

# BETAINE INCREASES PERCENTAGE HATCHED IN BROILER BREEDERS

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# Betaine's function in nature

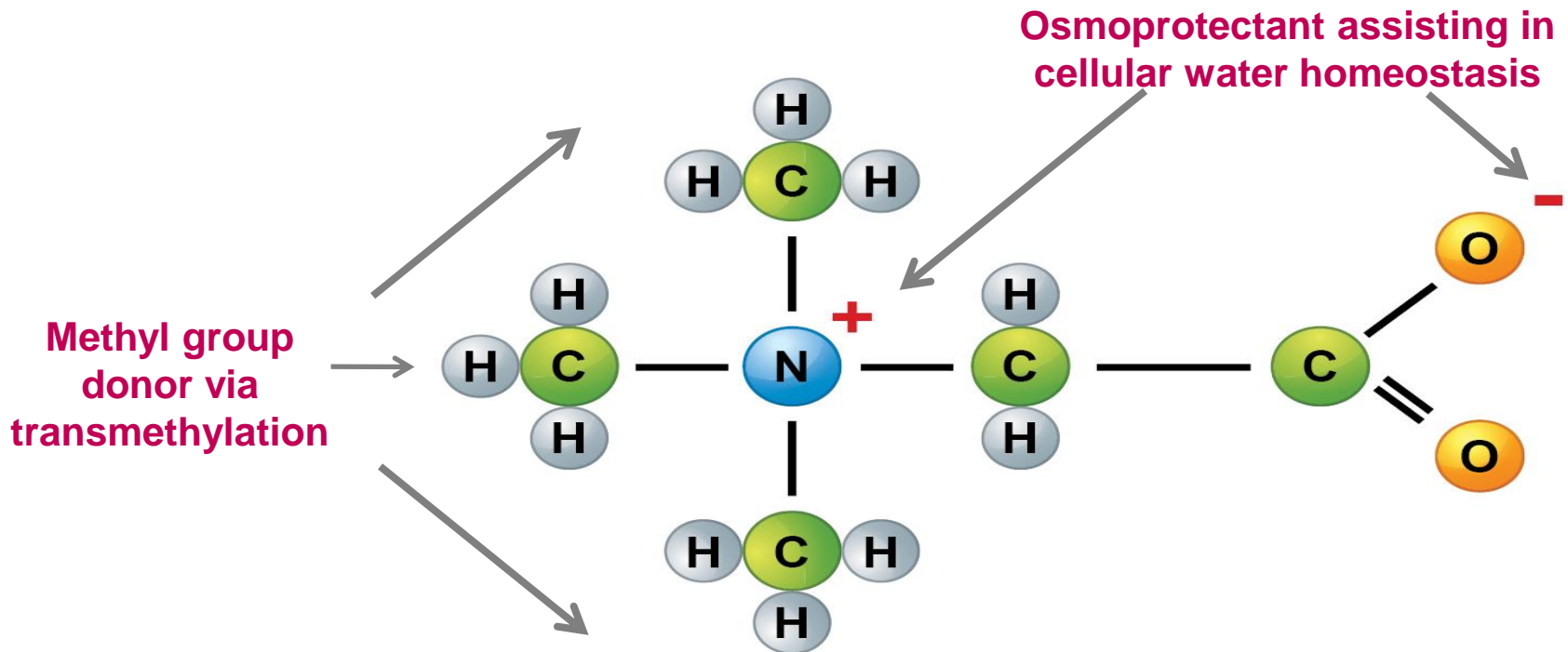
- The role for betaine in animals, plants and microorganisms is to protect cells against osmotic inactivation
- Plants and bacteria produce and accumulate betaine to cope with salt and temperature stress<sup>1</sup>



<sup>1</sup> Eklund *et al.* (2005)

# What makes Betafin<sup>®</sup> natural betaine special?

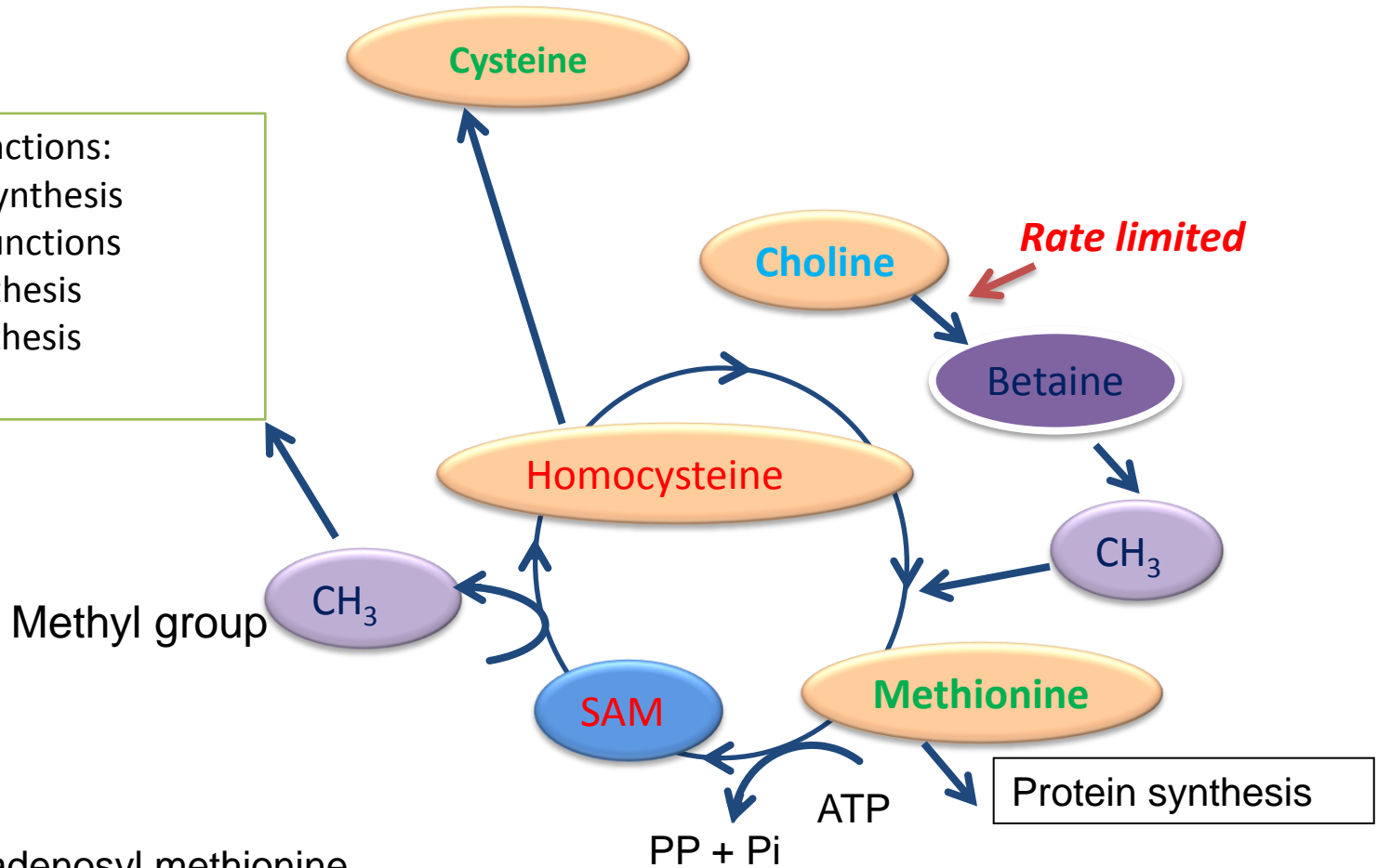
Betafin<sup>®</sup> natural betaine has two functions from the same molecule



Chemically, betaine is the trimethyl derivative of the amino acid glycine with a formula of  $(\text{CH}_3)_3\text{NCH}_2\text{COO}$  and a molecular weight of 117.2

# The Methylation Cycle

- Important functions:
- DNA/RNA synthesis
  - immunity functions
  - protein synthesis
  - choline synthesis
  - other



SAM = S-adenosyl methionine

PP = pyrophosphate, Pi = inorganic phosphate

# Reported effects of Betaine in poultry

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- Spares choline and methionine
- Improves gut health and function
- Decreases effects of heat stress
- Increases carcass and breast meat yield
- Reduces coccidiosis lesions (additive effect in combo with ionophores)
- Reduces excreta moisture (improved litter quality)
- Increased immunity against viruses
- **EKLUND, M., BAUER, E., WAMATU, J. and MOSENTHIN, R. (2005) Potential nutritional and physiological functions of betaine in livestock. Nutrition Research Reviews 18: 31-48**

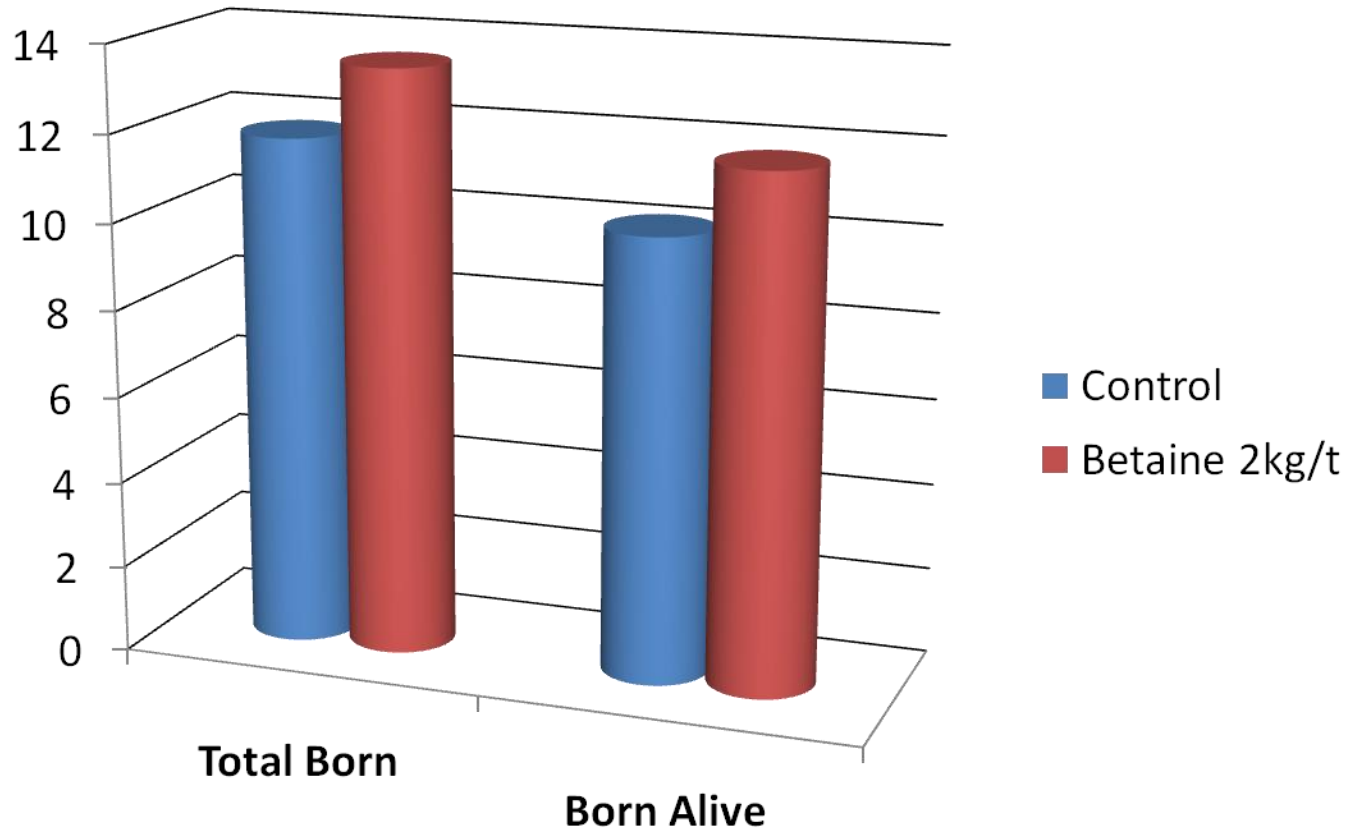


# Betaine increases embryo survival in SOWS

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- High blood Homocysteine increases risk of embryo mortality post 21 days gestation
- Betaine significantly reduces homocysteine
- Betaine in gestation/dry sow diets significant improves embryo survival (van Wettere et al, 2012)

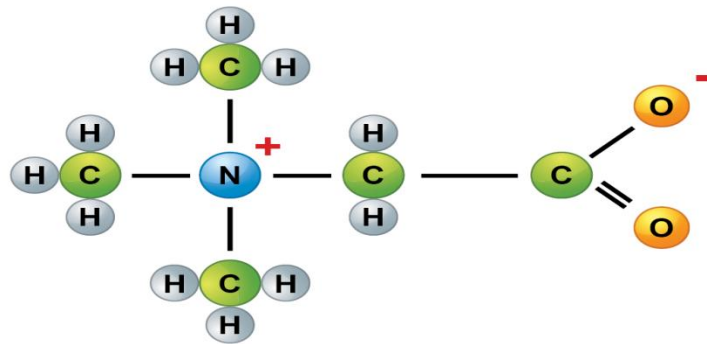
# Effect of betaine on total born and born alive supplemented to gestating sows



(van Wettere et al, 2012)

# Hypothesis

Supplemental betaine enters the egg and improves percentage hatched in the broiler breeders





# Experiment 1: Betaine manipulation in the egg

- 60 Hyline brown laying hens @ 50 weeks of age
- Housed in individual cages
- 2 treatments arranged in a randomise factorial design
  - Sorghum soybean based control
  - Control diet supplemented with 1000ppm natural Betaine (Betafin S1)
- Diets offered for 42 days
- Eggs collected after 10 days pre-treatment
- Contents of eggs were emptied into one vessel each week, homogenised and subsample analysed for betaine content

# Performance

Treatment	Egg Wt (g)	Egg Wt (g/wk/rep)	Egg No. (per wk/bird)	Feed Intake (g/rep/wk)	FCR (g:g)	Lay %
Control	61.2	1129.2	5.88	2196.2	1.99	83.97
Betaine	62.7	1132.8	5.87	2219.3	2.00	83.81
P =	0.23	0.96	0.95	0.75	0.92	0.92
SEM	0.829	49.55	0.11	51.28	0.094	1.02

# Betaine content of the egg

Treatment	Week 2	Week 3	Week 4	Week 5	Week 6	Average*
Control (mg/100g)	0.38	0.50	0.56	0.46	0.40	0.46
Betaine (mg/100g)	1.30	1.36	1.20	1.64	1.34	1.37

\*The addition of 1 kg/tonne or 1000ppm of betaine to the diet increased the content by 0.91 mg/100g in the egg ( $P < 0.001$ ).

# Experiment 2: Commercial evaluation of betaine in broiler breeders

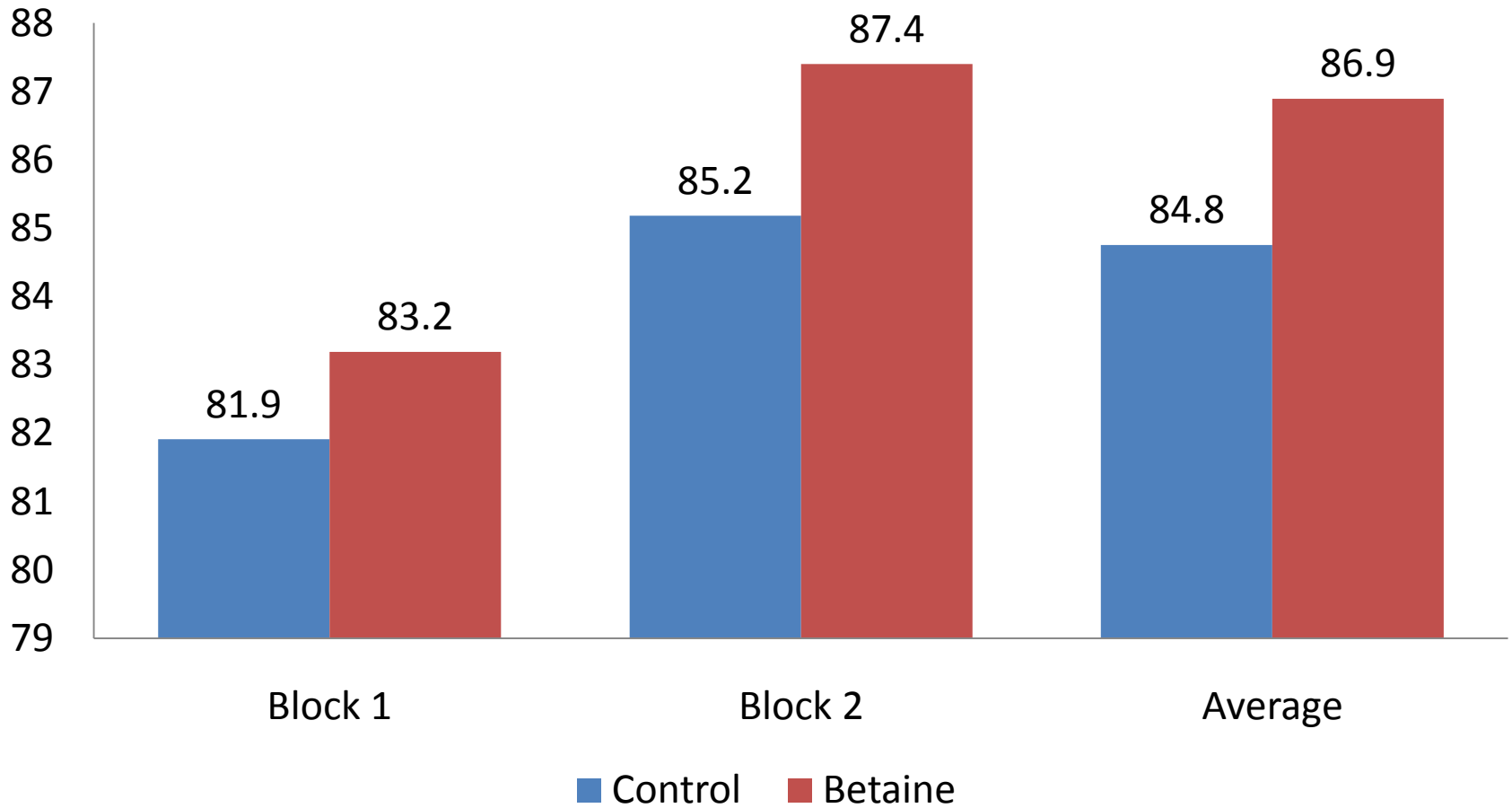
- Turi Foods Bannockburn breeder Farm (study overseen by Scolexia)
- Approx 7,000 Ross 308 hens per shed, with 8 males per 100 hens.
- The sheds are 100% deep litter.
- The treatments were two levels of natural Betaine (Betafin S1, Danisco), at 0 and 2000ppm.
- The study began when hens were 25 weeks of age, and ended when the hens were 55-56 weeks old.
- Percentage hatched, chick weight and percentage of chick culls were recorded 3 times a week.

# Experiment 2: continued

- The experiment was run in two blocks, with a cross-over of treatments so that no one treatment was offered to the same shed.
- One shed per treatment per block
- First block was run in 2012 Autumn early winter, using natural nesting boxes
- The second block run in 2013 late winter and spring, using Jansen nesting boxes



# Effects on Hatchability

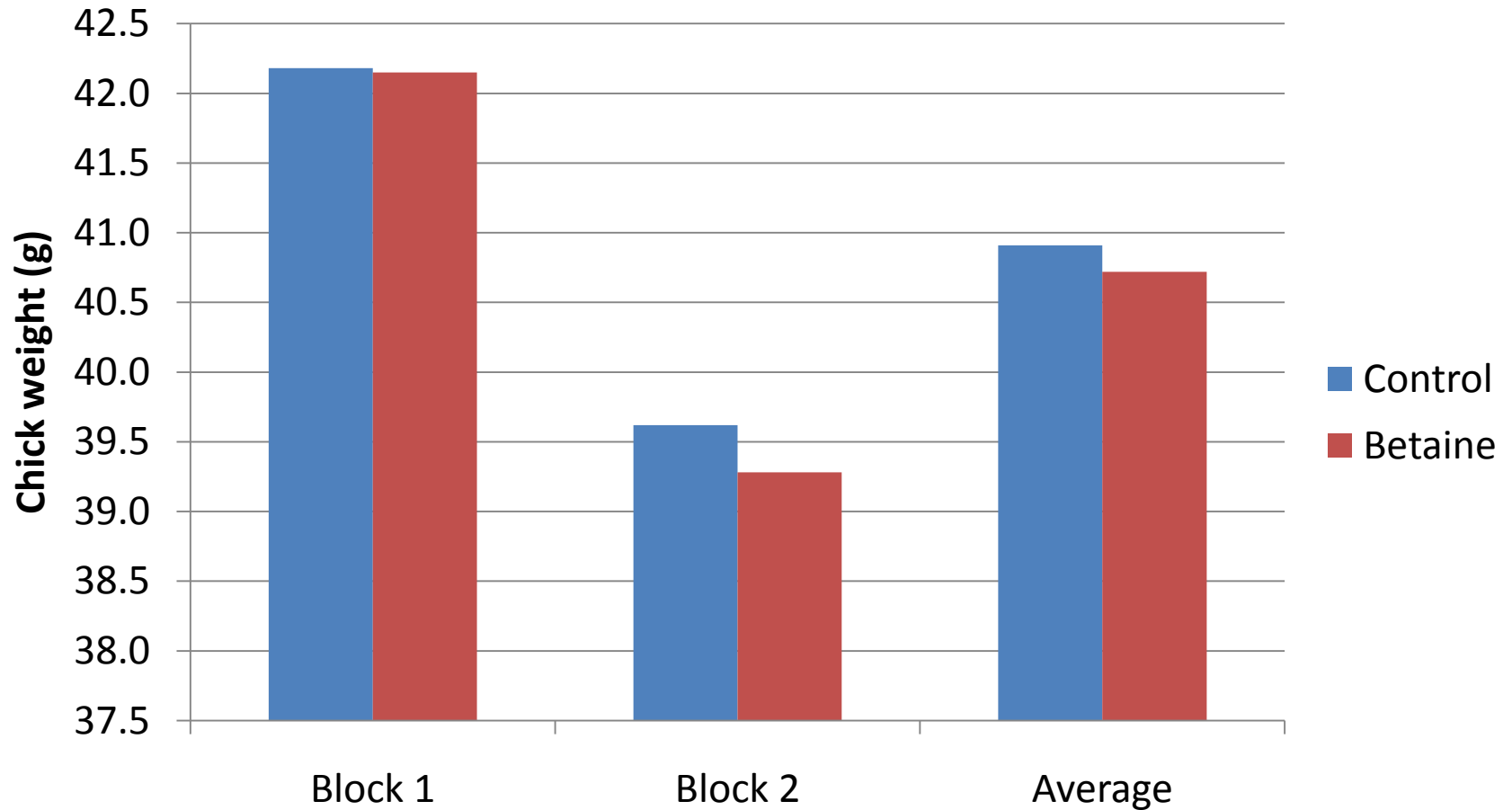


Betaine effect: P=0.161

P=0.0001

P=0.004

# Effects on chick weight



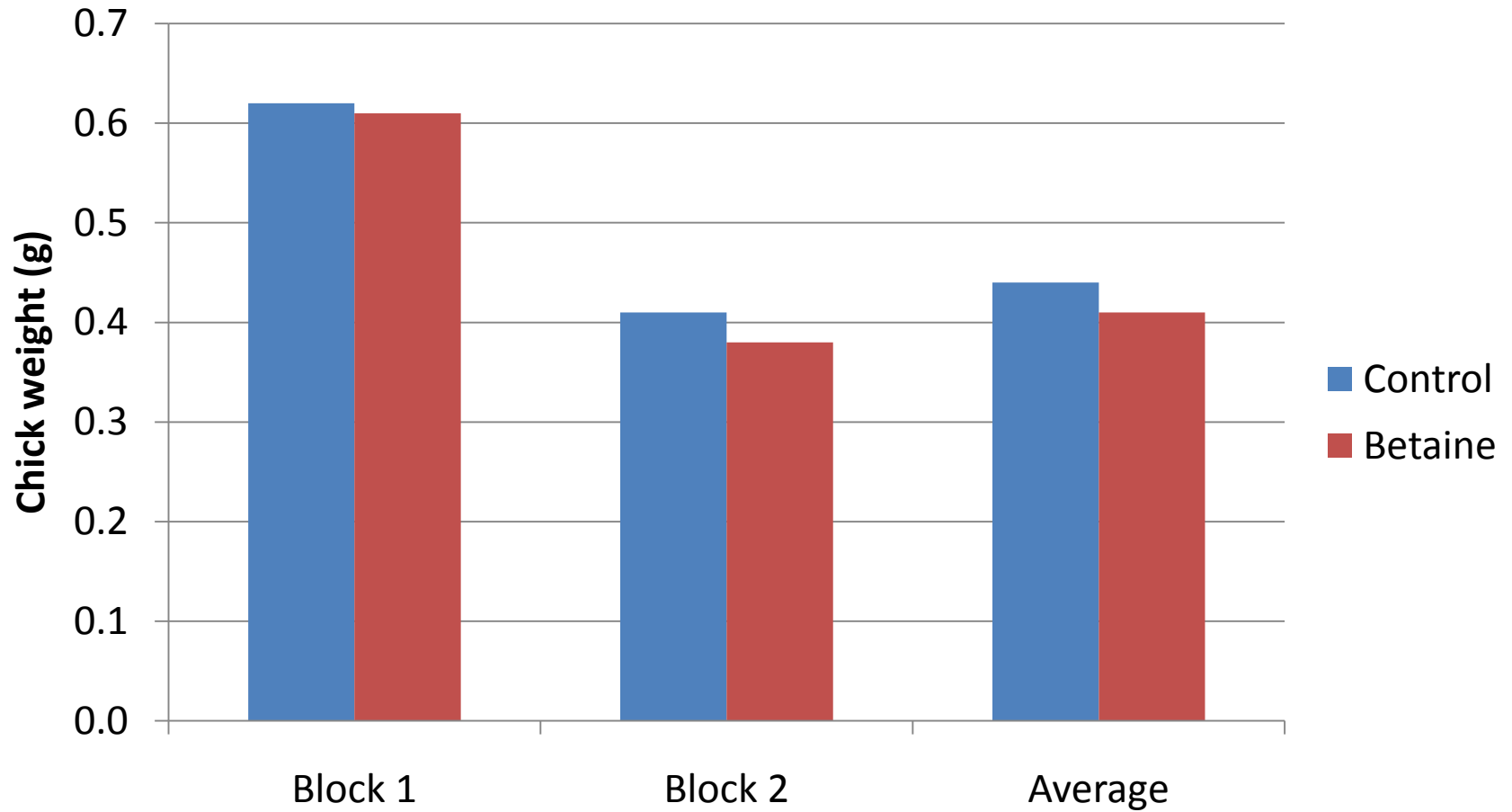
Betaine effect:

P=0.952

P=0.487

P=0.614

# Actual percentage culls



Betaine effect:

P=0.871

P=0.247

P=0.397



# Implications

- Results suggest modern nesting boxes improve hatchability and reduce culls
- Increasing percentage hatched may impact on lower chick weights
- Significant influence of betaine on hatchability

# Conclusions

- Supplemental natural betaine increases the betaine content of the egg.
- Betaine supplementation significantly increased percentage hatched (without negative impacted on chick weight)
- Betaine can potentially save the broiler industry a net \$8.3 million
- More work required on the effects on progeny growth