

Meeting Embryonic Requirements of Broilers Throughout Incubation: A Review

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Abstract

During incubation of chicken embryos, environmental conditions, such as temperature, relative humidity, and CO₂ concentration, must be controlled to meet embryonic requirements that change during the different phases of embryonic development. In the current review, the effects of embryo temperature, egg weight loss, and CO₂ concentration on hatchability, hatchling quality, and subsequent performance are discussed from an embryonic point of view. In addition, new insights related to the incubation process are described. Several studies have shown that a constant eggshell temperature (EST) of 37.5 to 38.0°C throughout incubation results in the highest hatchability, hatchling quality, and subsequent performance. Egg weight loss must be between 6.5 and 14.0% of the initial egg weight, to obtain an adequate air cell size before the embryo internally pips. An increased CO₂ concentration during the developmental phase of incubation (first 10 days) can accelerate embryonic development and hatchability, but the physiological mechanisms of this acceleration are not completely understood. Effects of an increased CO₂ concentration during late incubation also need further investigation. The preincubation warming profile, thermal manipulation, and *in ovo* feeding are new insights related to the incubation process and show that the optimal situation for the embryo during incubation highly depends on the conditions of the eggs before (storage duration) and during incubation (environmental conditions) and on the conditions of the chickens after hatching (environmental temperature).

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