

Improving Broiler Wellbeing and Microclimate through precision livestock farming (PLF) Application

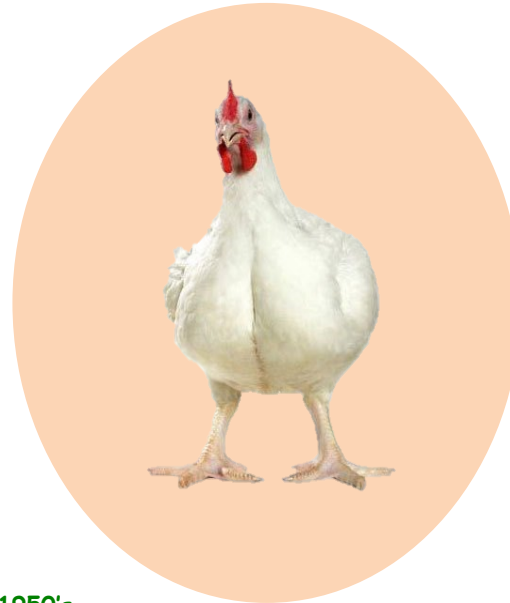
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the broiler's paradox

Growth:
Body weight
Feed consumption
FCR
meat production

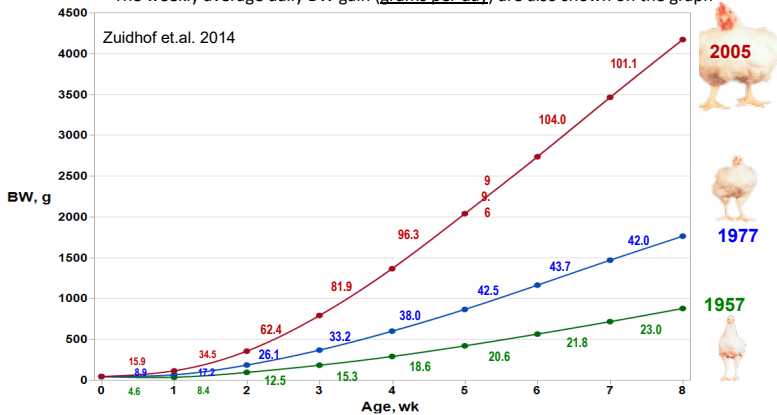


Capability to maintain
adequate dynamic
steady-state
mechanisms in the
body

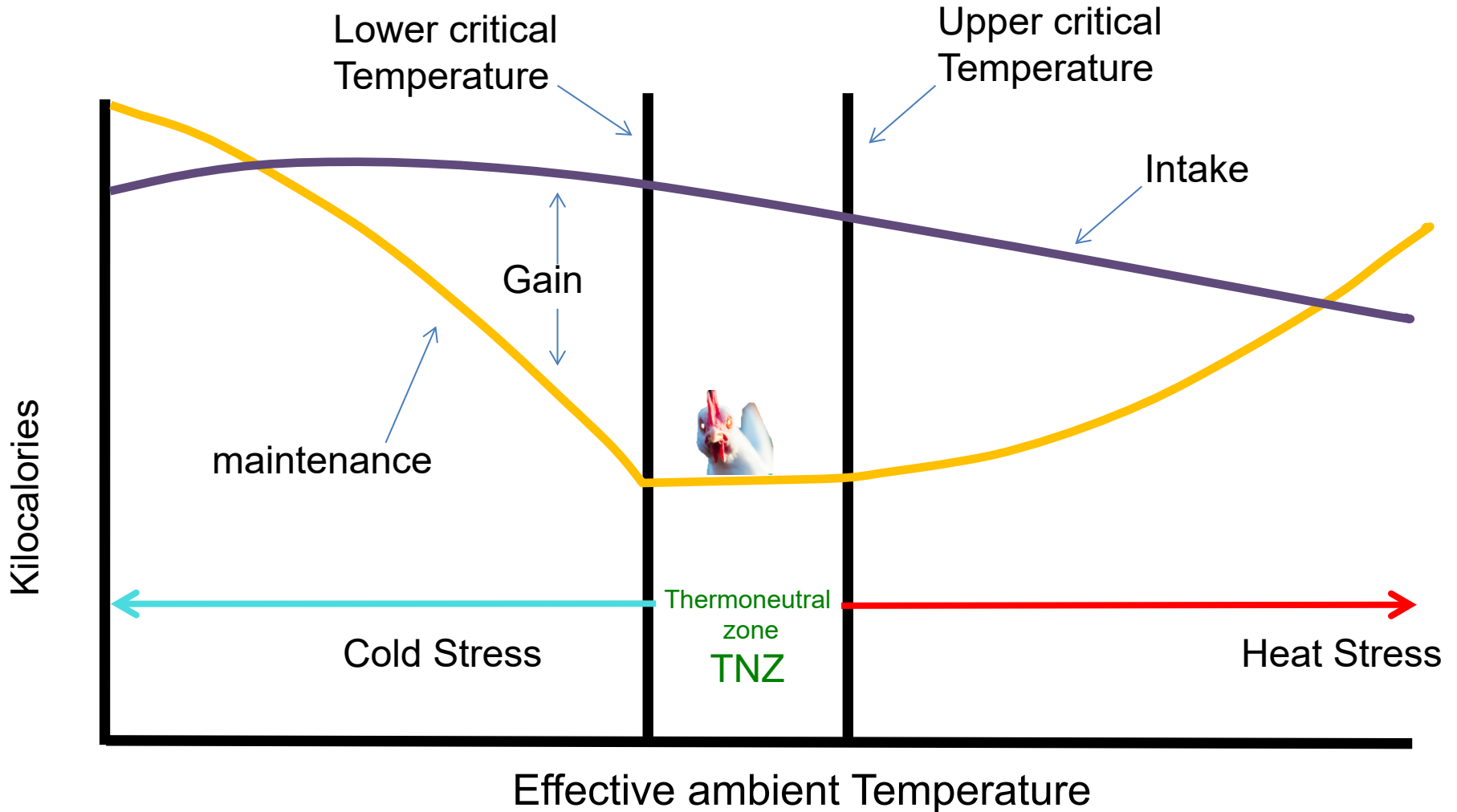
Genetic improvement in growth of broilers since 1950's

Growth curves of two strains kept without selection from 1957 and from 1977, and of Ross 308 broilers (in 2005), show weekly means of body weight (BW)

The weekly average daily BW gain (grams per day) are also shown on the graph

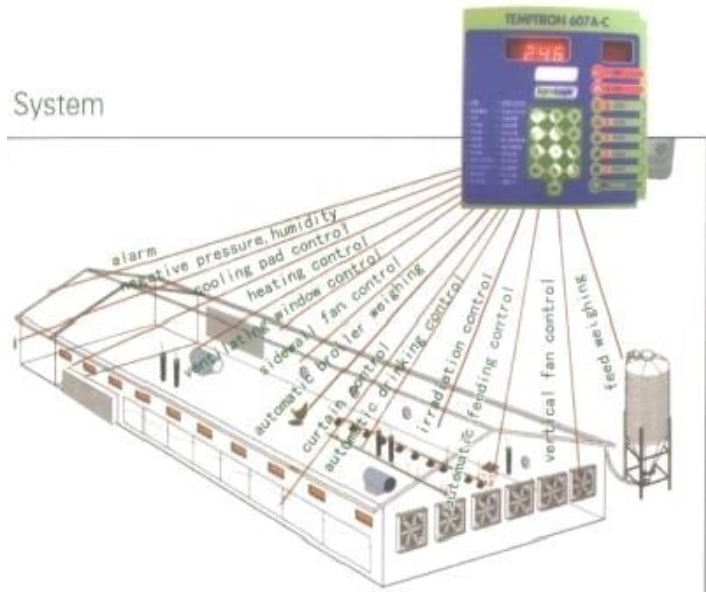


The Conflict between High Productivity and Thermotolerance

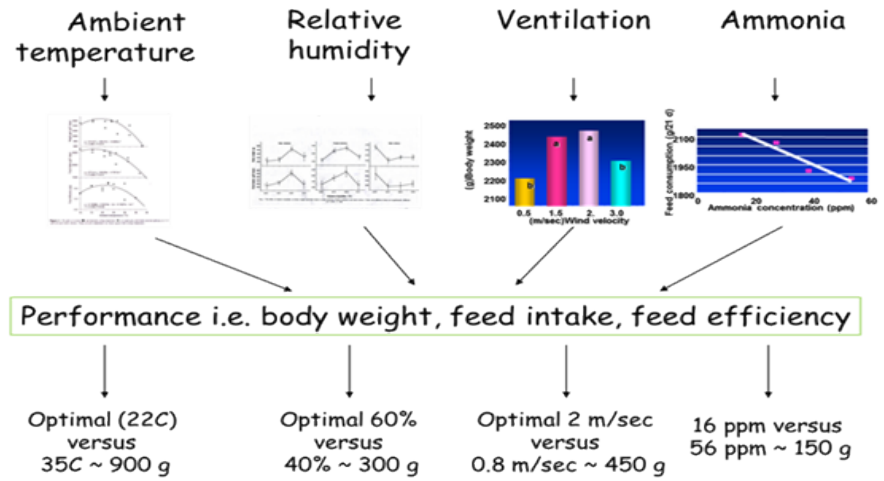


The **environmental condition in poultry houses** influences the wellbeing and productivity of broilers chicks.

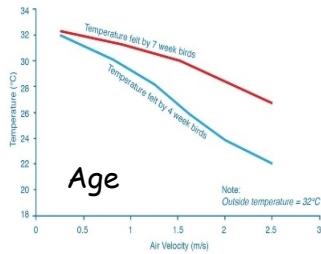
In order to provide the appropriate micro-climate, modern broiler-houses are equipped with climate control system, with sensors distributed in the broiler-house space measuring environmental parameters around the broilers.



Optimizing the Environment



Broiler centric approach



Feather coverage



Metabolism



Behavior and preference



Litter management and condition

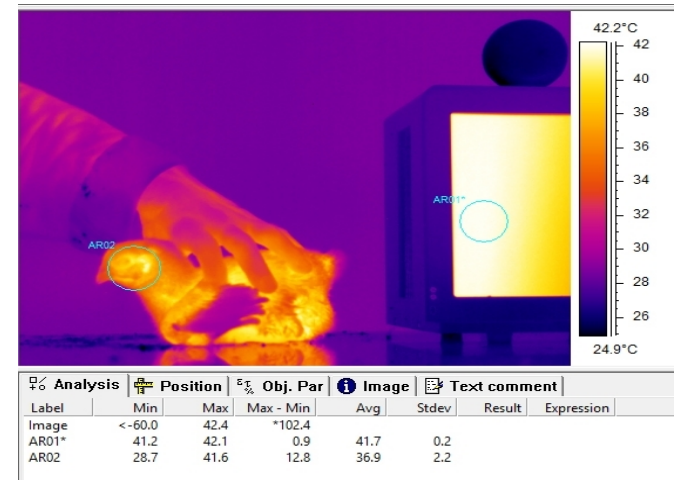


How can we tell what is the broiler physiological state?

In birds, **body temp.** (Bt) is the most physiologically-protected parameter.

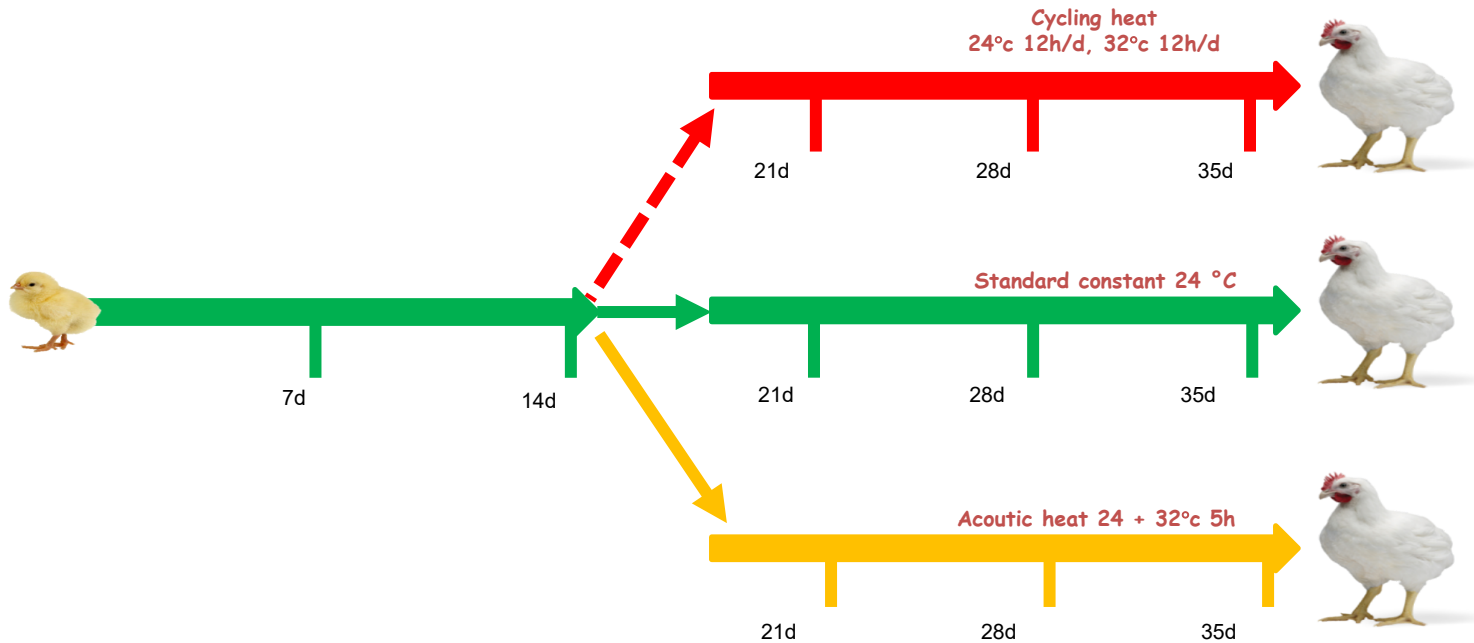


Looking for an easy and precise way:

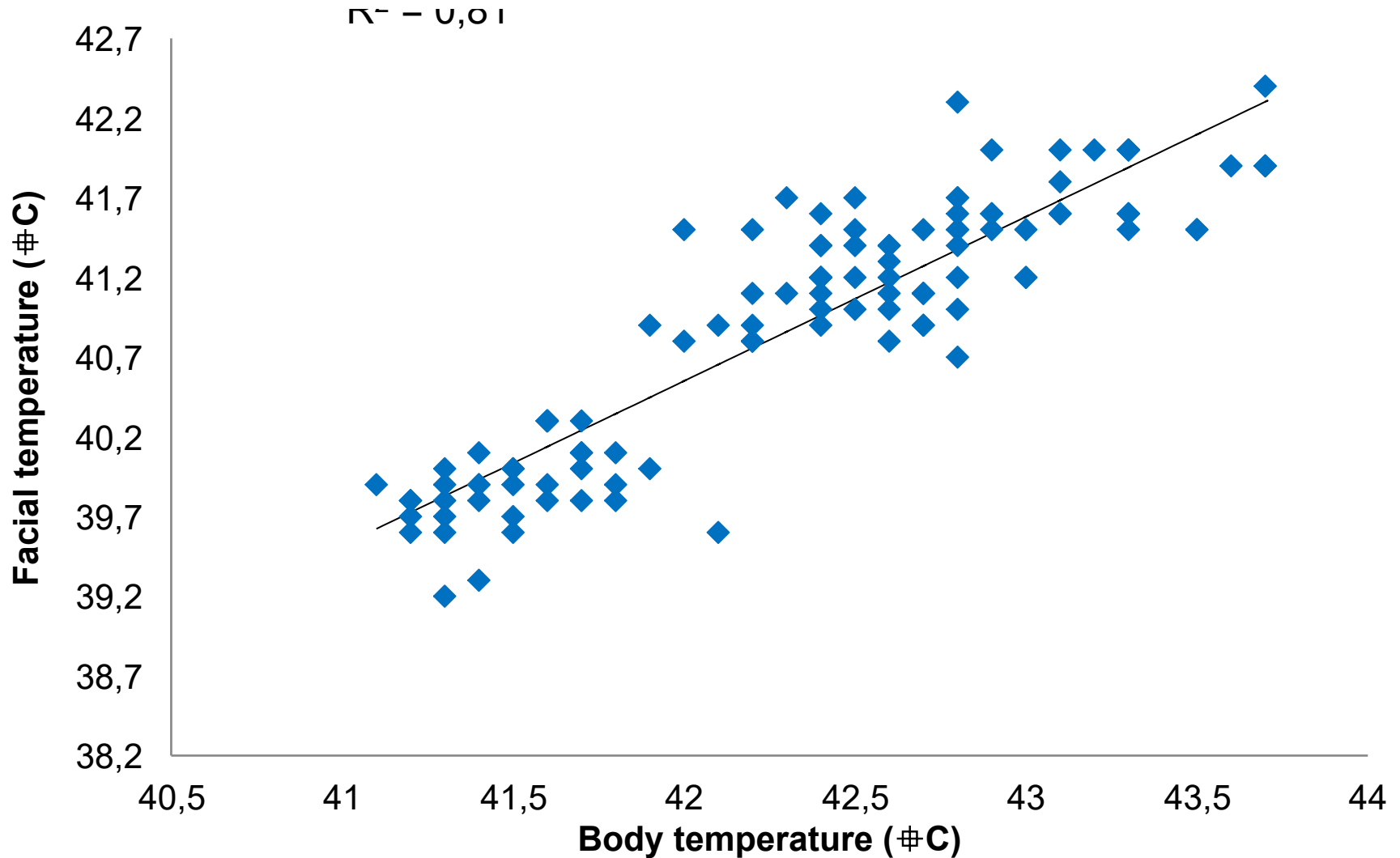


Yahav, S. and Giloh, M. (2012). Infrared thermography – applications in poultry biological research. In: Infrared Thermography. Edited by Prakash, R.V. Intech Publications. pp. 93-116.

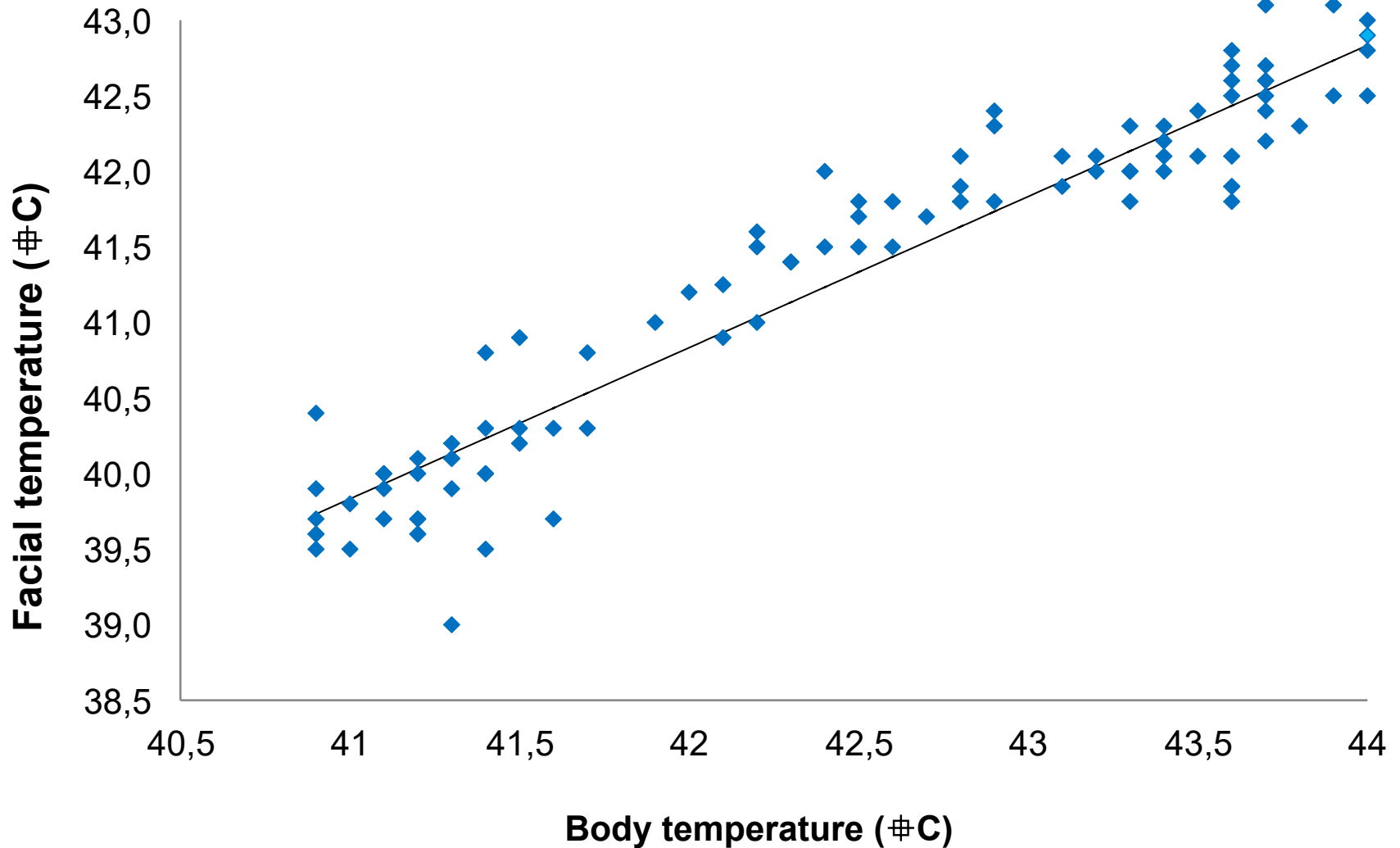
Facial temperature set up:



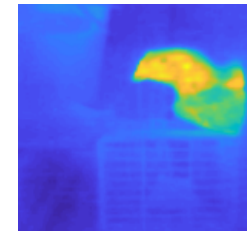
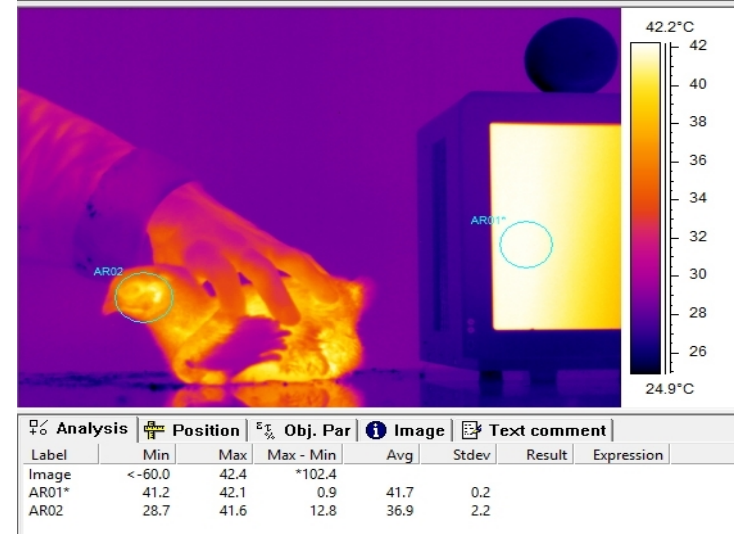
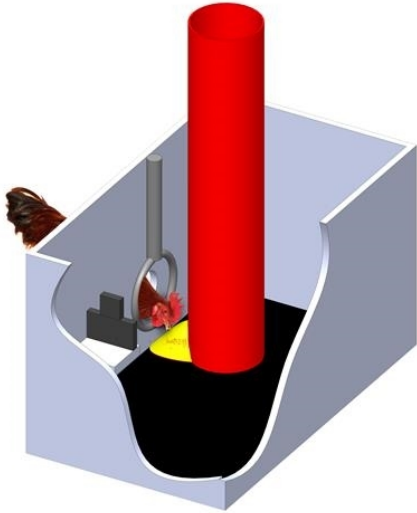
3rd-week Facial to body temperature correlation of male broilers raised under either standard conditions, short-term rapid elevation in ambient temperature, or Cycling heat 24°C 12h/d, 32°C 12h/d



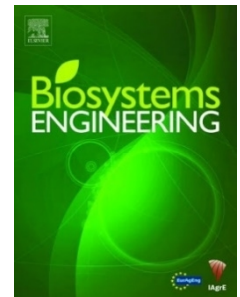
5th-week Facial to body temperature correlation of male broilers raised under either standard conditions, short-term rapid elevation in ambient temperature, or Cycling heat 24°C 12h/d, 32°C 12h/d

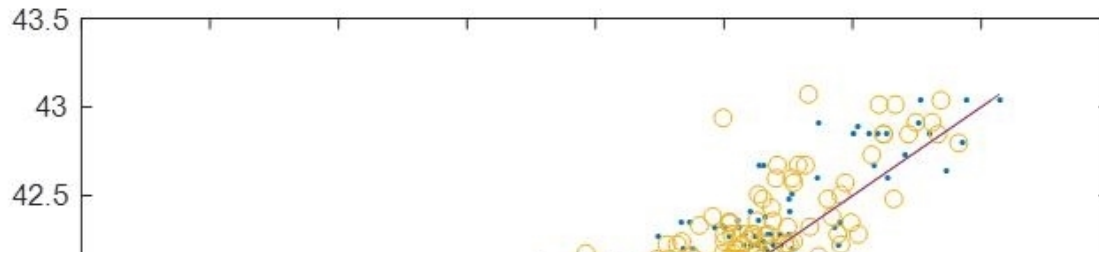


An affordable real-time thermal system to evaluate broiler's body temperature and thus to improve climate control in the poultry house

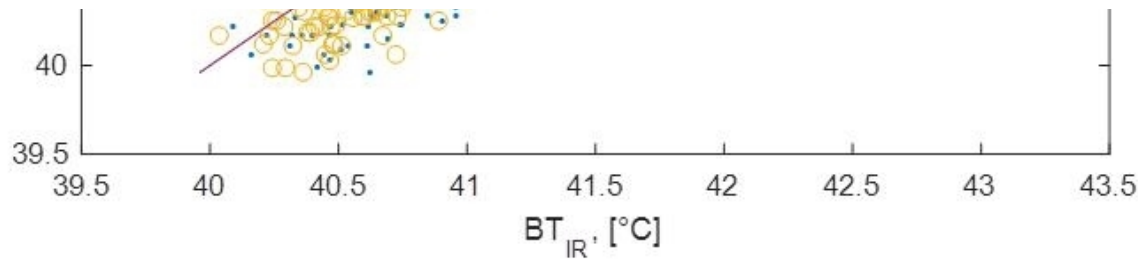


Further reading:
 Automatic broiler temperature measuring by thermal camera.
 Victor Bloch, Natan Barchilon, Ilan Halachmi, Shelly Druyan, 2020





Correlations between thermal camera and body temperature was found to be sufficient for farm implementation



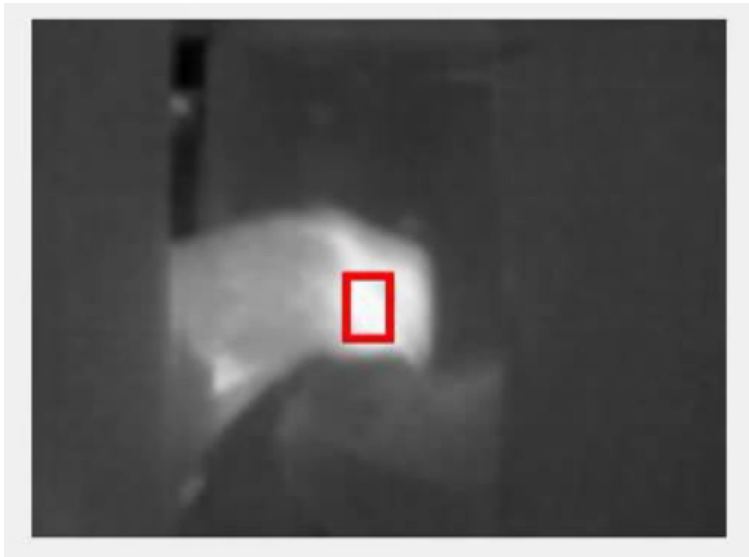
infrared thermography temperature [°C]

Body temperature

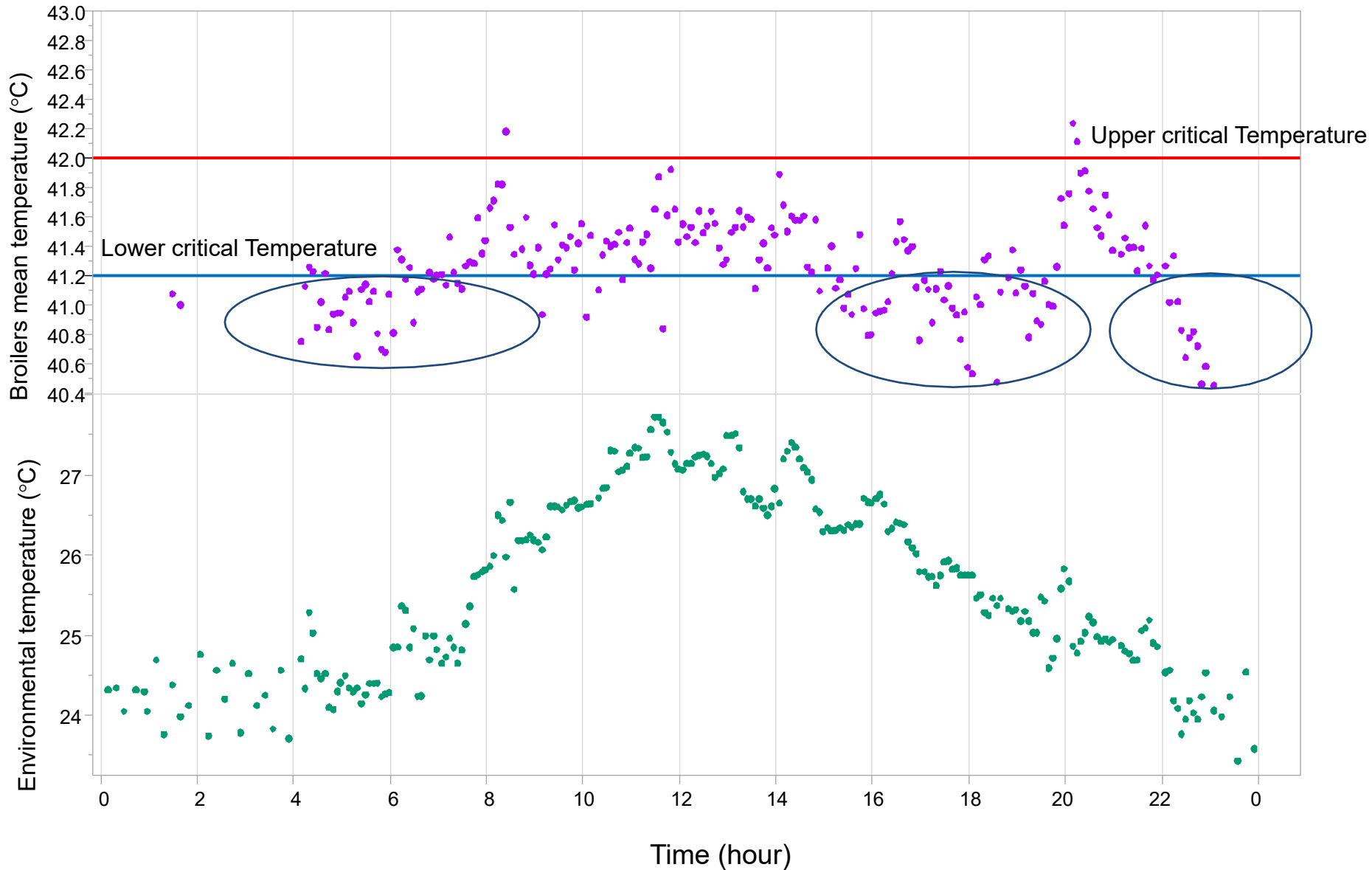
- Implanted temperature loggers in the broiler abdominal cavity (BT_{core}) is compared with
- infrared thermography temperature (BT_{IR}) monitored by FlirOne (dots) and Lepton (circles) cameras.

Commercial management condition

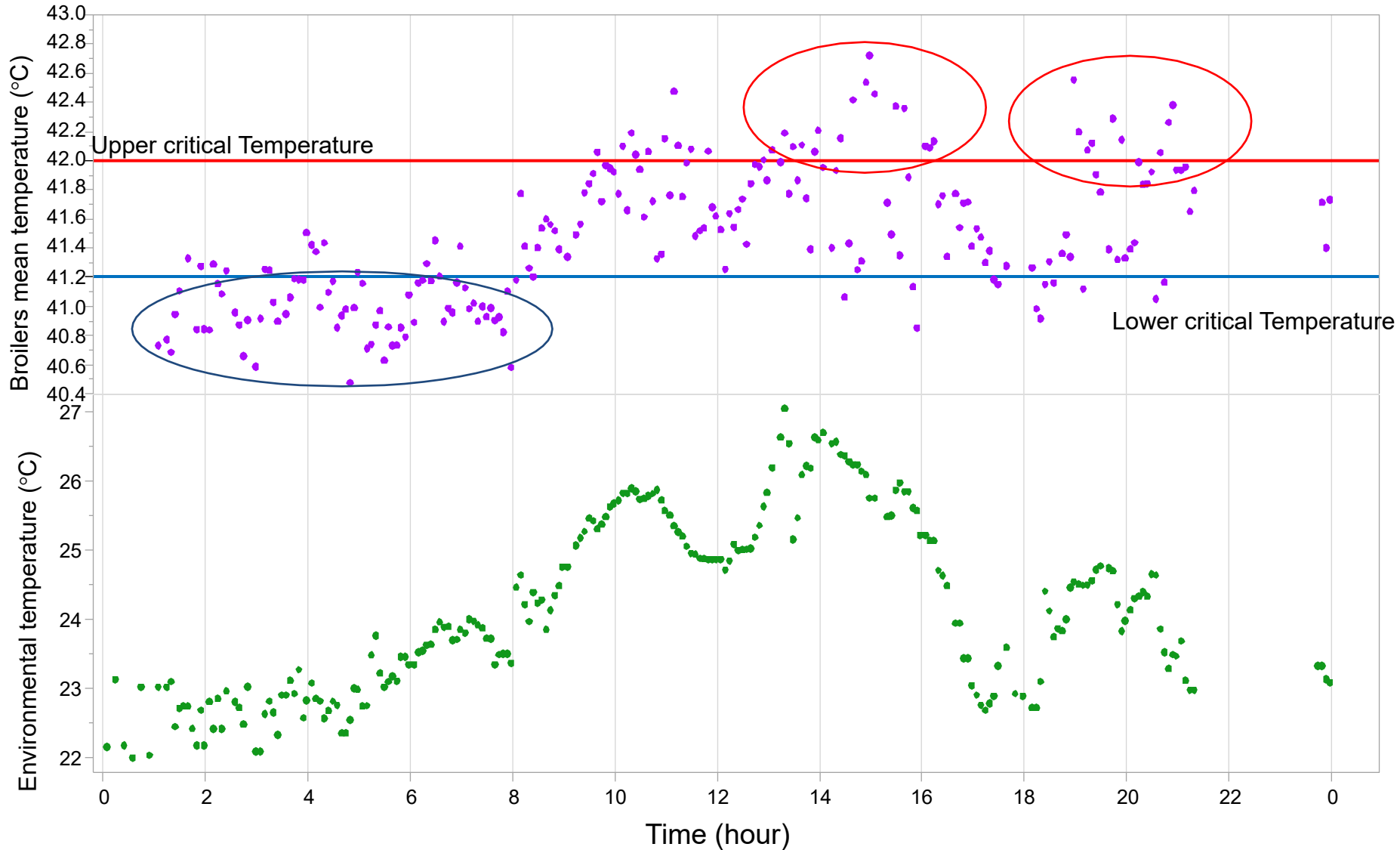
monitoring individual broiler temperatures from day 18 to 35 days, with temperature threshold values set.



Mean individual broilers temperature (mean per 5 min), vs. ambient temperature - 26 day old



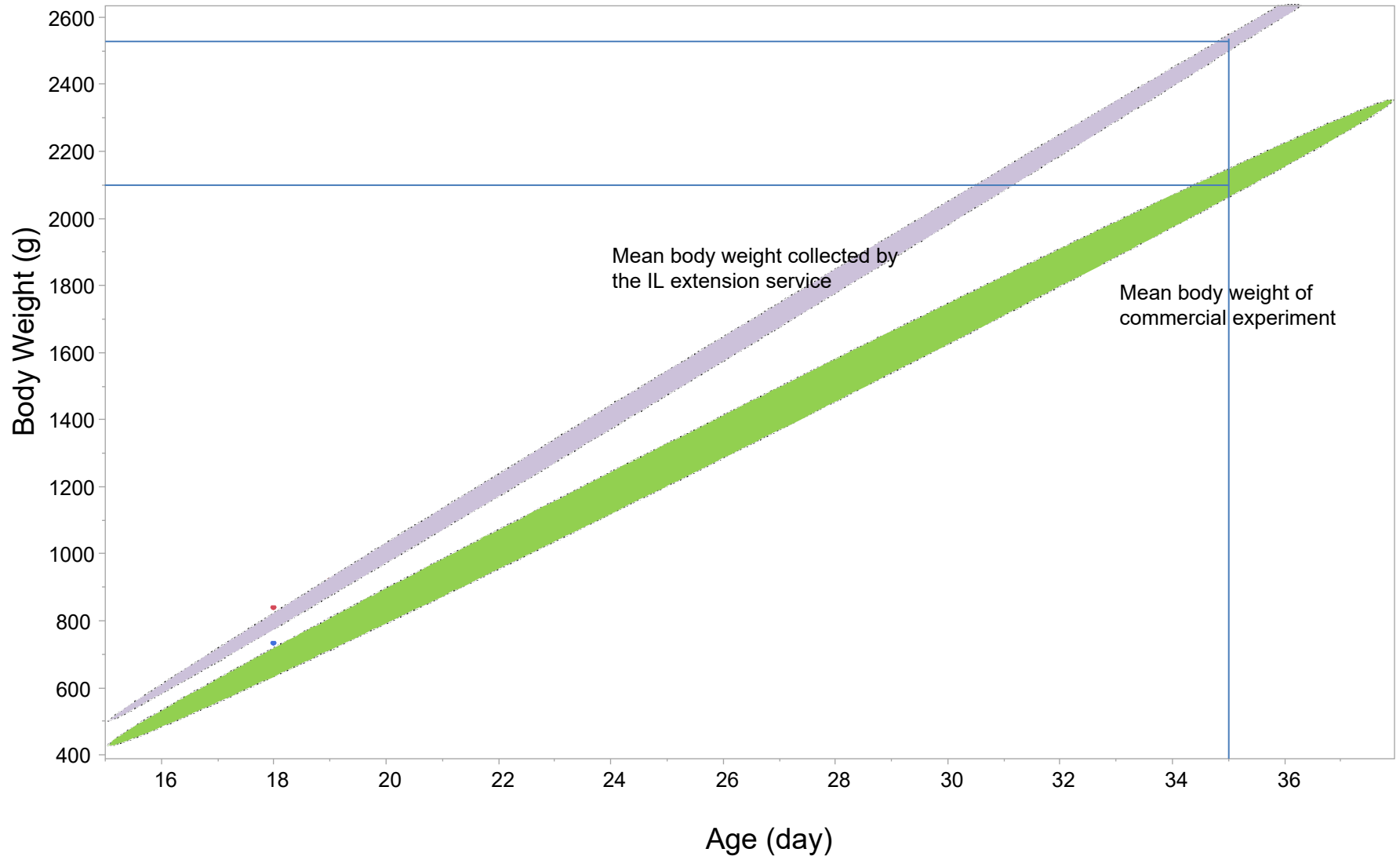
Mean individual broilers temperature (mean per 5 min), vs. ambient temperature - 33 day old



Between day 18 and day 35:

- 16 occurrences were recorded where the broilers body temperature fell below the lower critical threshold
- in the fifth week, five cases were detected where the broilers body temperature exceeded the upper critical threshold.

Broiler's flock mean body weight (g) commercial flock vs. Israel extensive srevise results for 2020 (mix sex)



Summary

- the system successfully identified thermal stress in broilers and has significant implications for broiler wellbeing.
- The results of this study suggest that monitoring individual broiler body temperatures is crucial for ensuring optimal micro-climatic conditions.
- By using this system as a temperature sensor in the climate control loop in broiler houses, farmers can ensure optimal environmental conditions that improve broiler productivity and welfare, leading to better economic outcomes.

Overall, this study highlights that monitoring the broiler house ambient condition doesn't necessarily reflect the physiological condition of the broiler and to safeguard their wellbeing efficiency individual body temperatures should be practice.

Acknowledgements

Thank
you



Mean individual broilers temperature (mean per 5 min), vs. ambient temperature - 33 day old

