Genetic parameters of body temperature in laying hens exposed to chronic heat

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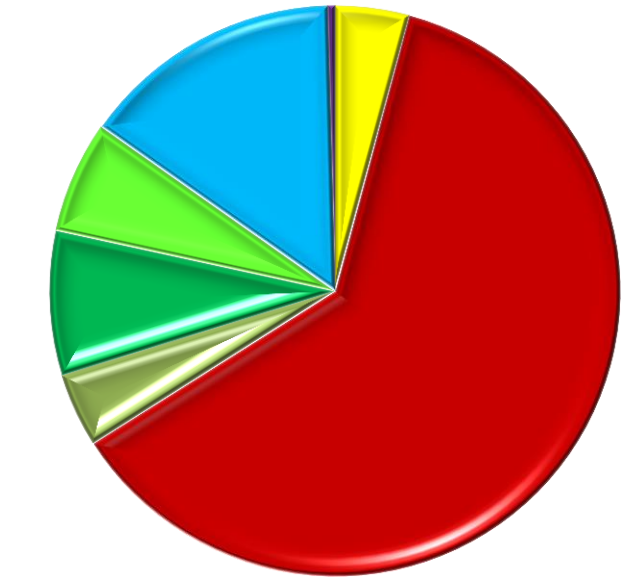
66th EAAP ANNUAL MEETING

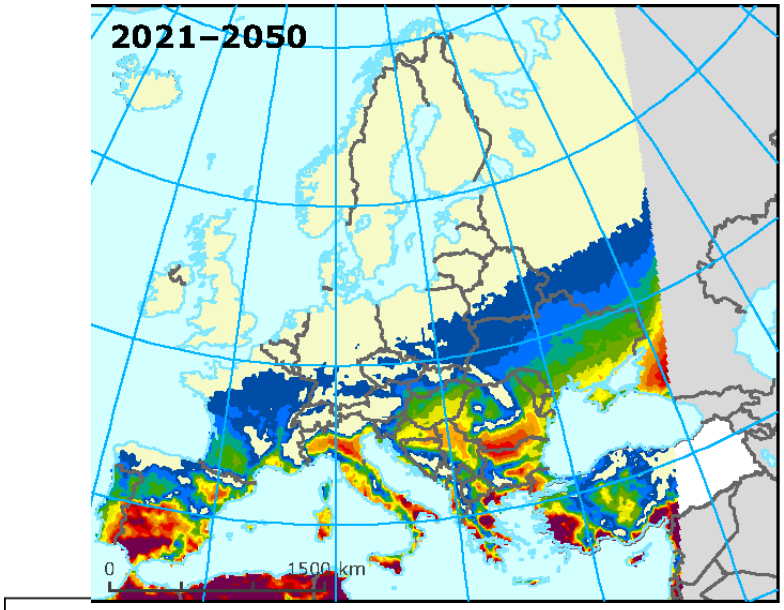
31th of August to 4th of September 2015

WHY DO WE NEED HEAT RESISTANT HENS?

World Egg Production (FAOStats, 2012)



Frequency of heat waves in Europe (Fischer and Schär, 2010)



Selection programs of Laying hens in optimally controlled conditions

Production performance vs. Thermal tolerance

HEAT DISSIPATION IN HENS

EVAPORATIVE HEAT LOSS

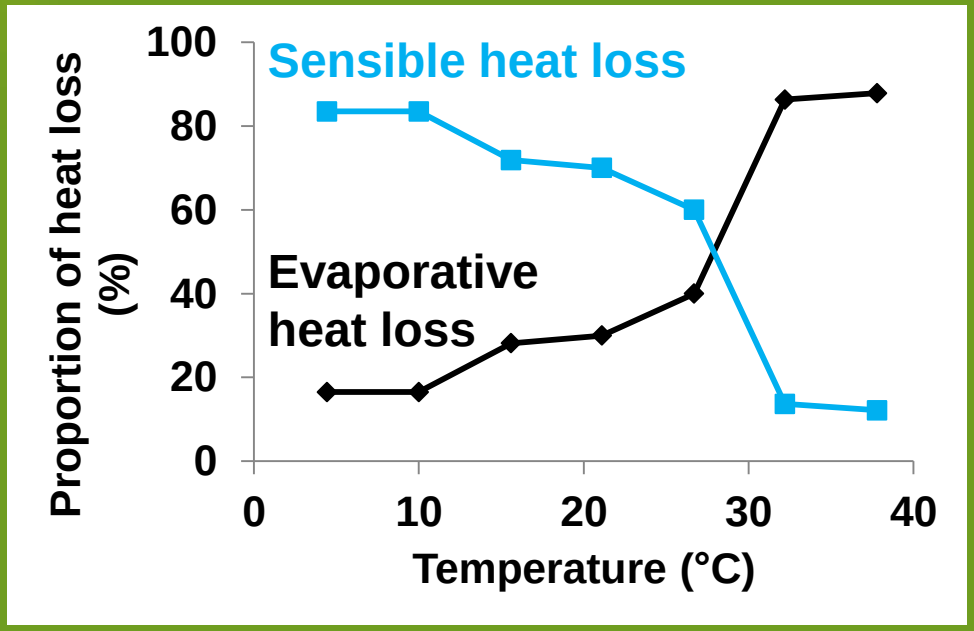
Evaporation

SENSIBLE HEAT LOSS

Convection

Conduction

Radiation



Anderson and Carter, 2007

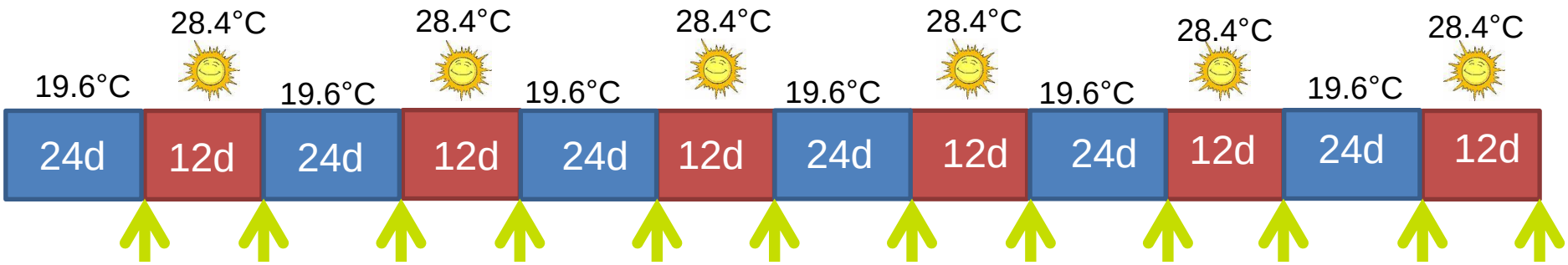
INRA SCIENCE & IMPACT

MATERIALS AND METHODS

- 2 genotypes of commercial laying hens
- 12 pens of 200 birds: 8 collective pens and 4 pens with individual nests
- 2 stress treatments: 6 stressed pens and 6 control pens
- 3 floor pens per genotype and per stress group

MATERIALS AND METHODS

- 6 cycles of chronic heat at 35 week of age



Thermography measures

MATERIALS AND METHODS

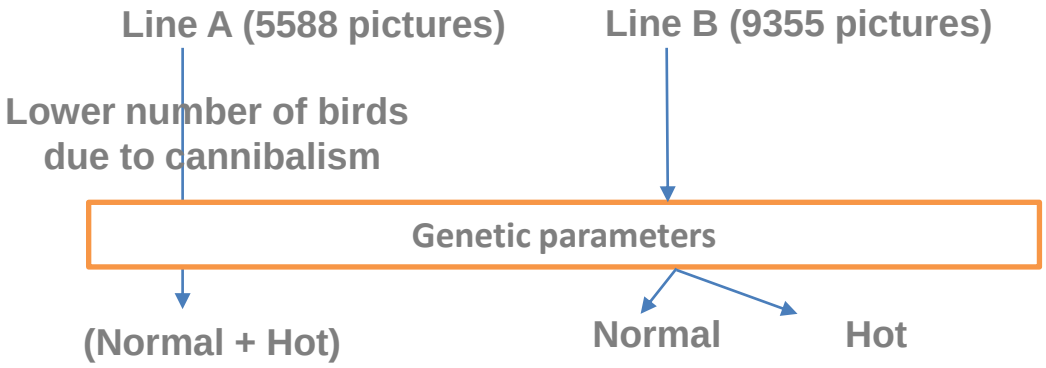
- Hens placed in a wooden box, pictures taken with FLIR B335 camera

- Analyses done with ThermaCam Pro 2.1 software

Mean shank temperature
Mean comb temperature
Mean wing temperature

STATISTICS

- **Proc GLM of SAS used to check significant effects to include in the model**
- **VCE6 with an animal model used to estimate genetic parameters**
  - Fixed effect of pen (N=12)
  - Fixed effect of heat stress treatment (heat vs normal)
  - Age of the hen
  - Ambient temperature of the pen
  - Number of pictures taken per bird (1 or 2)
  - Random direct genetic effect of animal

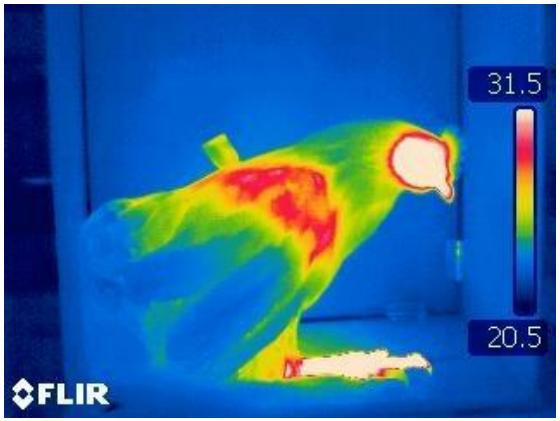


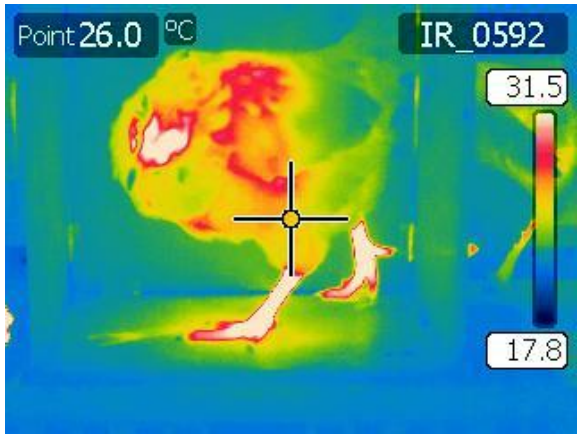
Results

Examples of pictures when it works … and when it does not

19.6°C

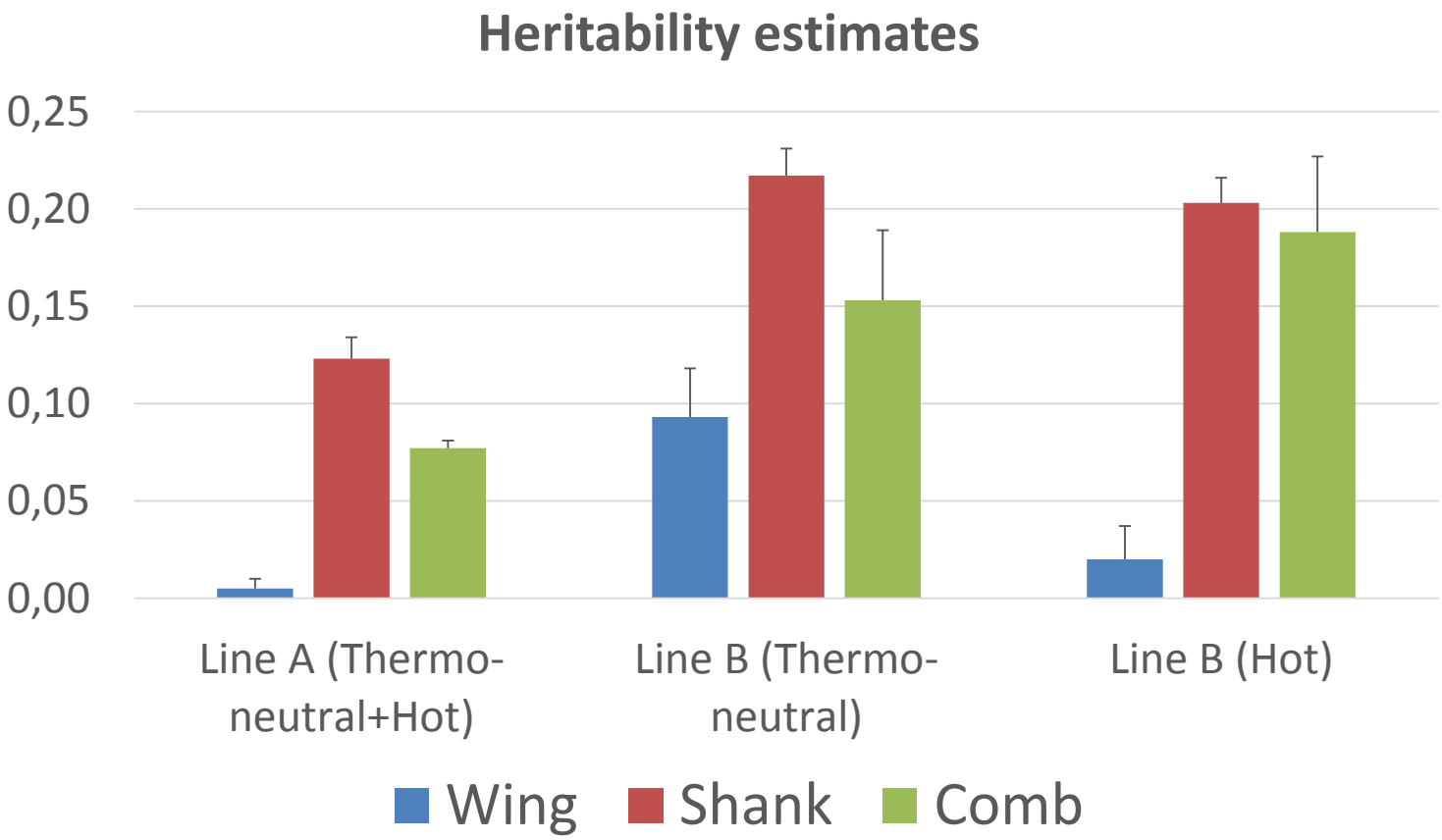
28.4°C





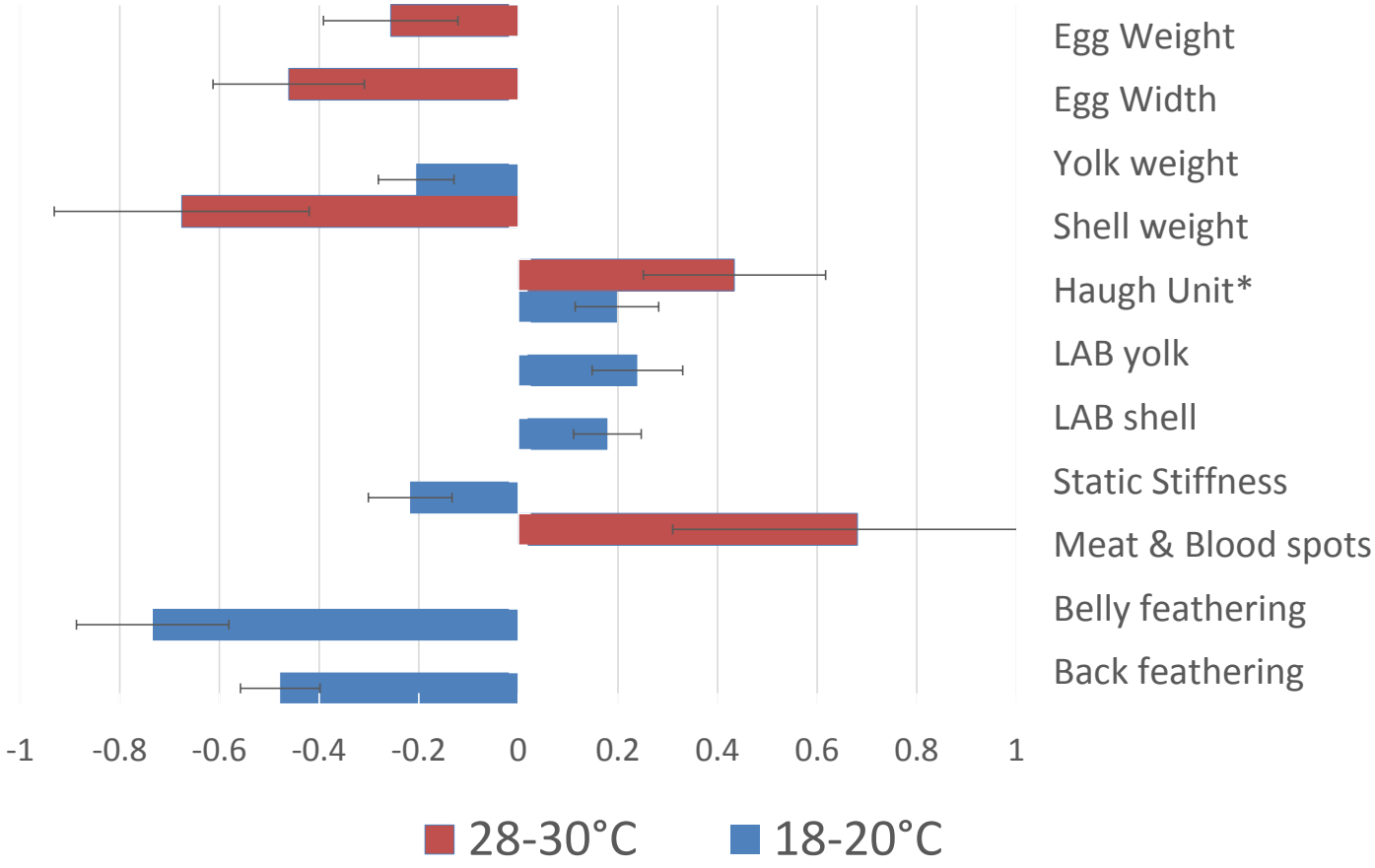
Results

Genetic parameters



Results

Genetic Correlations with shank temperature



Conclusions

- **Heritability estimates:**

  Wing → Low heritability

  → Surface temperature reflects environmental temperature

Shank and comb → higher heritability estimates

→ Heat dissipation partly under genetic control

- **Birds with poor plumage = less heat dissipation by shank**

- **Surface temperature is correlated with egg quality under heat stress**

- **Infrared thermography, a pertinent tool for phenotyping heat dissipation**

Thank you for your attention