Effect of thermal manipulation of slower-growing broiler chickens on chick quality and physiology

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Why thermal manipulation during incubation?

- **Thermal manipulation** = Increase or decrease of incubation temperature during certain embryonic periods
- Epigenetics = Thermal programming possible
  - Improved resistance to temperature/pathogens in later life
- BUT also + or - effects possible on:
  - Survival & Chick quality
  - Skin development
    - High temp increased # blood vessels and diameter

What is the effect of thermal manipulation on chick quality and skin development of slower-growing broilers?

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Experimental design

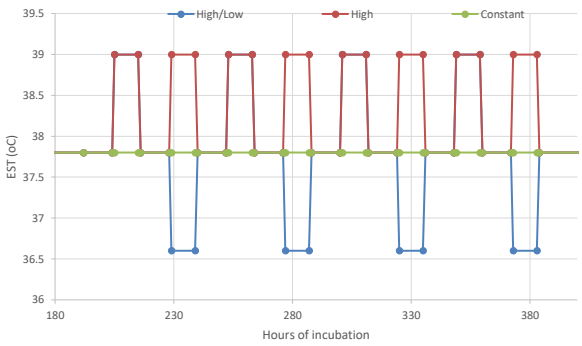
3 eggshell temperature treatments

1. Control (C):
Constant eggshell temperature of 37.8°C

Thermal treatment (TM): from embryonic day 9-16 temperature changed every 12 h

2. High/Low (HL)
37.8°C – 38.9°C – 37.8°C – 36.7°C

3. High (H)
37.8°C – 38.9°C



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Several measurements

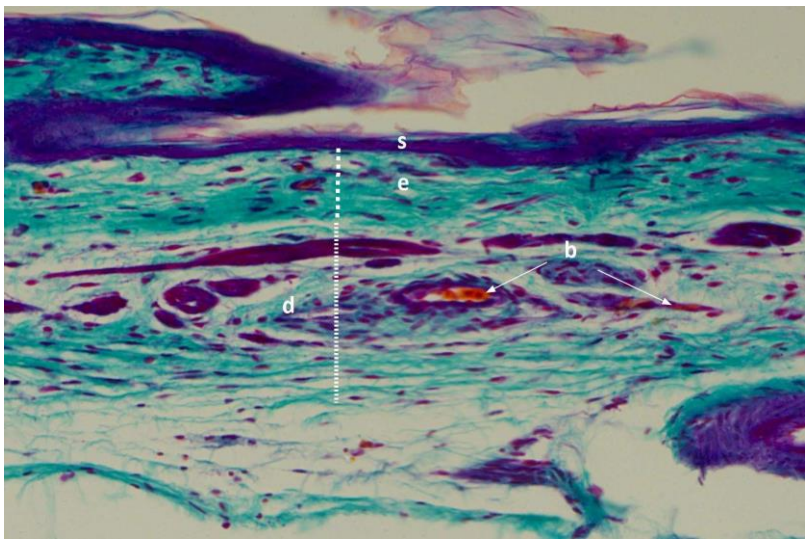
Heat production

Chick quality

Skin development
- Thickness of
  - s = stratum cornea
  - e = epidermis
  - d = dermis
- Number/Perimeter
  - b = blood vessel

Blood parameters

Bursa of Fabricius morphology



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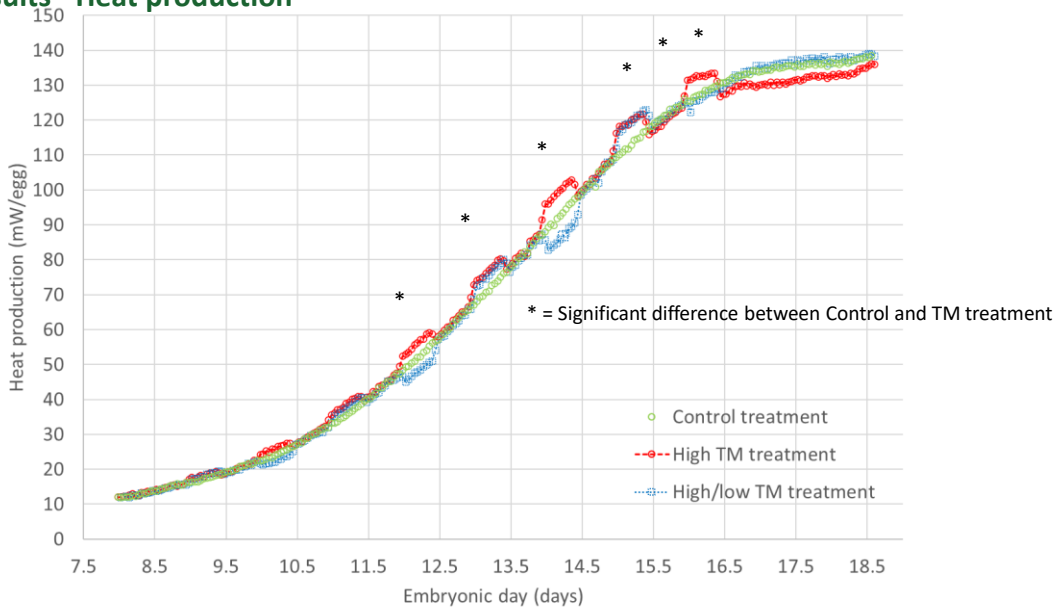
Results - Heat production



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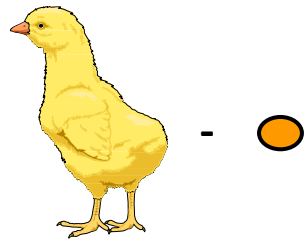
Study 1 – Results - Chick quality

Parameter	Control	High	High/ Low	SEM	P-value
Hatch time (hrs)	498	493	497	2	0.44
Body weight (g)	40.8	40.7	40.8	0.18	0.95
YFBM (g)	36.4	35.9	36.3	0.21	0.42
Residual yolk (g)	4.50	4.80	4.52	0.13	0.32
Heart (% of YFBM)	0.77	0.70	0.75	0.03	0.34
n	52	54	59		

Yolk-free body mass
Body weight minus Residual yolk weight



No difference in chick quality between treatment groups

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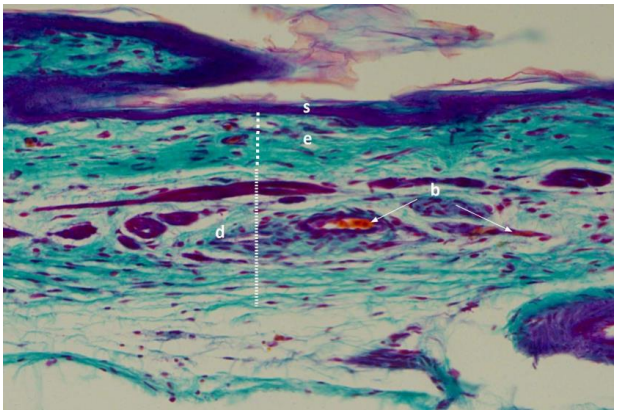
Results - Skin development

Parameter	Control	High	High/ Low	SEM	P-value treatment
Skin					
Str corneum (µm)	10	10	9	0.7	0.88
Epidermis (µm)	35	38	39	2.6	0.58
Dermis (µm)	74	75	85	7.1	0.57
Blood vessel ratio	9.0	8.6	8.9	0.54	0.91
Vessel perim (µm)	18	17	18	2.2	0.94
n	13	11	13		



No difference in skin development between treatment groups

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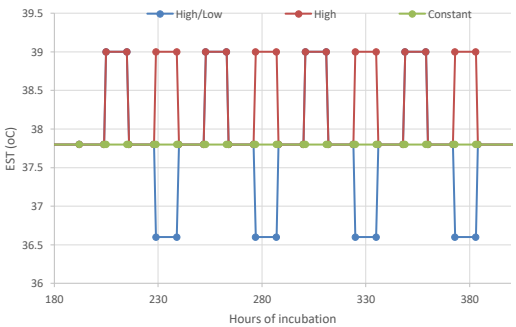
Conclusion Thermal Manipulation (TM) in slower-growing broiler chickens

Early life consequences of TM

- Heat production was instantly affected by TM
  - Metabolic rate affected
- No effect of TM treatment on chick quality or skin development @ hatch
  - No negative effects found
  - No physiological / adaptive capacity adjustments?
- Follow-up research to assess effectiveness of TM in later life
  - Fine tuning of amplitude, timing and frequency



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