

# Pas Reform

Hatchery Technologies

**Circadian Incubation** <sup>TM</sup>

The next generation of modular, single stage incubation

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# Circadian Incubation™, next generation of single-stage technology

- Introduction
- Circadian Incubation™
- Adaptive Metabolic Feedback™



## Introduction

- Development of poultry industry
  - Increased scale of production (size of hatcheries)
  - Uniformity of day old chicks
  - Animal welfare issues



## Introduction

- Uniform day old chickens are alert and look uniform in hatcher baskets

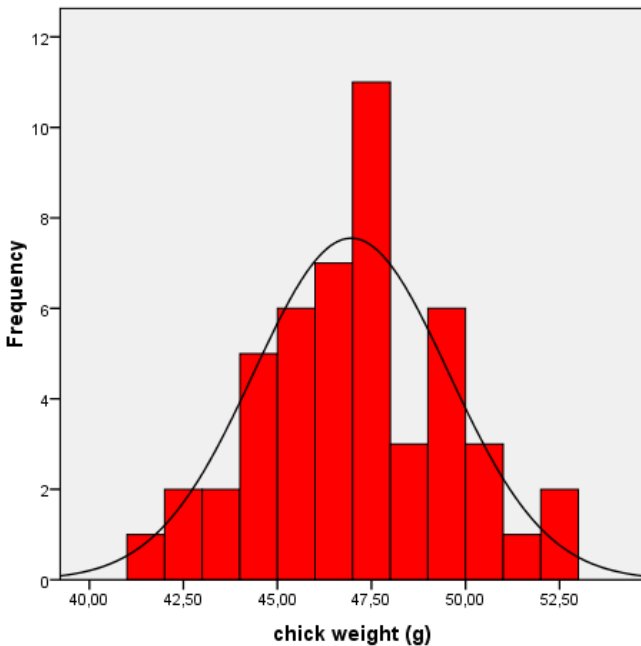


# Introduction

- Uniform day old chickens have a uniform weight distribution

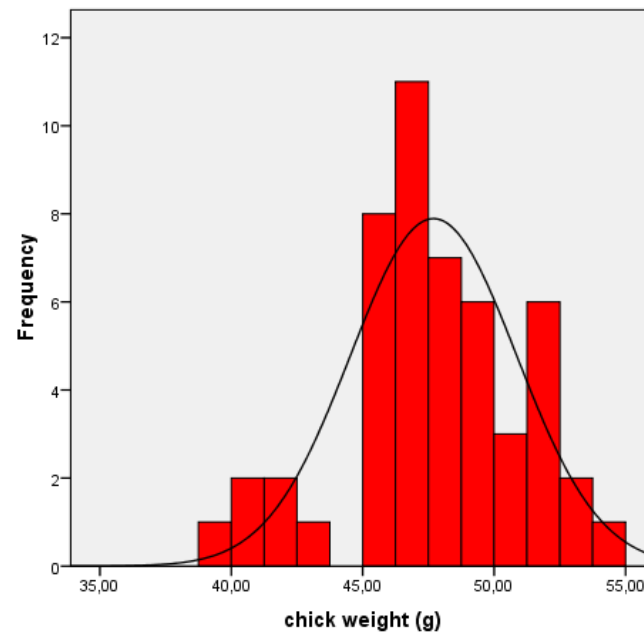
CV=5.5%

Ditribution of chick weights: Smart-Pro (CV=5.5%)  
flock age 56 wks



CV=6.9%

Ditribution of chick weights: Smart-traditional (CV=6.9%)  
flock age 56 wks



## Introduction

- Development of poultry industry
  - Increased scales of production (size of hatcheries)
- Uniformity of day old chicks
- Optimum performance needs robust chicks



### Pas Reform's definition

- Robust day old chicks have the *potential* to adapt to stressful situations (heat or cold stress) in the farm, with minimal loss of performance
- Day old chicks received robustness during embryonic development



- Conclusion

The modern hatchery incubates for

- Robustness
- Uniformity



Circadian Incubation™, next generation of single-stage technology

## Pas Reform introduces

- Incubation for robustness:  
Circadian Incubation™
- Incubation for uniformity:  
Adaptive Metabolic Feedback™



## Circadian Incubation™

- Circadian Incubation™ is a new step in modular single stage incubation



## Circadian Incubation™

- Circadian Incubation™ is a new step in modular single stage incubation
- Circadian Incubation™ improves tolerance for heat (or cold) stress post-natal
- Circadian Incubation™ improves robustness with respect to temperature stress



## Circadian Incubation™

- Circadian Incubation™ stimulates thermoregulatory system to control chicks body temperature
- Circadian Incubation™ is based on scientific research by several research groups on thermal conditioning during specific sensitive periods in embryonic life (reviewed by Yalçin et al, WPSA journal march 2010)



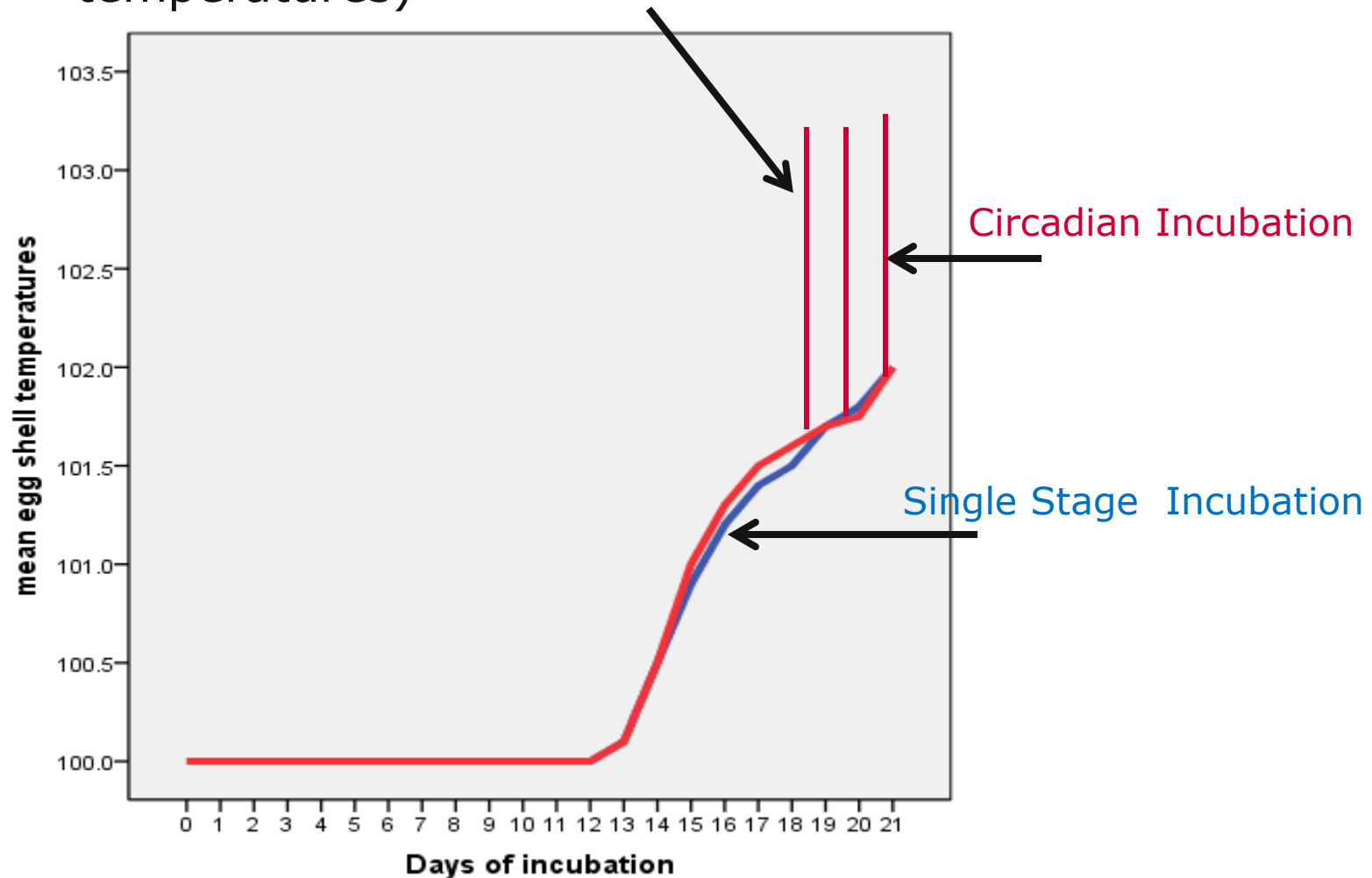
## Circadian Incubation™

- Circadian Incubation™ = thermal stimulation during sensitive periods of the maturation phase of the embryo



## Circadian Incubation™

- Thermal stimulation = cyclic temperature stimuli (egg shell temperatures)



Thermal-stimulation: 2 uur/day at 38.5 °C  
from days 18-21 (Tzschentke and Halle, 2009)

	<b>Overall hatchability of fertile eggs (%)</b>	<b>Male: weight gain g/broiler/ 1-35d</b>	<b>Male: final body weight (35 d)</b>	<b>Male: feed conversion rate 1-35d</b>
Control (single stage)	94.6	62.2 ± 2.9	2270 ± 203	1.50 ± 0.04
Thermal-stimulation	97.0*	64.6* ± 2.0*	2336* ± 191	1.47 ± 0.02*

(\*P < 0.05)



## Conclusion

- Circadian Incubation™ is a new step in modular single stage incubation
- Circadian Incubation™ when applied during the last days of incubation improves hatchability, growth of males and male feed conversion rates



## Conclusion

- Circadian Incubation™ = thermal stimulation during sensitive periods in embryonic development
- To find sensitive periods for different egg types more investigations are initiated in collaboration with Dr. Barbara Tzschentke, Humboldt University



Circadian Incubation™, next generation of single-stage technology

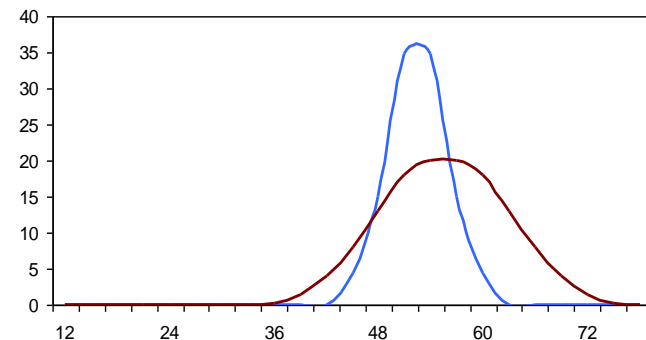
## Pas Reform introduces

- Incubation for robustness:  
Circadian Incubation™
- Incubation for uniformity:  
Adaptive Metabolic Feedback™



## Adaptive Metabolic Feedback™

- Incubation for uniformity = incubation for a narrow hatch window
- Incubation for uniformity = homogeneous start of incubation



## Homogeneous start of incubation

- homogeneous initial egg temperature (=preheating)
- modular incubator design
- prevent cold spots from humidifiers



## Homogeneous start of incubation

- No cold spots from excessive ventilation or humidification through application of Adaptive Metabolic Feedback (AMF™)



# Adaptive Metabolic Feedback (AMF™)

- From research we know that modern broiler embryos may be tolerant to higher levels of CO<sub>2</sub> (up to 1.4%) due to non-ventilation during the first 10 days



## Conclusion

- Ventilating during the first days of incubation to control the level of CO<sub>2</sub> is not really necessary
- However.....



## Conclusion

- Ventilating to control the level of CO<sub>2</sub> is not really necessary
- ..... ventilating means:

$$P_{\text{air cell}} - P_{\text{ambient air}} > 0$$

thereby supporting natural moisture loss from the eggs



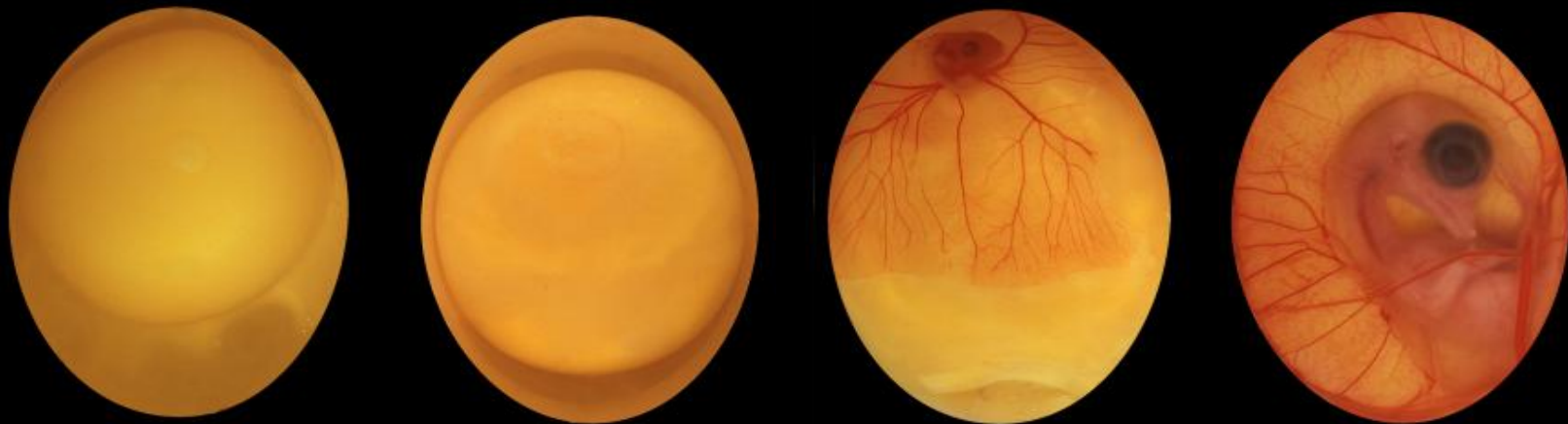
Ventilation to control the level of *moisture* (H<sub>2</sub>O) **is** necessary for:

- optimum egg weight loss
- optimum mineral balance in embryonic compartments
- optimum chick quality



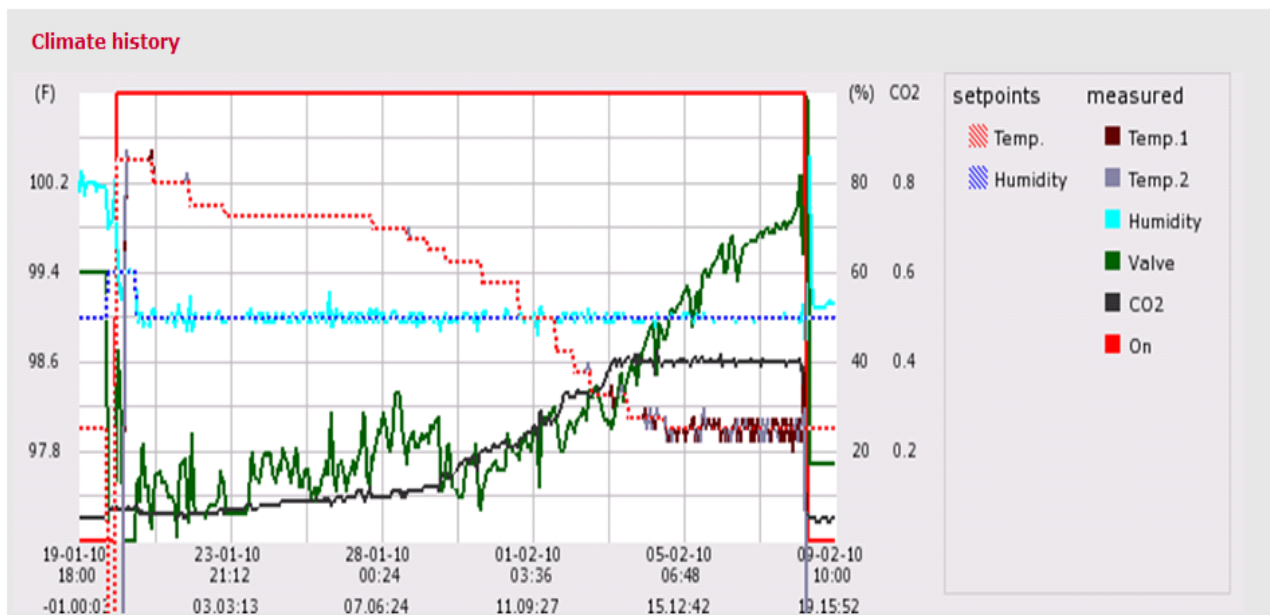
## Adaptive Metabolic Feedback™

- Egg weight loss is optimum and natural when relative humidity levels are between 50-55%



## Adaptive Metabolic Feedback (AMF™)

- prevents excessive inlet of fresh (*cold*) air and excessive humidification



# Adaptive Metabolic Feedback (AMF™) for uniformity

- Prevents too high levels of RH
- Optimum weight loss for optimum
- hatchability and chick quality
  - Good navels
  - Soft bellies



# Pas Reform introduces the next generation of single stage incubation

- Incubation for robustness:  
Circadian Incubation™
- Incubation for uniformity:  
Adaptive Metabolic Feedback™



# Circadian incubation™

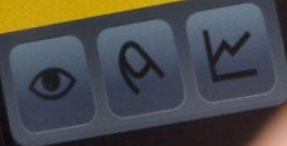
Next generation design for the future-focused hatchery

Day 3

49-72 hours

Phase 1 - Differentiation

- Blood ring (area vasculosa)
- Heart beats
- Head is turned to right



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