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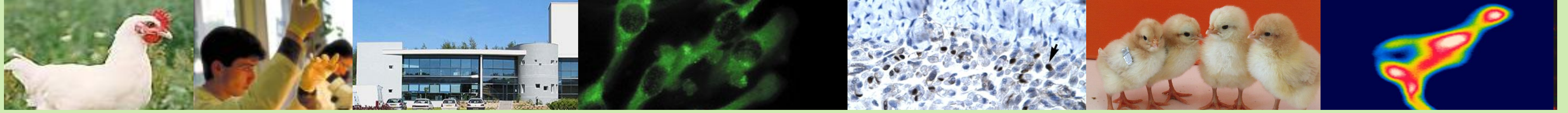
# Embryo heat acclimation modifies physiological responses without altering breast meat quality in broiler chickens

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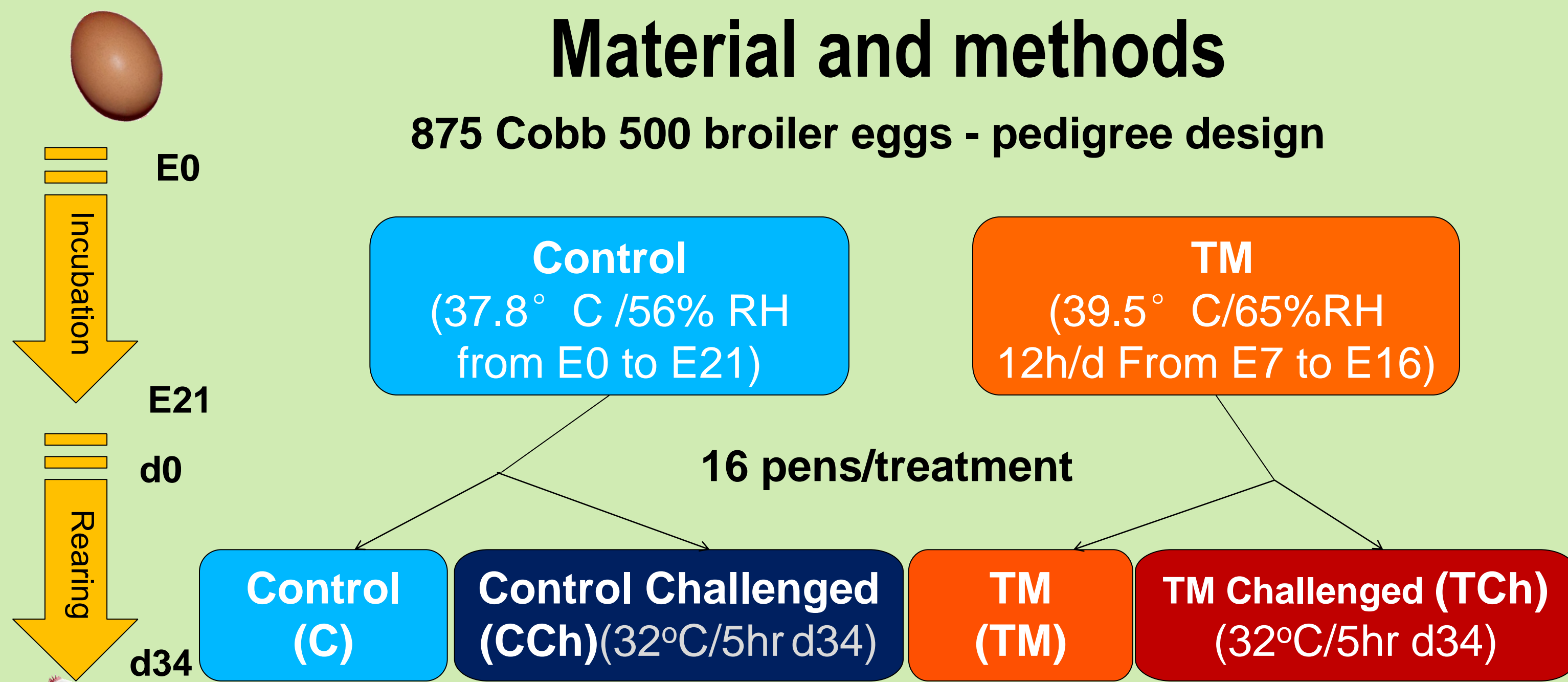


## Introduction

The selection of broilers has increased muscle mass without similar improvement of cardiovascular and respiratory systems, causing limited capacities to sustain high temperatures. Thermal manipulation during embryogenesis (TM) consists in periodically changing temperature and relative humidity in incubators to improve the thermotolerance of chickens until market age (Piestun et al., 2008). The objective of this study was to determine long lasting effects of embryo heat manipulation on the physiology, growth and meat quality of broilers reared in semi-commercial conditions.

## Material and methods

875 Cobb 500 broiler eggs - pedigree design



- Measurement of body temperature and growth from d0 to d34
- **d34**: Measurement of blood gas pressures and electrolyte concentrations. Blood cell numeration and determination of the physiological stress marker Heterophil/Lymphocyte ratio (H/L)
- **d35**: Slaughter at INRA processing plant and meat quality analysis. Measurement of body weight and body composition (breast and abdominal fat yields).



### Breast muscle characteristics:

- pHu** (24hr post mortem)
- Color** (L\*: Lightness, a\*: redness, b\* yellowness)
- Drip loss** (120hr post mortem)
- Meat Peroxidation** (TBARS analysis)

**Genetic analysis:** heritability of body weight, comb temperature and body composition (VCE6)

## Results

From d0 to d28:

	Control	TM	TM Effect
Hatchability (% Fertile eggs)	86.13	83.19	NS
Body weight d28 (g)	1525 ± 14	1534 ± 14	NS
Feed conversion ratio d0-d28 (g/g)	1.49 ± 0.02	1.47 ± 0.02	NS

## Conclusion:

Thermal manipulation during embryogenesis decreased body temperature of broilers reared in semi-commercial conditions until d28, with no changes in body weight and feed consumption. TM and heat challenge slightly decreased d35 body weight. TM did not induce major effect on technical quality of breast meat but it lowered abdominal fat yield and affected respiratory physiology. Heat increased H/L ratio in controls but not in TM broilers, possibly reflecting a lower stress status in the early-treated animals.

### References

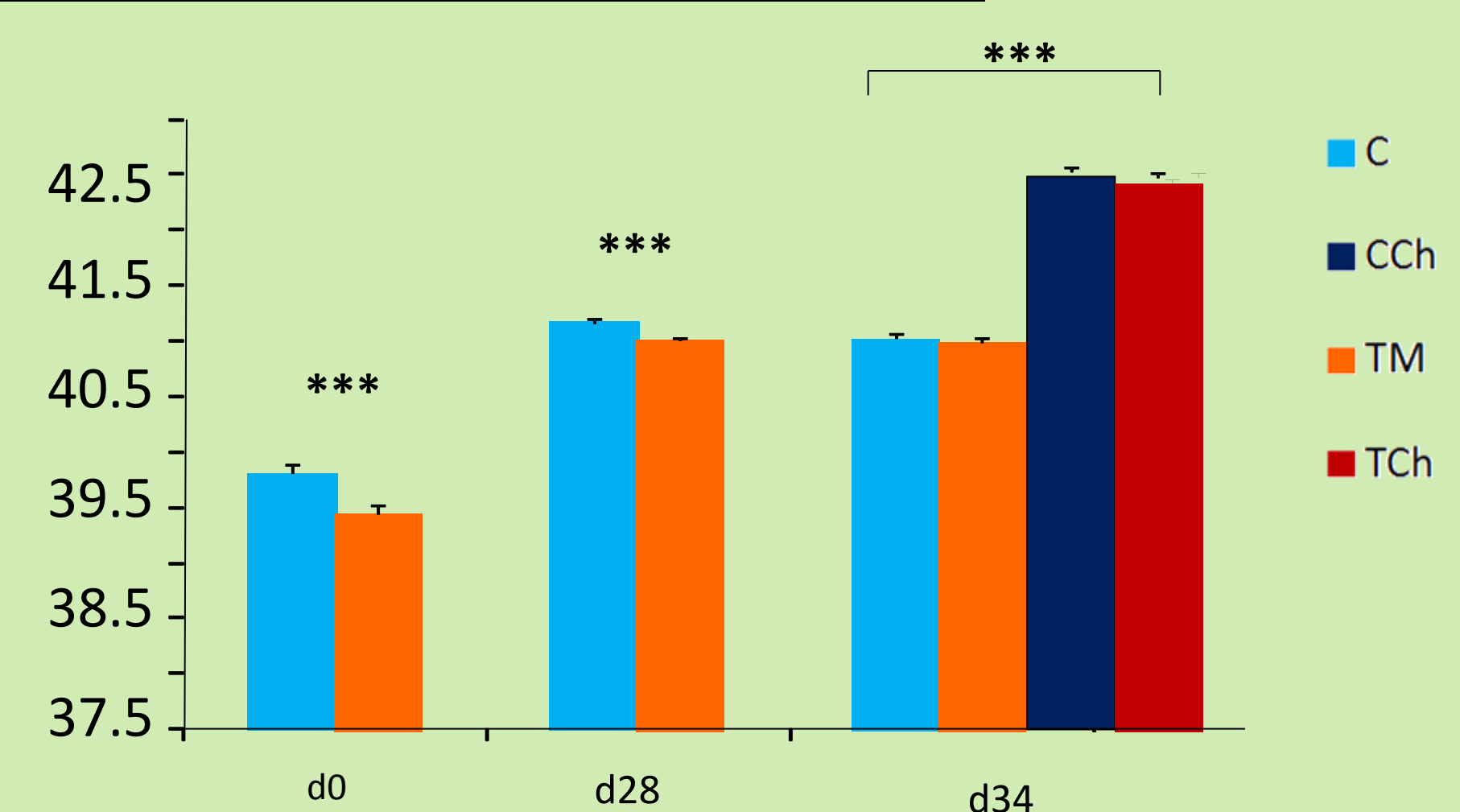
Piestun Y., Shinder D., Ruzal M., Halevy O., Brake J., Yahav S., 2008. Poult. Sci., 87(8), 1516-1525.

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## Results

### Body temperature from d0 to d34 (°C):



**At slaughter age:** Lower body weight (-1.4%) and abdominal fat yield (-7.8%) in TM chickens. Higher breast yield in TM females as compared to control ones (21.04 vs. 20.42%).

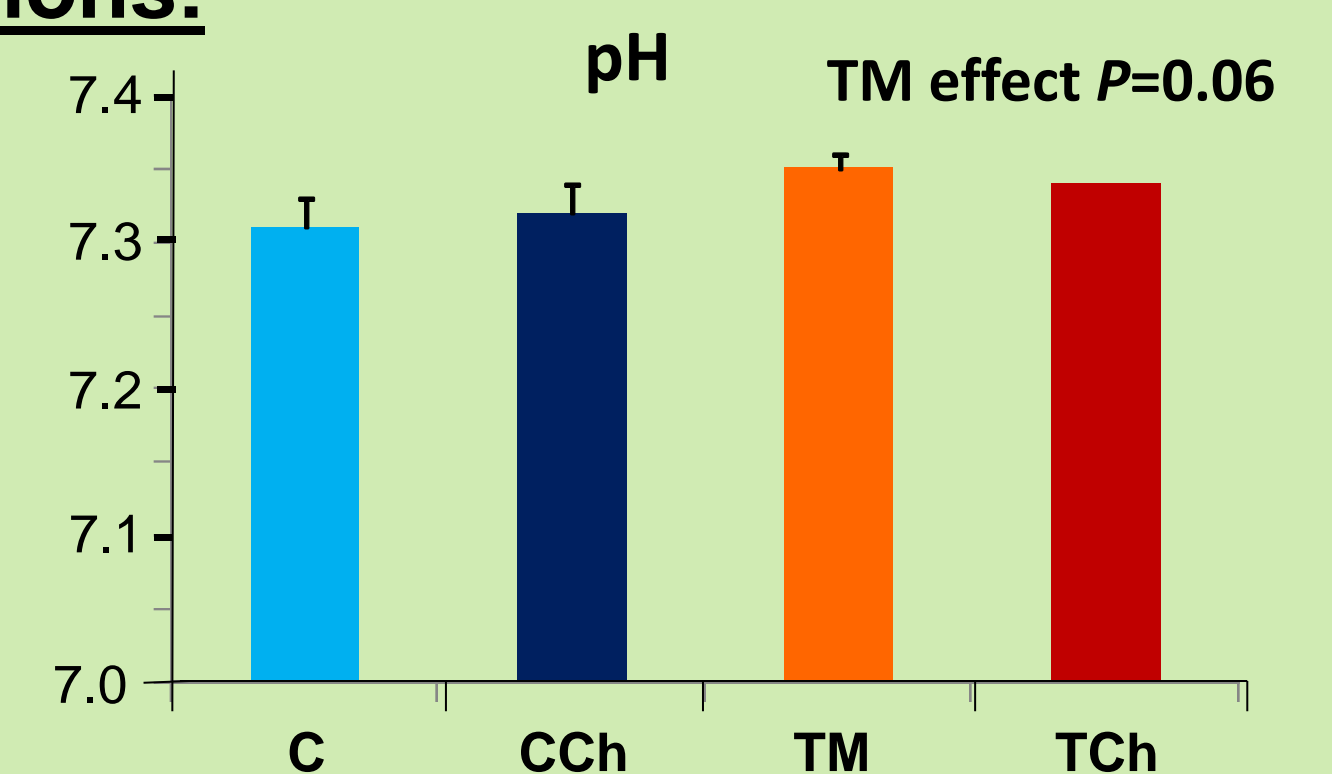
### Breast meat quality:

- No effects of acclimation or heat challenge on color of meat, drip loss and TBARS.
- Slightly higher pHu due to heat challenge

### Blood gas and ions concentrations:

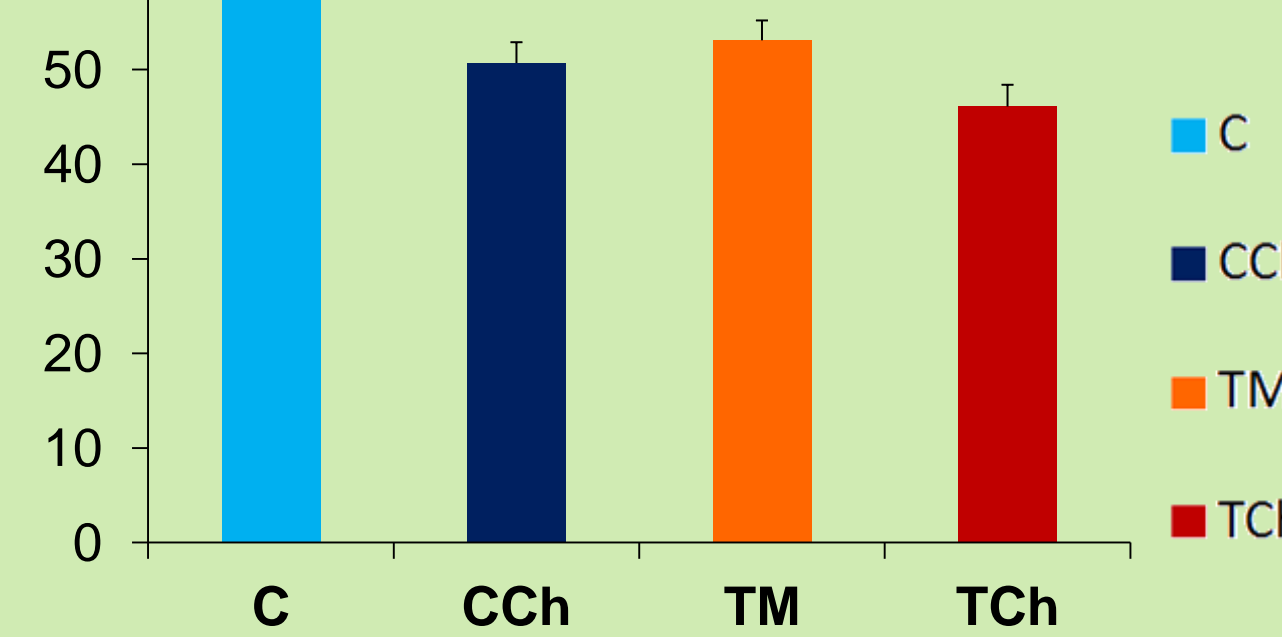
#### Effect of heat challenge:

- ↘ HCO<sub>3</sub><sup>-</sup>
- ↘ pCO<sub>2</sub>
- ↘ totCO<sub>2</sub>
- ↘ Ca<sub>2</sub><sup>+</sup>



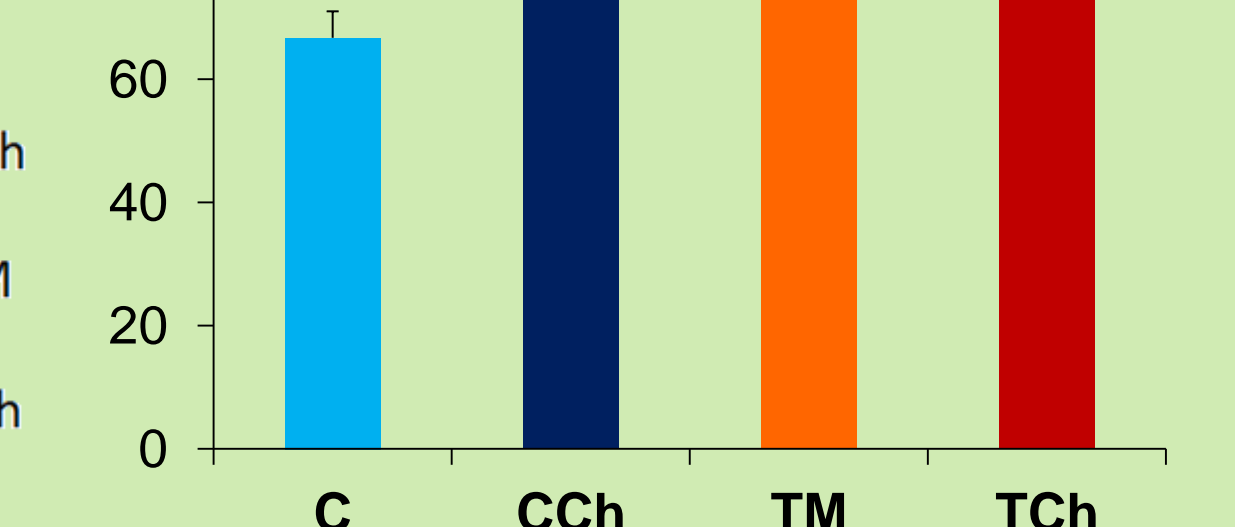
#### pCO<sub>2</sub>

TM effect: P<0.05 and Challenge effect: P<0.05



#### O<sub>2</sub>sat

TM effect: P<0.05

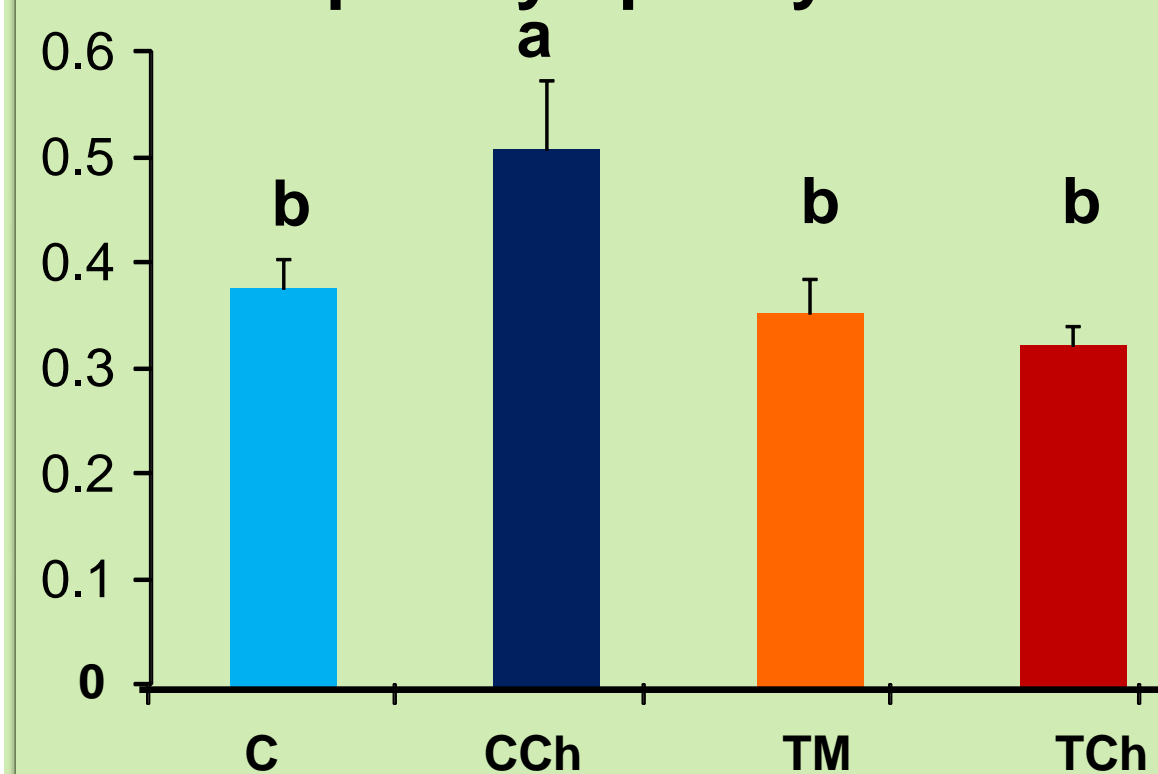


### Genetic Analysis

Parameters	Heritability (h <sup>2</sup> )
BW d35	0.40
Comb temperature d34 at thermal neutrality	0.12
Comb temperature d34 during heat challenge	0.32
pHu	0.40
Breast yield	0.29
Abdominal fat yield	0.21

### A stress marker

#### Heterophil/Lymphocyte ratio:



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