The mystery of young breeders

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Birds are warm blooded animals, which means that they can actively influence their metabolism to keep their body temperature at a constant level. If they lose more heat than wanted and therefore get cold, they will first try to limit their heat loss, but if that is not possible or not sufficient they will start to produce more heat to stay warm. This is a very important mechanism for an animal, as their metabolism function is optimal at a specific temperature.

Environmental temperature

A cold blooded animal like a snake or a fish reacts differently to temperature fluctuations. They do not have a specific optimal body temperature, but their metabolism can function at a range of temperatures.

Their body temperature changes with the environmental temperature and they do not change their metabolism to correct it.

They do have a higher metabolism if their body temperature goes up, which is the reason why cold blooded animals are more active in higher temperatures.

Although birds are warm blooded, chicken embryos react like a cold blooded animal. They can not actively change their metabolism, but their rate of development depends on the temperature, and especially on the temperature inside the shell (the so-called embryo temperature).

Unlike a snake, they do have a specific optimum body temperature. If this optimum temperature is not achieved, the development and growth will be impaired, and more and more research shows that this impairs performance later in life as well.

The transition from a cold blooded (poikilotherm) embryo to a warm blooded (homeotherm) chicken does not happen immediately at hatch. It is a slow process that takes several days to be completed.

The first signs of the change can be observed at the end of incubation, approximately at day 19. The transition process is normally completed approximately 4-5 days after hatch.

From that moment on, the chick really reacts as a warm blooded animal, before that moment it still partly reacts as an cold blooded embryo, at least from a thermoregulatory point of view.

This means that during the first 4-5 days of life, the chick is very sensitive to temperature, and especially to low temperatures. If they are getting too cold, they will not move around and find food and water but will sit lethargically on the litter.

When this happens, they will start slow and non-uniform, which results in a poor growth and poor uniformity later on. The chance that they will die from navel yolk sac and E. coli infection also increases.

Sub-optimal conditions for young chicks will result in a decrease of uniformity.

Byproduct of metabolism

Birds, like all animals, produce heat as a byproduct of their metabolism. So if they are eating, digesting feed and growing, they will produce heat and to a certain degree keep themselves warm.

The problem is that when a chick is cold, it does not move and does not eat, and it does not start producing heat that results in a higher body temperature. Once the bird is eating, the problem of under cooling is much less, but first it has to start eating as quickly as possible.

The thermoregulatory system does not develop for each type of chicken in the same way. Some genetic strains react differently from others, but there is especially a difference relating to the age of the breeder flock.

We know that chicks from young breeder flocks (younger than 33-35 weeks) have more problems during the brooding period.

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Broilers originating from young breeders have an increased first week mortality and a reduced growth rate when compared to chicks from an older breeder flock.

We often think that this is because the eggs are small, therefore the chicks are small at hatch and that creates the problem. This is definitely part of the problem, as a bird that is smaller takes longer to reach the same body weight, but it is not the only problem.

Eggs from breeders that are younger than 33-35 weeks of age produce chicks that take much longer (24-48 hours more) to develop their thermoregulatory system.

This means that at hatch and during their first days of life they are less mature than chicks that are produced by older breeders. It is as if they are neonates, animals that are born too early, although their actual hatch time is normal.

Embryo development

It is not known what the origin is of this problem. Genetically chicks from young breeders are identical to those from older breeders, so the genetic capacity of the bird is not the problem. More likely it is related to the development of the embryo, which is influenced by the composition of the egg.

One of the problems could be that the young breeder bird is still growing itself, which creates a competition for nutrients between her own body and the egg.

This would mean that the transition of nutrients from the breeder to the egg and from the egg to the embryo plays a role.

Many attempts have been made to overcome the problem by feeding the young breeder a more balanced diet, but without much success.

Influencing the yolk composition by feeding a different diet to the breeder has not resulted in an improvement yet, as the embryo from these young breeders seems unable to take up this adjusted composition. Perhaps the relative new science of nutrigenomics can give more answers. Nutrigenomics studies the influence of nutrition on gene expression.

Although all genes are present in every embryo of the same genetic make up, the expression of these genes depends on a lot of variables, including nutrition.

As the embryo of a young breeder reacts so differently from that of an older breeder, perhaps this science can give us directions on how we have to manage and feed our young breeders or embryos from young breeders to help them develop better.

But, until science has given us more answers and solutions, we have to deal with a large number of chicks in commercial operations that react as a neonate at placement in the broiler house.

Maximum control essential

As these chicks are very sensitive to sub-optimal conditions and especially to temperature, maximum control of the environment for each individual chick is of the utmost importance. Only in this way can we stimulate feed intake for these birds and let them develop further into a fully functional chick.

It will take them 24-48 hours longer to get to that same stage of development and in that brooding period the birds are more sensitive, but once that period is passed the normal potential of the bird is there.

To achieve this ultimate control, the Hatchbrood system has been developed.

The system consists of cradles that each contain 50 chicks, with feed and open water. The temperature control is based on a proven principle based on a constant temperature and air velocity for all chicks throughout the system.

Chicks are placed in this system immediately after pulling the hatch, to ensure fast access to feed and water and full temperature control.

After 4-5 days, birds are transported to the farm where normal growing procedures are continued.

As this system is able to give full climate control and perfect conditions for all individual birds, the neonate chicks from young broiler breeder flocks will have a better start and a better opportunity to develop into a full grown healthy broiler. ■