



MINISTERIO
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Plan de Recuperación,
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ESTATAL DE
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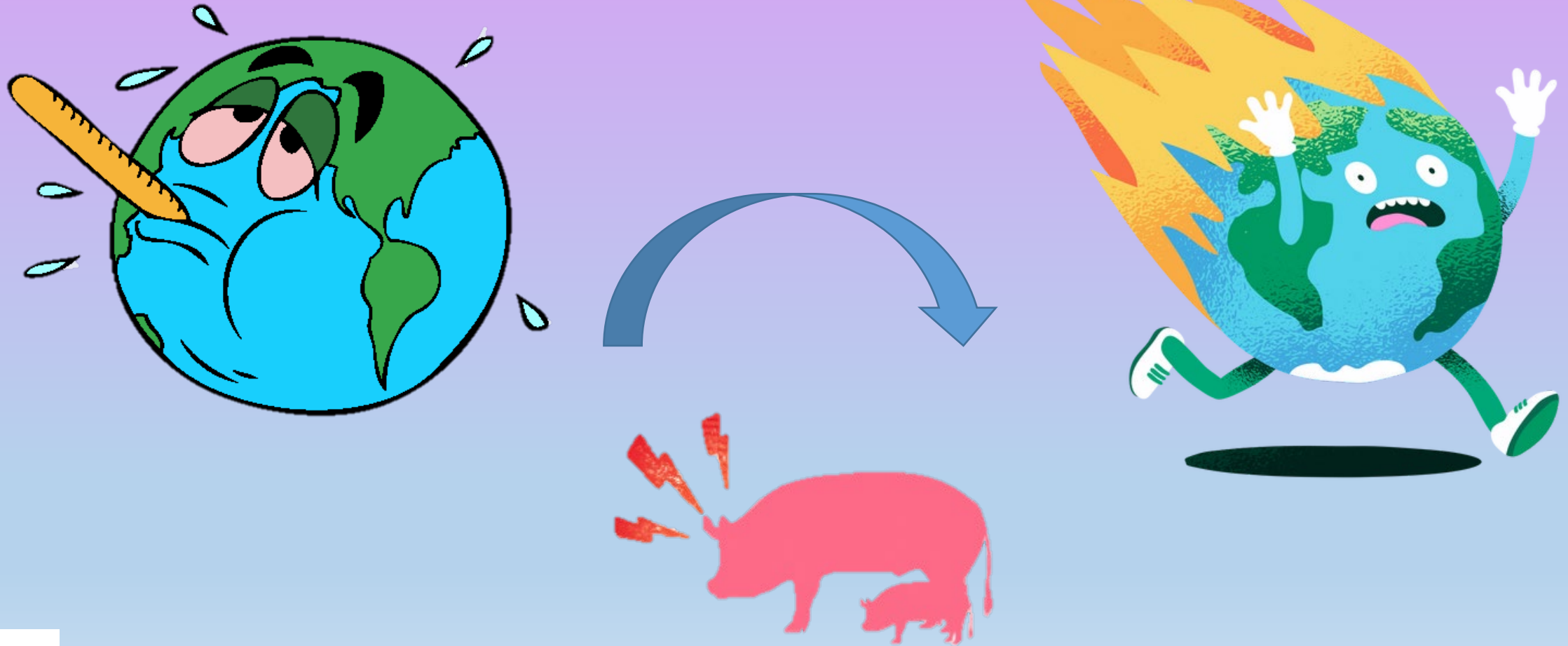
CSIC
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Maternal supplementation with betaine or amino acids during lactation improves the viability of Iberian piglets under heat stress

C. García-Contreras, I. Fernández-Fígares, M. Lachica, F. Sánchez-Esquiliche, L. Ramírez, F. Gómez-Carballar, R. Nieto

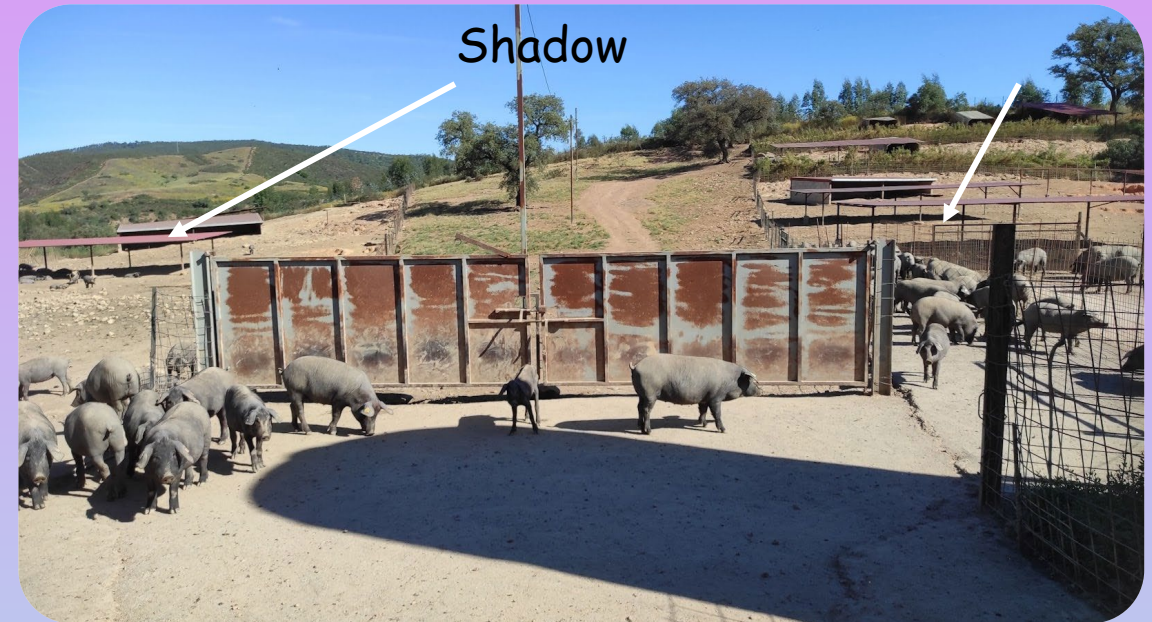
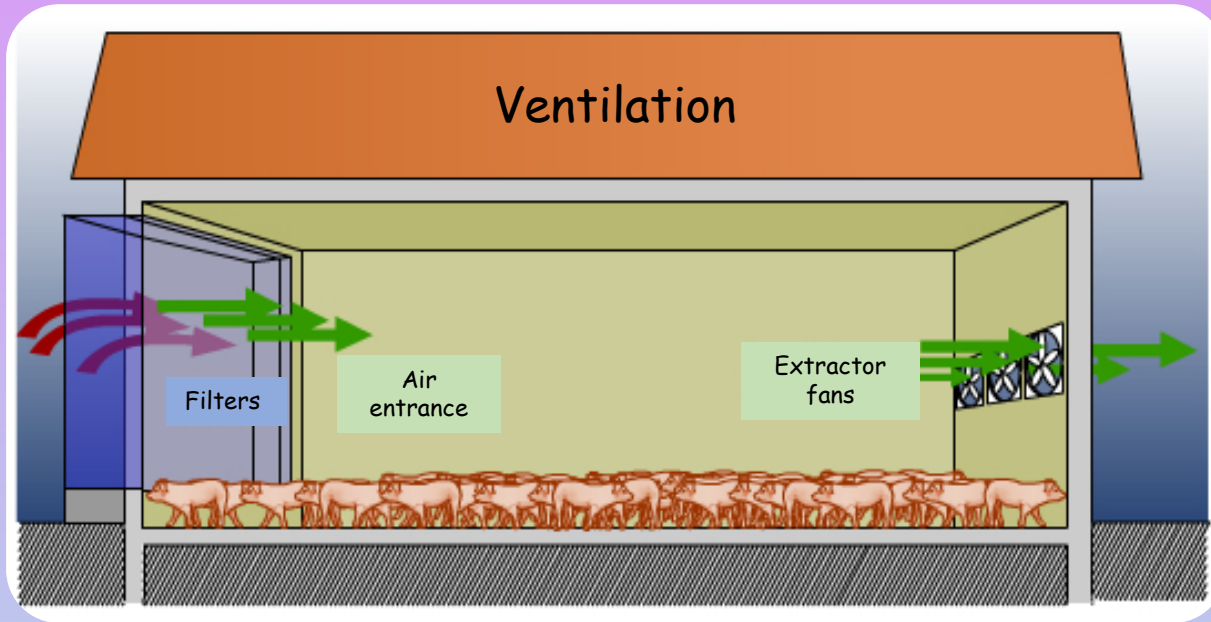
1. Pig production and heat stress



1000 million USD/year in USA

INTRODUCTION

1. Pig production and heat stress



INTRODUCTION

2. The lactating sow

High metabolic heat generation associated with milk production



INTRODUCTION

2. The lactating sow

High metabolic heat generation associated with milk production



Reduction in milk yield



3. Nutritional mitigation of adverse heat stress effects

3.1. Betaine



- Cellular protector against osmotic stress
- Methyl group donor
- Intestinal microbiota modulator
- Reduction in body heat production

3. Nutritional mitigation of adverse heat stress effects

3.1. Amino acids (Arginine and Valine)



Above requirements may increase the uptake of nutrients by the lactating mammary gland and have beneficial effects on the catabolic state of sows

Demonstrated benefits in lactating sows and their litters

Improved daily feed intake of sows and average daily gain of the piglets

3. Nutritional mitigation of adverse heat stress effects

3.1. Amino acids (Arginine and Valine)



Above requirements may increase the uptake of nutrients by the lactating mammary gland and have beneficial effects on the catabolic state of sows

Demonstrated benefits in lactating sows and their litters

Improved daily feed intake of sows and average daily gain of the piglets

They may have synergistic effects acting through different mechanisms of action to improve the performance of sows and litters under heat stress

OBJECTIVE

Evaluate nutritional strategies to mitigate the detrimental effect of heat stress in the lactating Iberian sow

The use of betaine or functional amino acids in multiparous and primiparous lactating sows

Experiment design

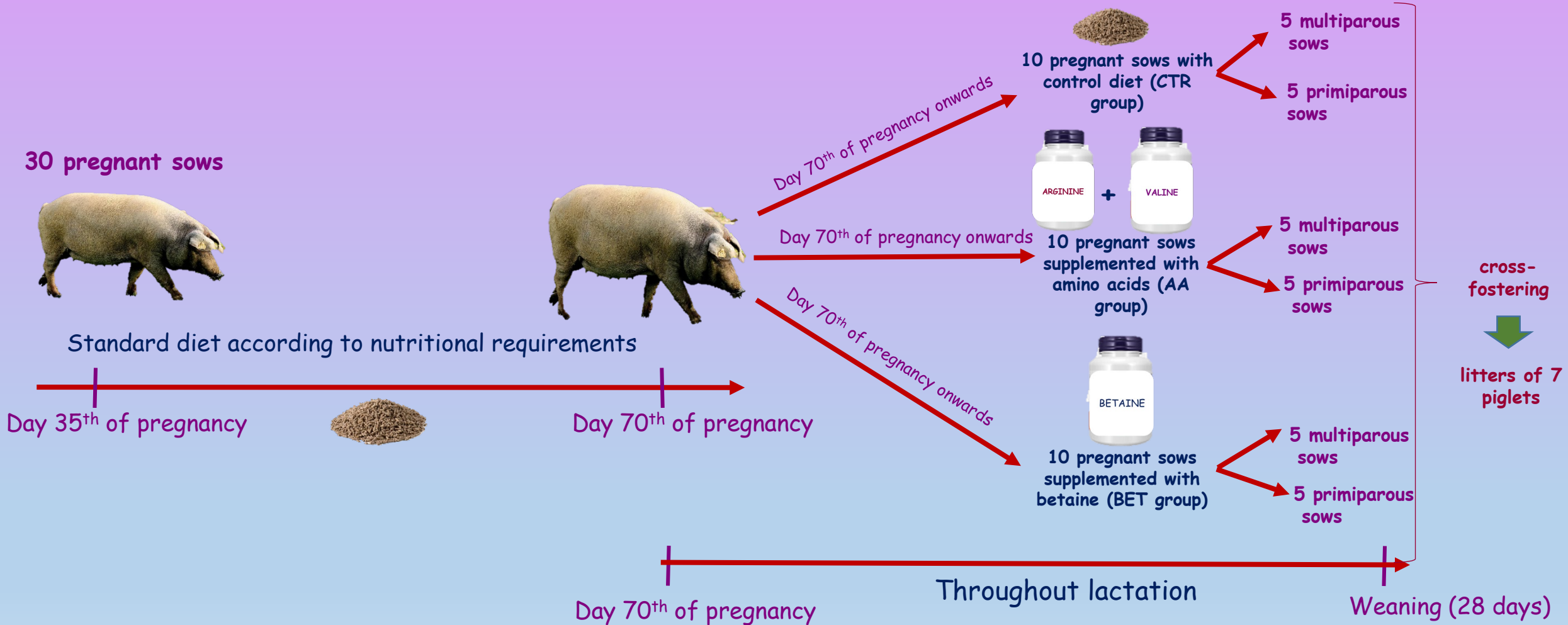
30 pregnant sows



Standard diet according to nutritional requirements



Experiment design



Measurements on sows



Sow body weight at farrowing and weaning



Number of total piglets



Ambient temperature



Rectal temperature



Blood samples at weaning



Milk sampling

Measurements on piglets

Birth and weaning body weight

Abdominal circumference
Thoracic circumference
Total length



Results and discussion

1. Effect of nutritional treatment under heat stress on the sows

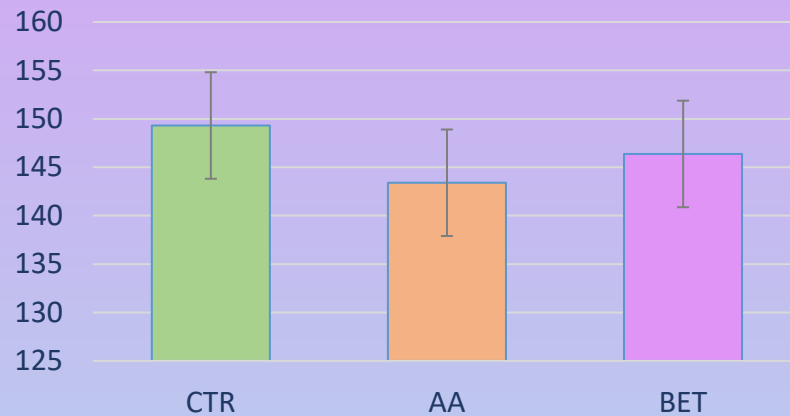
Maximum average ambient
temperature: **32.3°C**



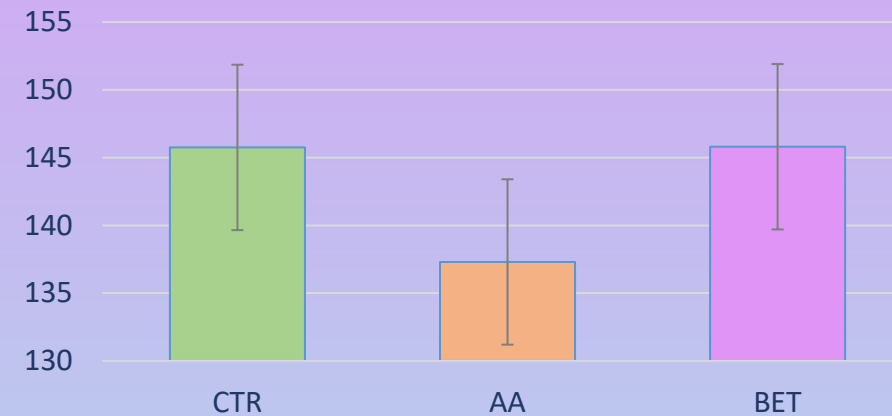
Minimum average ambient
temperature: **23.4°C**



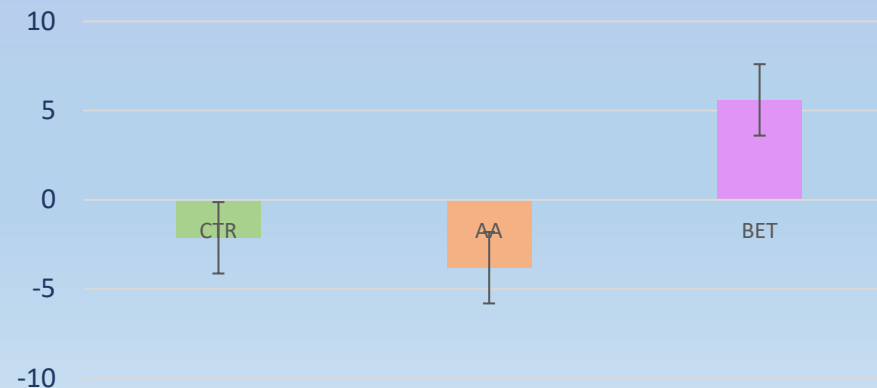
Postpartum BW (kg)



Weaning sow BW (kg)



Sow BW change during lactation (kg)



Daily intake $\approx$ 5kg/d and
RT around 38.5°C

No significant
differences

2. Effect of nutritional treatment under heat stress on the piglets

At birth

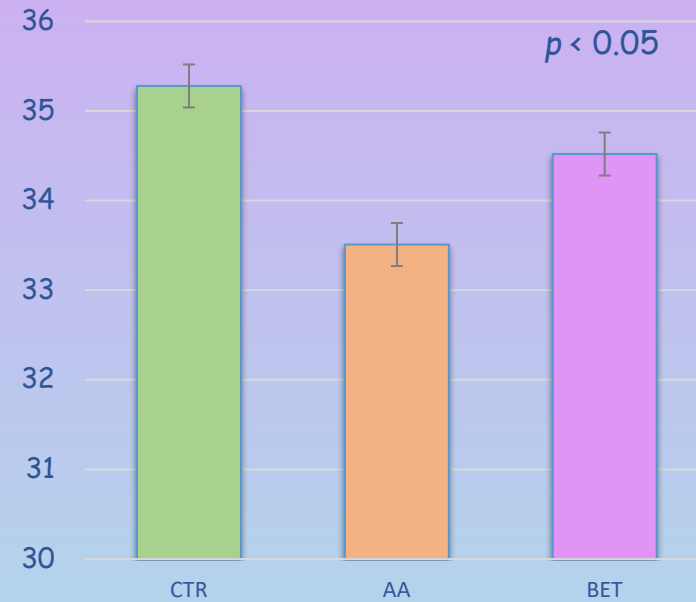
Birth BW (g)

$p < 0.001$



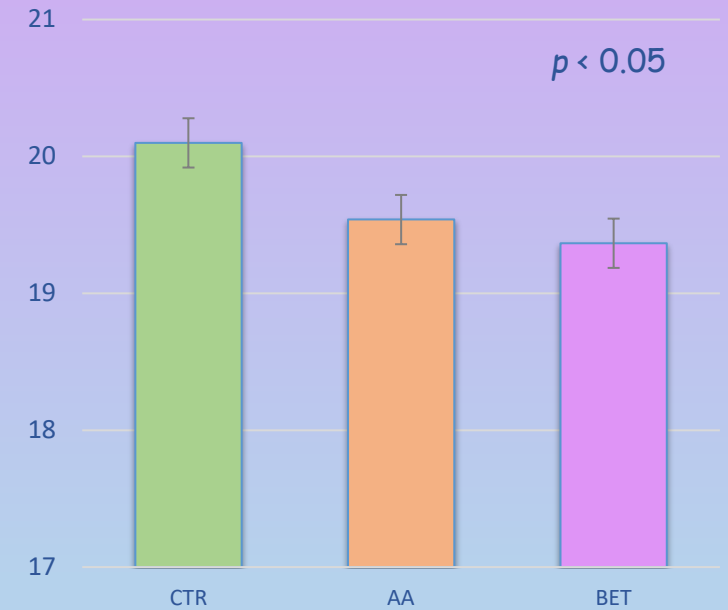
Total length (cm)

$p < 0.05$



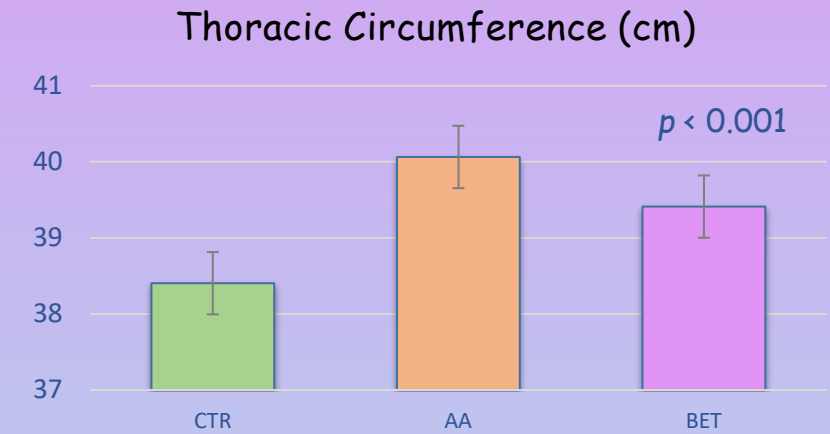
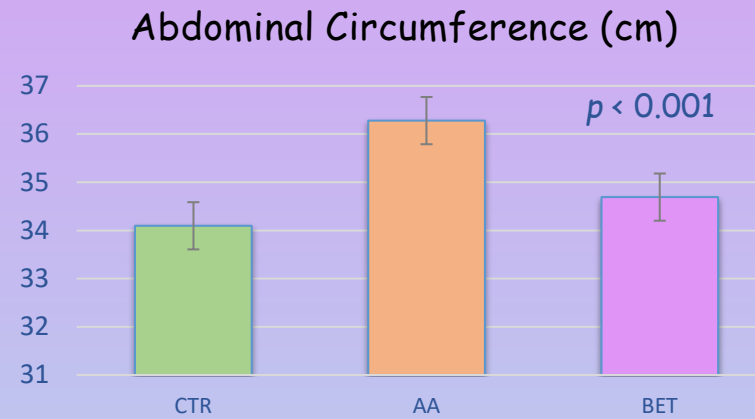
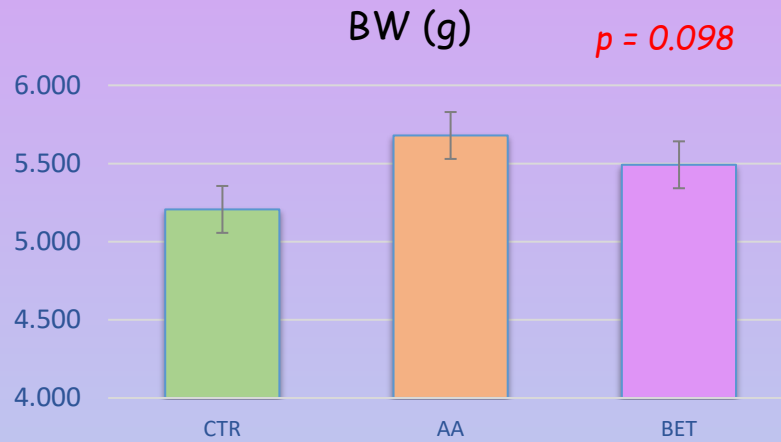
Abdominal Circumference (cm)

$p < 0.05$



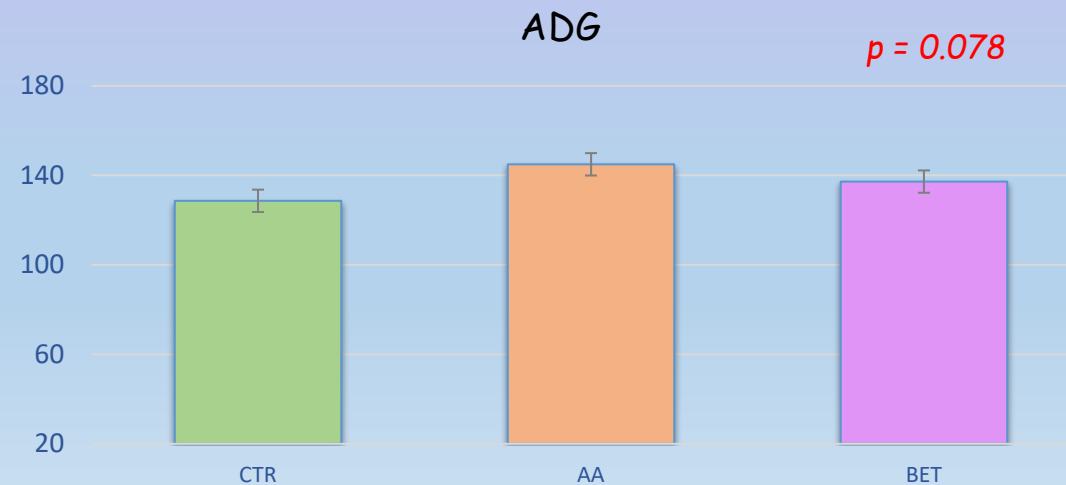
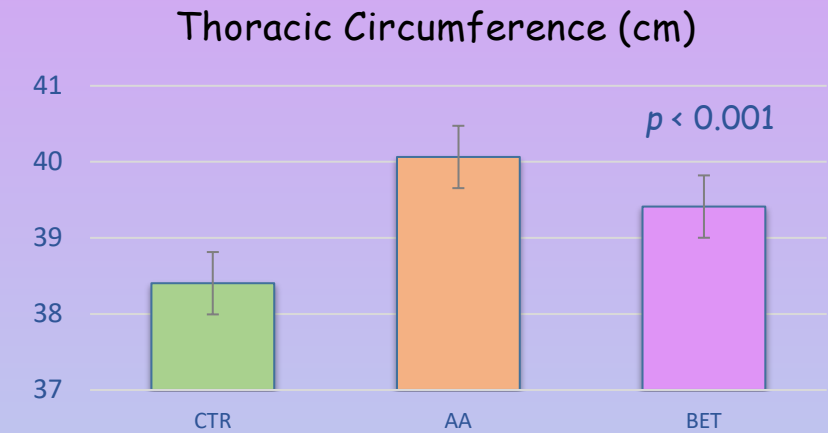
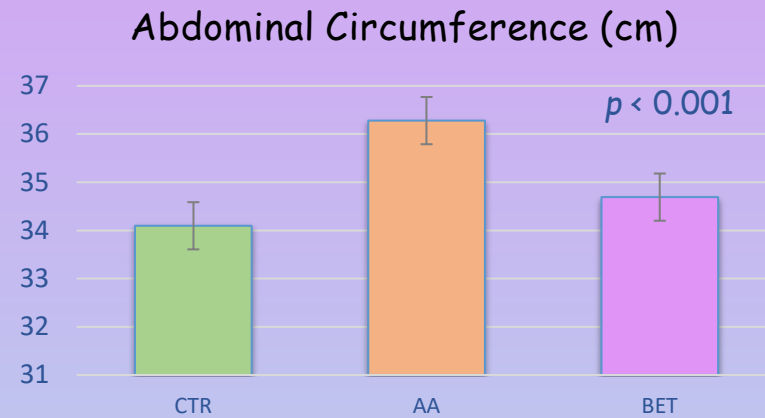
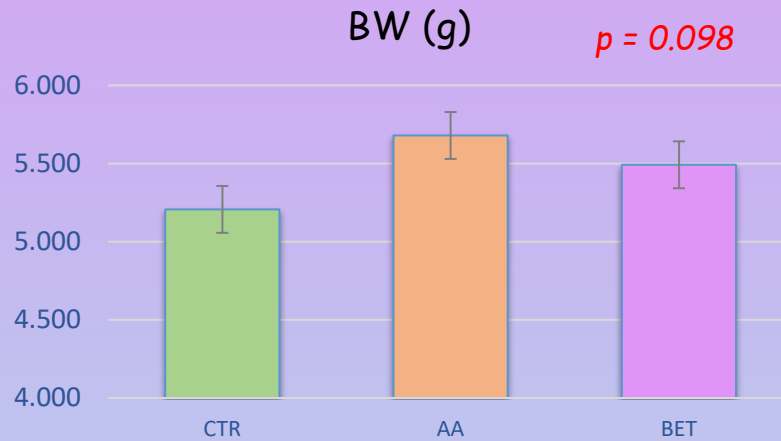
2. Effect of nutritional treatment under heat stress on the piglets

At weaning



2. Effect of nutritional treatment under heat stress on the piglets

At weaning





**Lower BW piglets
in AA and BET
group**

During
lactation

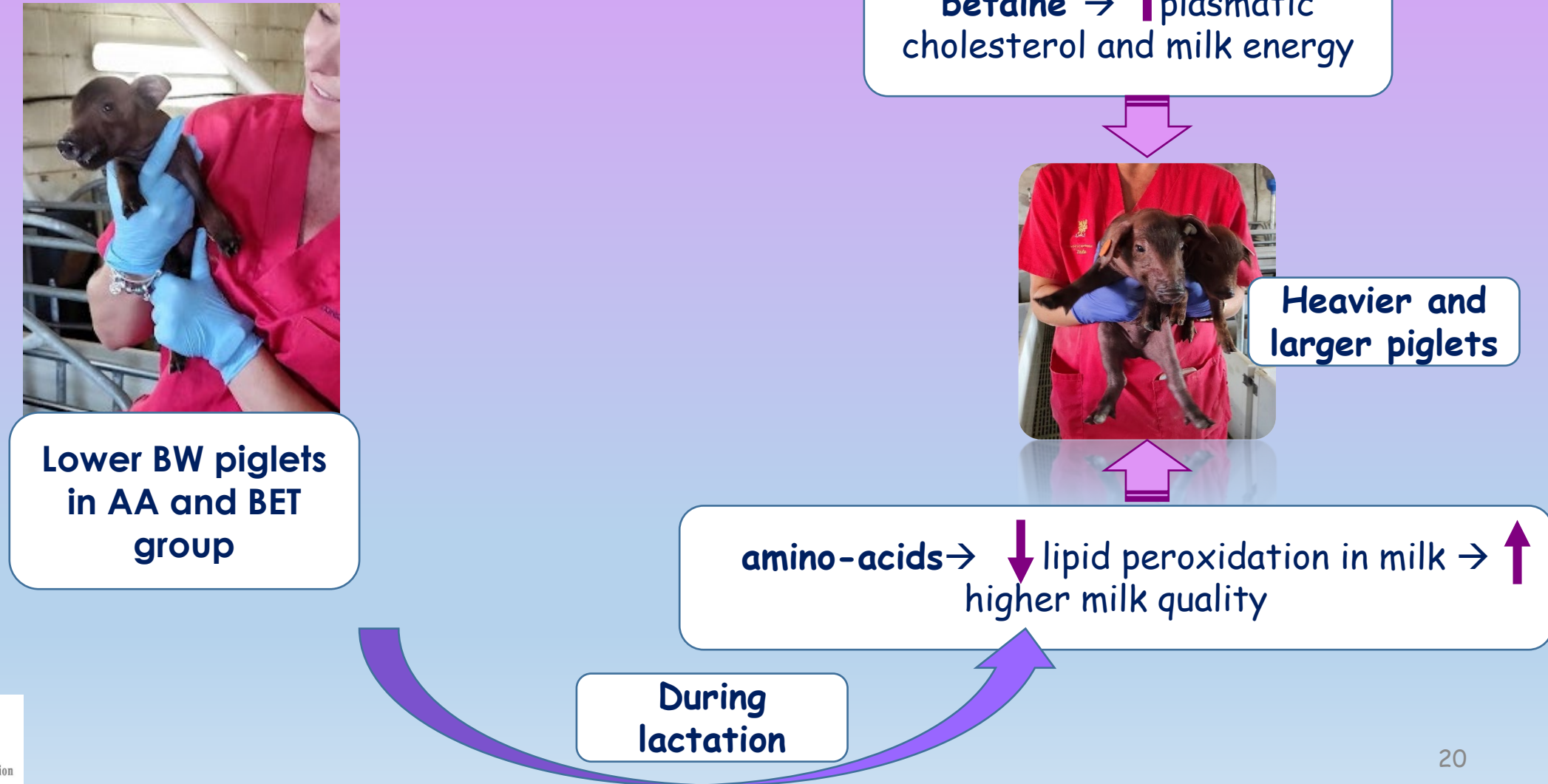
betaine → ↑ plasmatic
cholesterol and milk energy

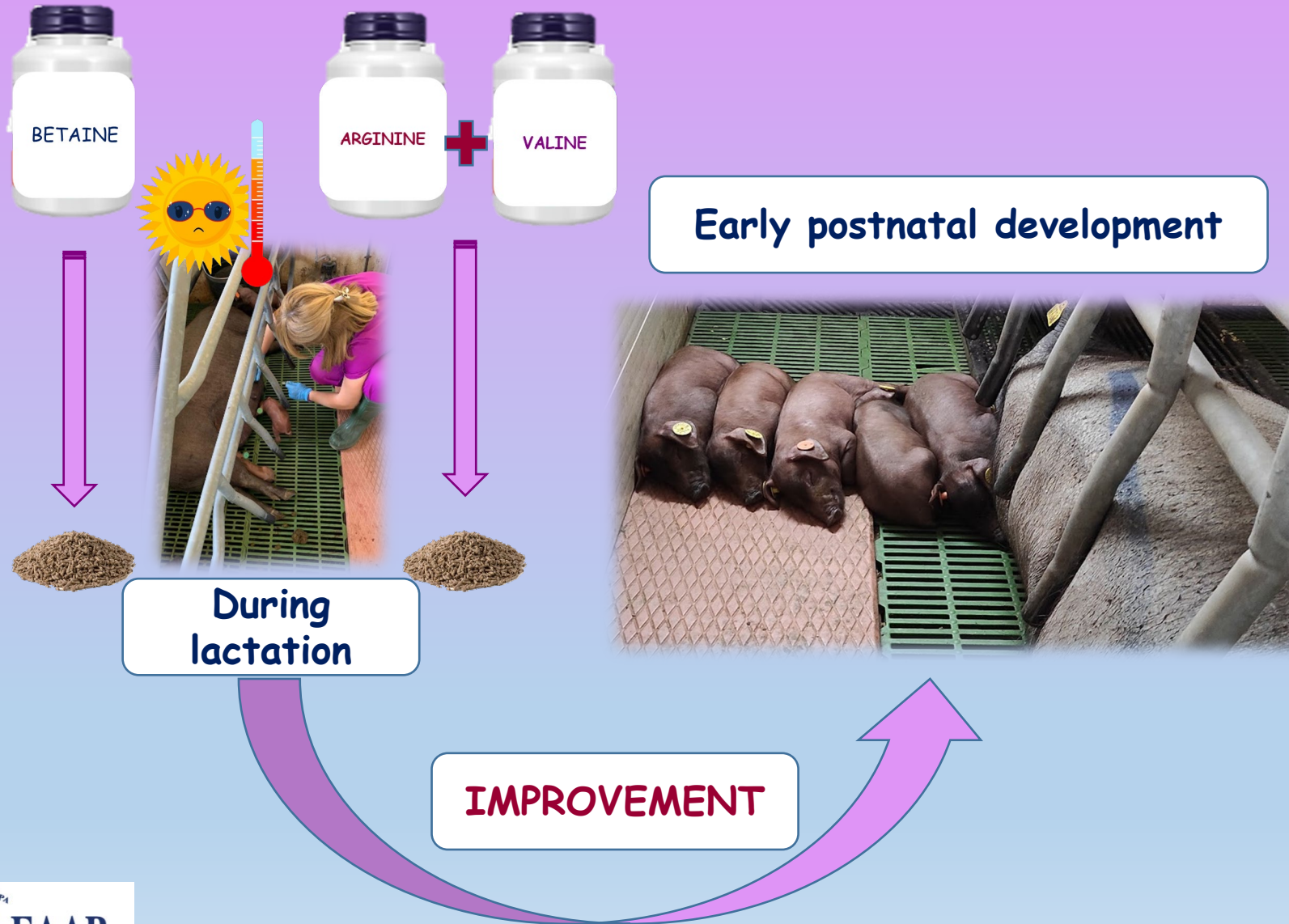


Lower BW piglets
in AA and BET
group



Heavier and
larger piglets





More studies are necessary to determine if this strategy affects:

- The chemical composition of the piglets carcass
- Intestinal microbiota
- Do these strategies act in the same way under thermoneutral conditions?



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Thank you very much for your attention

The results collected in this work are part of the development framework of the R&D project *Heat stress in lactating Iberian sows: physiological and productive effects and nutritional mitigation strategies (LACTIBEST): PID2021-125059OB-I00*