Maximising the potential of the day-old chick

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During the first five days of a chicken's life, the bird goes through a period in which the highest growth rate of his whole life occurs. In these first five days, the chicken can multiply his own body weight up to four times compared to the weight at day 0. Because of the short life cycle of the birds, the developmental and growth phase is crucial. The growth that is missed during the first five days of the posthatch period will not be regained later in life.

Developing genetic potential

Brooding reflects the first five days of the chicken's life. A good start during these first five days increases the possibilities for the bird to express its genetic potential later in life.

During this critical period, the bird therefore needs special care to optimise the start and further development from the moment of hatch onwards. During the brooding period, important developmental and physiological processes occur. Although the bird is anatomically complete at the day of hatch, the digestive, immune and thermoregulatory systems are not fully developed. To optimise early growth and development, early feeding is essential for the stimulation and development of the digestive tract. Besides this, early feed may prevent essential immunoglobulins of the residual yolk being used for energy instead of used as maternal antibodies.

The immune system is activated and developed in the brooding period, and is important for the immune competence of the chicken later in life.

The development of the thermoregulation system takes place during the first 4-5 days posthatch. Before the completion of the thermoregulation system, chickens are not able to regulate their own body temperature. Therefore, they behave as cold-blooded animals by adjusting their body temperature to the environmental temperature.

In contrast to cold-blooded animals, chickens require an optimal body temperature of 40.6°C. At this optimal body temperature, metabolic processes, growth and development are optimised. After 4-5 days the birds are completely homeotherm. This transition towards a homeotherm animal is affected by several factors, such as the age of the breeder flock and strain. For example, the younger your breeder flock, the longer it will take for the chickens to become fully homeotherm. In chickens of young breeders, the transition will last 24-48 hours longer compared to the transition in chickens of older breeders.

Patented radiators ensure uniform laminar airflow.

Brooding in practice

After hatching, chickens are transported to the broiler house. During transport, brooding conditions are often sub-optimal because the birds are restricted from feed and water. The maintenance of the optimal body temperature is difficult when the truck is not equipped with an adequate cooling system and uniform airflow.

In the traditional broiler houses, air temperature, floor temperature, air speed, relative humidity and the carbon dioxide concentration are crucial factors that need to be controlled to optimise the body tem-

Continued on page 8

Continued from page 7
perature of all the birds. These variables are all extremely important during the brooding period.

However, the number of variables influencing the environment, and the size of the broiler houses impede the optimalisation of the body temperature of all the birds. When the body temperature is not equal to the optimal value, the heat production of the chicken will change, their metabolism will change and the growth and development will retard.

Sub-optimal and non-uniform conditions will, therefore, lead to delayed start-ups, reduced growth rates and a non-uniform flock. As a solution, the HatchBrood system was developed to create uniform, optimal conditions for the first five critical days of the chicken's life.

The HatchBrood system

In the HatchBrood system, 39,600 chickens can be brooded. The system is divided into 12 sections in which 3,300 chickens can be held. Six sections on the left and right side of the system are separated by a central corridor.

After hatching, chickens are transferred to the HatchBrood Cradles. Each Cradle can contain 50 chickens.

A total number of 22 Cradles are stacked on one trolley and three trolleys can fit into one section.

In the Cradles, the chicks have access to feed (above) and fresh water (below).

Every Cradle is equipped with two feeding troughs which hold the right amount of feed necessary for the number of days that the chickens stay in the HatchBrood system.

Chickens have unlimited access to water, by a constantly running open drinking water system.

Fresh air enters the HatchBrood system at every layer of Cradles and each layer of Cradles has its own illumination provided by LED light.

To control the ambient conditions, the HatchBrood system is equipped with special designed radiators, which create an uniform, laminar airflow.

Six temperature sensors, equally divided on the inside of the HatchBrood system, measure the air temperature and control the ambient temperature to obtain optimum chicken body temperatures of 40.6°C throughout the system.

The HatchBrood system has the following benefits:

- In the HatchBrood system, all the crucial variables that influence the brooding conditions, such as temperature, air speed, relative humidity and carbon dioxide concentration are controlled on chicken level which optimises early growth and development and which improves the predictability and the technical results.
- Transport of the chickens to the broiler house is postponed for a few days, to prevent sub-optimal conditions during the first five critical days of life. Furthermore, chick-

ens have access to feed and water much earlier than in the current practical situation. Therefore, the development of the intestinal tract and activation of their immune system starts earlier and under optimal conditions.

● In the HatchBrood system, the heat that is produced by the chickens and the heat that is generated by the radiators is captured in an energy recovery system. This will lead to energy savings compared to the traditional housing systems. To control the brooding temperature in HatchBrood system, less energy is used than in a traditional broiler house. Also less carbon dioxide is produced, leading to a positive contribution to sustainable poultry farming.

Improving technical results

By creating an optimal environment in the HatchBrood system, the first critical days of the chicken's life are controlled and growth and development of the chickens are improved.

Results showed that chickens brooded in the HatchBrood system had a longer chick length at day four, compared to chickens brooded in traditional houses, which suggests that the HatchBrood chickens are better developed.

In addition, mortality decreased and the uniformity of the flock improved. Besides these results, the HatchBrood system is especially beneficial for chicks of young breeder flocks (<35 weeks).

Chickens of young breeders are more sensitive to sub-optimal conditions than chickens of older breeders and, therefore, require perfect care. Although the developmental phases during the first five days are the same, it is known that chickens of young breeders have a more immature thermoregulation system than chickens of older breeders. Chickens of young breeders require a higher environmental temperature that lasts longer, to maintain their body temperature at the optimal level of 40.6°C. When the care is optimised, their growth rate will be comparable to the growth rate of chickens of older breeders and the mortality rate shows remarkably low numbers.

Control of the brooding conditions during the first five crucial days of the chicken's life, will lead to an optimal start and further development of the day-old chick. ■