



Delayed Placement and High Body Temperatures negatively affect Chick Quality in the Early Brooding Period

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In commercial hatcheries, the time between hatch and feed consumption can be up to 72 hours because of hatch time, chick handling, and transportation time. These procedures are required but result in a delay in water and feed consumption for chickens. A long delay in feed and water consumption posthatch has been shown to negatively affect chick quality and subsequent performance. Suboptimal environmental conditions between hatch and first feed consumption may even further decrease chick quality at hatch and performance in later life, but these effects are less quantified. In hatcheries, heat stress in chickens after hatch (rectal temperature >41 °C) can easily occur because of a lack of cooling capacity in the hatcher or unawareness about optimal body temperatures after hatch and during chick handling and storage. The Research department of HatchTech investigated the effect of high rectal temperatures (41 °C) and delayed placement (9 hrs) on the growth performance of broiler chickens in the early brooding period which are the first 4 days posthatch.

The current study was performed in HatchTech hatchers and a HatchBrood unit. HatchBrood is a system that provides an optimal environment during the brooding period and ensures that the rectal temperature of the chickens is maintained at an optimal and uniform temperature between 40.0 and 40.6 °C (www.hatchbrood.com). In the HatchBrood, day-old chickens are placed in cradles containing 50 birds each. Air temperature and velocity, relative humidity, and CO₂ are constantly monitored and adjusted to settings to maintain optimal brooding conditions. All chickens have access to fresh air, water, and feed. After 4 days, chickens are transported to the farm to complete their production cycle.

In the current study, chickens of a prime Cobb and Ross breeder flock of 46 weeks were used. Chickens were placed in the HatchBrood either 2 hours (direct placement treatment) or 9 hours (delayed placement treatment) after pull time. Chickens of the delayed placement treatment were kept in a hatcher at an optimal ($\pm 40^{\circ}\text{C}$) or high ($\pm 41^{\circ}\text{C}$) rectal temperature for 9 hours and were then placed in the HatchBrood. Body weights and feed intake were measured at pull time, after 9 hours in the hatcher and after 24 and 96 hours in the HatchBrood.

Results showed that the growth of Cobb and Ross chickens was comparable and on average 67.6 g during the 96 hours in HatchBrood. Chickens of the delayed placement treatment lost about 1.5 g of body weight during the 9 hours in the hatcher (Table 1). This weight loss was slightly higher for the chickens maintained at a high rectal temperature compared to chickens maintained at the optimal rectal temperature. Body weight loss in the posthatch period is mainly caused by water loss and this is a result of the respiration of the bird and the evaporation of water. When chickens become overheated, they start to pant and this increases the loss of water. Panting is used to lose more heat through evaporation, but has the negative effect that more water is lost from the body and the chicken can become at risk of dehydration.

When the chickens of the delayed placement treatment were placed in the HatchBrood, they were able to compensate the 1.5 g in water loss that occurred in the hatcher. This was shown by the result that chickens of the delayed placement treatment increased their body weight on average by 16.2 g in the first 24 hours and chickens of the directly placed treatment increased their body weight on average by 14.6 g in the first 24 hours in the HatchBrood ($\Delta = 1.6$ g). The higher increase in body weight of the delayed placement treatment in the first 24 hours in HatchBrood was probably caused by a higher water intake, because feed intake was comparable.

At 96 hours in the HatchBrood, chickens of the delayed placement treatment with an optimal rectal temperature in the hatcher had a higher body weight ($\Delta = +3.8$ g; +5.4%) compared to chickens of the delayed placement treatment with a high rectal temperature in the hatcher (Table 1). This shows that chickens that experience heat stress in the hatcher or during chick handling and transport have a lower posthatch growth. The high rectal temperatures in the current study (41°C) were relatively mild and higher rectal temperatures ($>42^{\circ}\text{C}$) can be found in practice which will even further decrease growth in the posthatch period and in later life.

Table 1. Growth after 9 hours in the hatcher and growth after 24 hours and 96 hours in the HatchBrood of chickens that had a rectal temperature of 40.0°C (normal) or 41°C (high) in the hatcher

Treatment	Hours in the hatcher		Hours in the HatchBrood	
		9	24	96
Delayed placement, 40°C		-1.3	16.1 ^a	70.2 ^a
Delayed placement, 41°C		-1.7	16.3 ^a	66.4 ^b

^{ab}Means followed by different superscripts within a column are significantly different ($P < 0.05$)

When chickens are withdrawn from feed and water up to 9 hours after pull time, it is important to maintain the rectal temperature of chickens between 40.0 and 40.6°C. This optimal rectal temperature is crucial to maximize chick quality and subsequent performance, especially when the time between hatch and first feed and water consumption is delayed.

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