

# Variations in incubation and postnatal environments affect the microbiota composition of fast-growing male chickens

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The caecal microbial population is known to influence the health and growth performance of the host, even when modified as early as at the embryonic step using in ovo inoculations. For favouring the developing chick embryo adaptation to thermal variations of later breeding environment, programs of temperature fluctuations during incubation were studied, such as those proposed for improving heat tolerance. The present study aimed to determine whether bacterial caeca composition was modified or not by variations in both incubation and postnatal environments in fast-growing male chickens.

Caecal bacterial communities were identified using high-throughput 16S rRNA gene sequencing techniques in 41 d-old chickens incubated either in control conditions (I0, 37.8°C and 56% relative humidity RH) or with temperature variations during incubation (I1; 39.5°C and 65% RH 12 h/d from day 7 to 16 of embryogenesis followed by 2 times 30 minutes at 15°C and 75% RH at days 18 and 19 of embryogenesis by transfer in a cold room). These incubation conditions were combined in a factorial design with control postnatal rearing conditions (T0 room with 33°C at d0 and temperature decrease down to 21°C until 3 weeks of age, which was maintained until 41 d of age) or challenging conditions in the T1 room with 28°C at d0, when chicks are sensitive to cold, a temperature decrease until reaching 21°C at 3 weeks of age, followed by heat exposure at 32°C from d 27 to 41, when chickens are sensitive to heat.

Results showed that the caecal microbiota composition of chickens from the T1 postnatal room differed strongly from that of chickens reared in the control T0 room. The experimental set-up cannot discriminate between the impact of thermal treatment and that of the bacterial environment of the room.

Interestingly, I0 and I1 caecal microbiota composition could be separated by discriminant analysis of principal components in the Control T0 room. Such discrimination, which was not observed in the challenge room T1 when considered alone, suggests that the incubation environment (temperature within each room/incubator) may affect the chicken caecal microbiota composition in the long term.

Funding: Integrated Management of Animal Health metaprogram of INRA for the “GISA-ROBUSTCHICK” project ([www.gisa.inra.fr/en](http://www.gisa.inra.fr/en))

**Key words:** gut microbiota; incubation; temperature variations; chicken