGE

The Windstreek broiler house has successfully combined a whole range of welfare improvements to create a system that is effective at providing higher welfare conditions for the broiler chickens whilst also ensuring that the production is commercially viable. Key aspects to the success of the system include:

- Bold thinking – the Windstreek broiler house features a range of animal welfare improvements, that are known to have a positive impact individually, and incorporated them into one house. In the initial concept design process, the objective was to try to start again from the basic principles, designing a new broiler house around the birds' needs.
- Supply chain partnership – the Windstreek broiler house has been made possible by close collaboration through the supply chain. Support and coordination between the producer, processor and retailer were essential to realise the project. Also essential was the partnership of equipment and building manufacturers and the technical support of Wageningen UR Livestock Research.
- Integrated approach to future-proofing – the Windstreek design takes into consideration energy use, environmental pollution, animal health and welfare, and economics in an attempt to mitigate future challenges to humane, sustainable farming.

## TO FIND OUT MORE

A video of the Windstreek broiler house can be found on Compassion's Food Business website: [www.compassioninfoodbusiness.com/awards/special-recognition-awards/best-innovation-award-2016/](http://www.compassioninfoodbusiness.com/awards/special-recognition-awards/best-innovation-award-2016/)

<sup>1</sup>Dutch Ministry of Economic Affairs, Agriculture and Innovation (2011) Pluimvee met Smaak (Broilers with Taste) *Wageningen Livestock Research Publication* <http://edepot.wur.nl/185043>

<sup>2</sup>Beter Leven assurance scheme: [www.beterleven.dierenbescherming.nl](http://www.beterleven.dierenbescherming.nl)

<sup>3</sup>Bailie, C.L., Ball, M.E., O'Connell, N.E. (2013) Influence of the provision of natural light and straw bales on activity levels and leg health in commercial broiler chickens. *Animal* 7:4, 618-626.

<sup>4</sup>Vermeij, I., Janssen, A., Bos, B. (2014) Broilers with taste; interactive design of more sustainable broiler production systems *XIVth European Poultry Conference 2014, Stavanger, Norway*. WPSA.

<sup>5</sup>Berg, C.C. (1998) Foot-pad dermatitis in broilers and turkeys. Prevalence, risk factors and prevention. *Doctor's dissertation*. Swedish University of Agricultural Sciences, Uppsala, Sweden.

Windstreek broiler house: [www.windstreek.eu](http://www.windstreek.eu)

Plukon Food Group: [www.plukonfoodgroup.com](http://www.plukonfoodgroup.com)

Further resources on broiler chicken welfare can be found on Compassion's Food Business website here: [www.compassioninfoodbusiness.com/resources/broiler-chickens](http://www.compassioninfoodbusiness.com/resources/broiler-chickens)

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