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Effect of antimocrobial substitution with Bacillus Subtilus on broiler health and performance

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Modern broiler production practices

- Shifting from extensive to intensive production
  - Controlled environment houses
  - Fast growing bird
  - Engineered nutrition
  - Higher bird density

Higher risk of diseases spread and losses

contaminated end-product

E-coli

Opportunistic pathogen

Production losses

TWO OF THE MAJOR BACTERIAL THREAT OF BROILER FARMERS

Mortality

Clostridium

10^4 CFU/g of digesta

Necrotic Enteritis

Antibiotic growth promoters in poultry industry

+

Used in sub-therapeutic dose over extended period

- **Suppress any bacterial growth**
- **Compensate any stressful conditions**

-

- **Residues in animal products**
- **Suppression of both beneficial and pathogenic bacterial strains**
- **Inducing bacterial resistance**

Clostat®

- **Bacillus subtilis (PB6) bacterium**
- **Isolated from healthy chicken gut coped after a clostridial challenge**
- **Bacillus subtilis once active in the intestinal cavity secrete surfactin able to dissolve other bacterial membrane**
- **Targeting mainly E-coli and Clostridium**

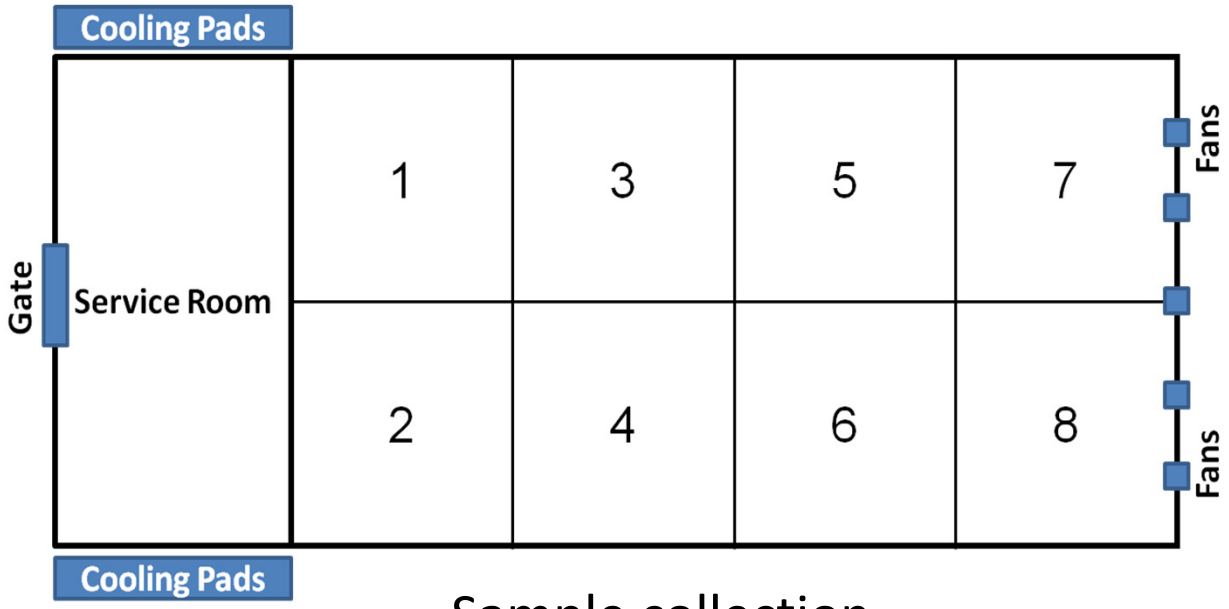
Aim of the study

Evaluate of Clostat® as a potential replacer of Antibiotic Growth promoter and its effect on E-coli and Clostridium growth Under commercial broiler operations

- **Trial 1 : Bacterial analysis**
  - 22000 Cobb broilers, parallel housing
  - AGP = Maxus® = Avilamycine
  - Clostat® = bacillus subtilus

- **Trial 2: Growth efficiency**
  - 18360 Cobb broilers, same house
  - AGP = Maxus® = Avilamycine
  - Clostat® = bacillus subtilus

- Body weight recorded in groups of 4 to 8 birds per weighing in each subsection
- Feed conversion ratio calculated
- Mortality recorded, percentage reported



Sample collection

Lesion Scoring

Figure 1: Score = 1

Figure 2: Score = 2

Figure 3: Score = 3

Figure 4: Score = 4

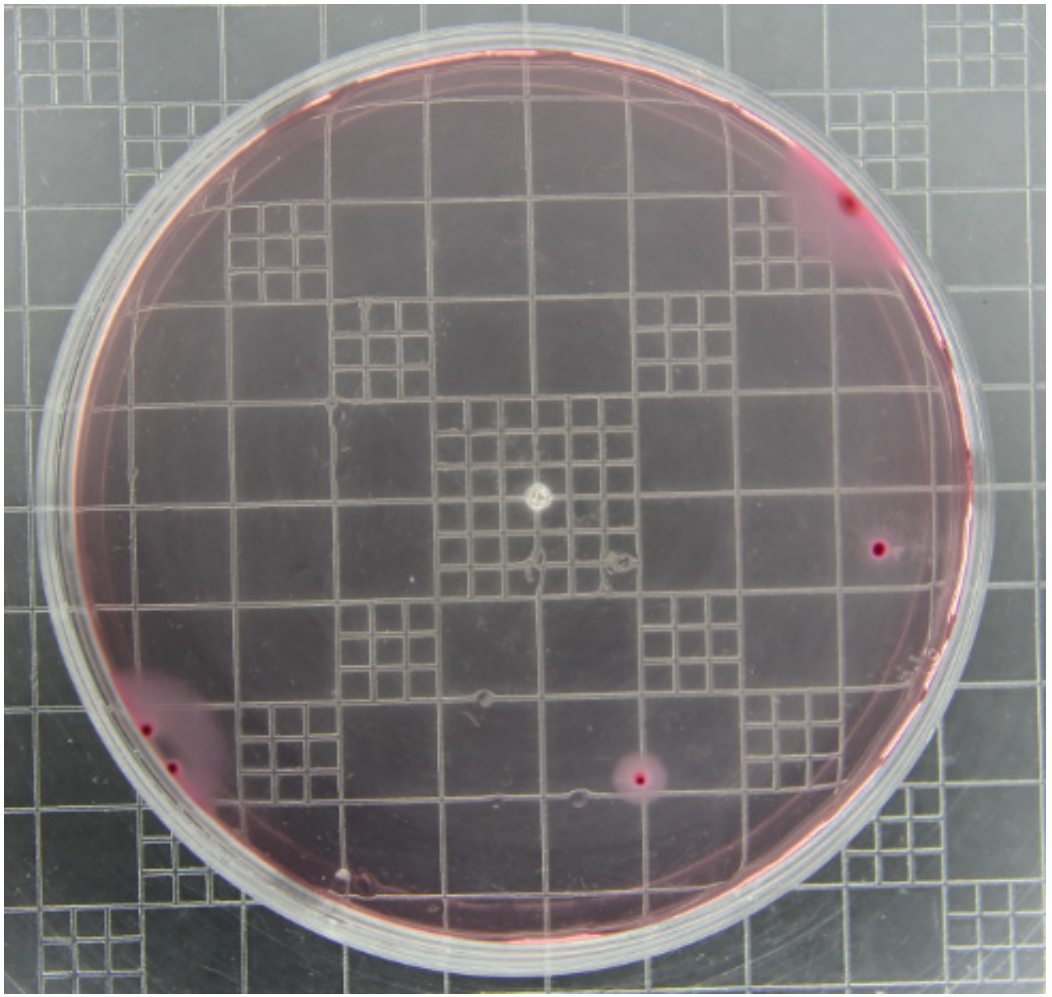
5 point scale

- 0 - no lesion
- 4 - high number of lesions and erosion of intestinal wall

Merck veterinary manual, 2005

E-COLI

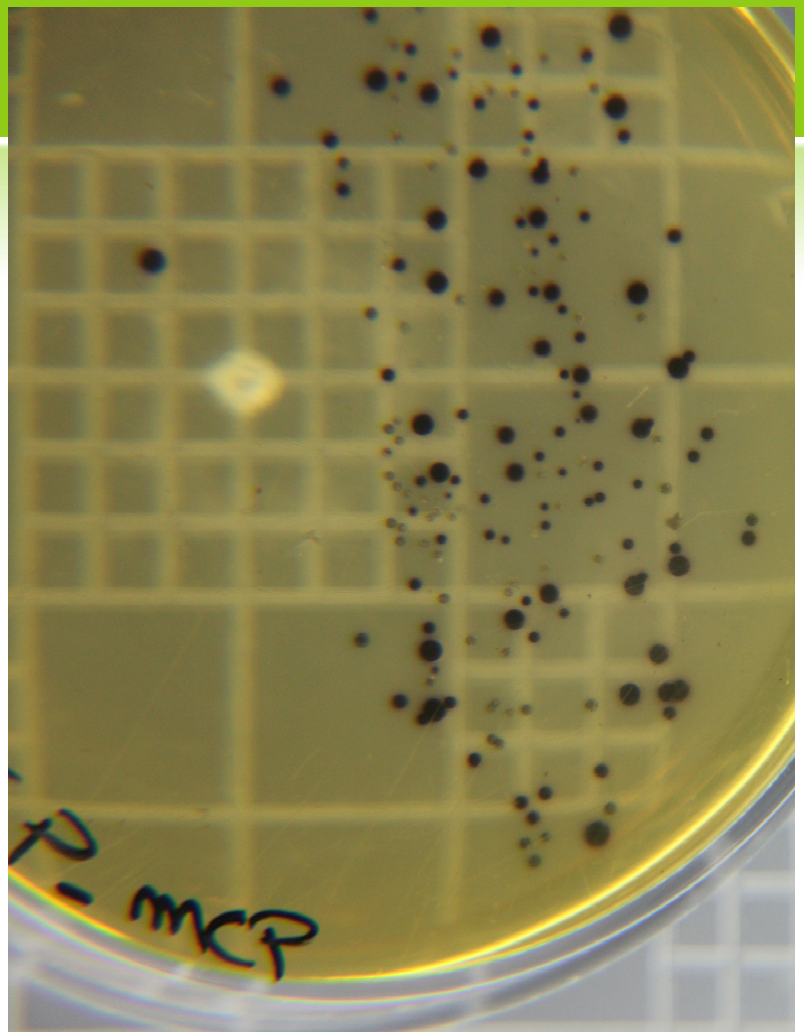
- **Grown on MacConkey agar**
- **Aerobically**
- **For 24h**
- **At 37^0C**



Typical Ecoli growth on MacKonkey agar

CLOSTRIDIUM

- Grown on ChromoSelect agar
- Anaerobically
- For 48h
- At 44^0C



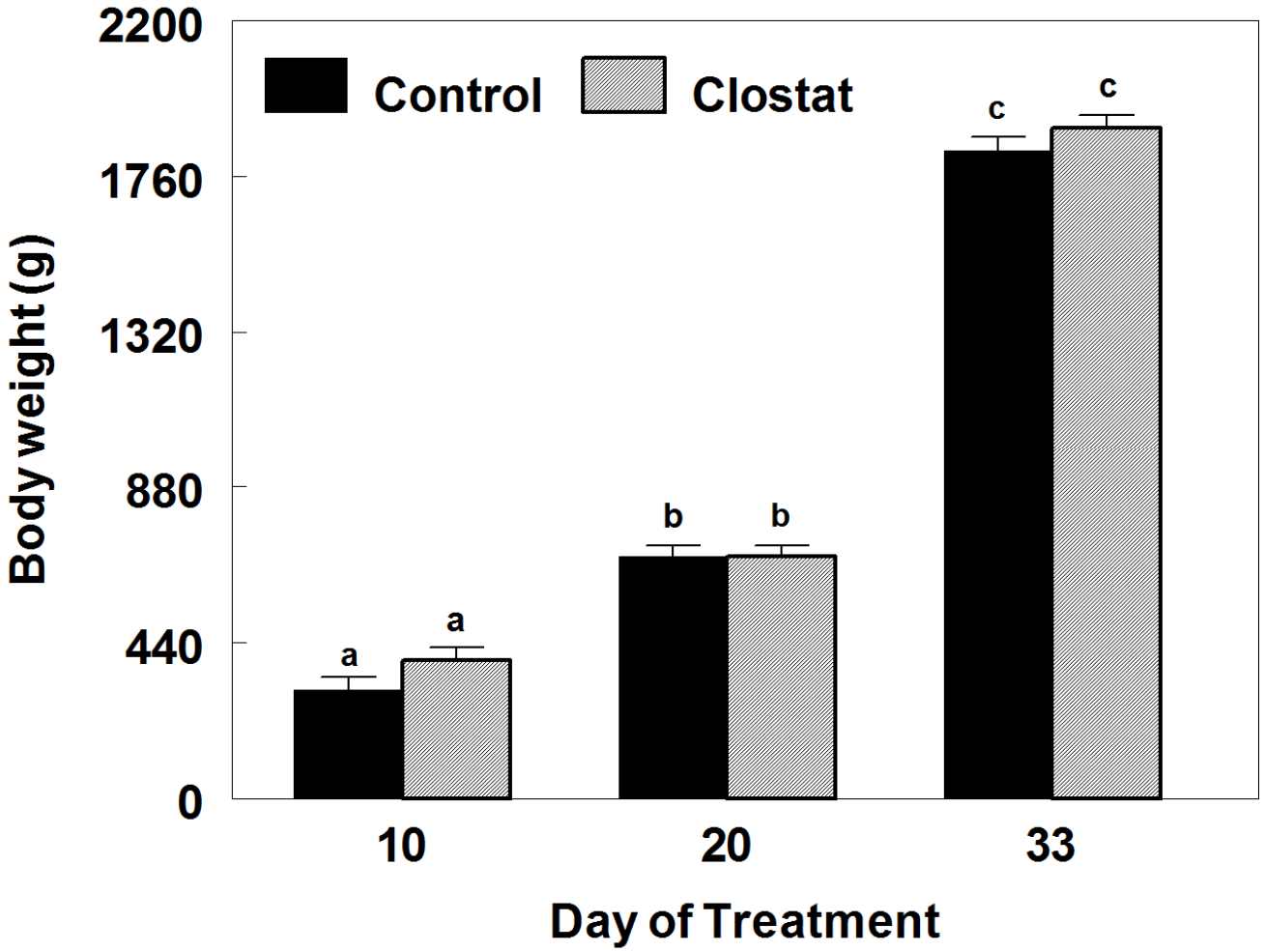
Typical growth on mCP ChromoSelect agar

Statistical analysis

- Data analyzed using GLM prcedure using SAS 9.1, and presented as Lsmeans ± SEM
- 2x3 or 2x6 factorial treatment arrangement:
  - Feed additive
  - Day of growth
- 2x3x2 factorial analysis showed no effect for sample type (digestive of fecal), so sample type was removed from the model

Results and Discussion

Body weight distribution among treatments in function of time in trial 1



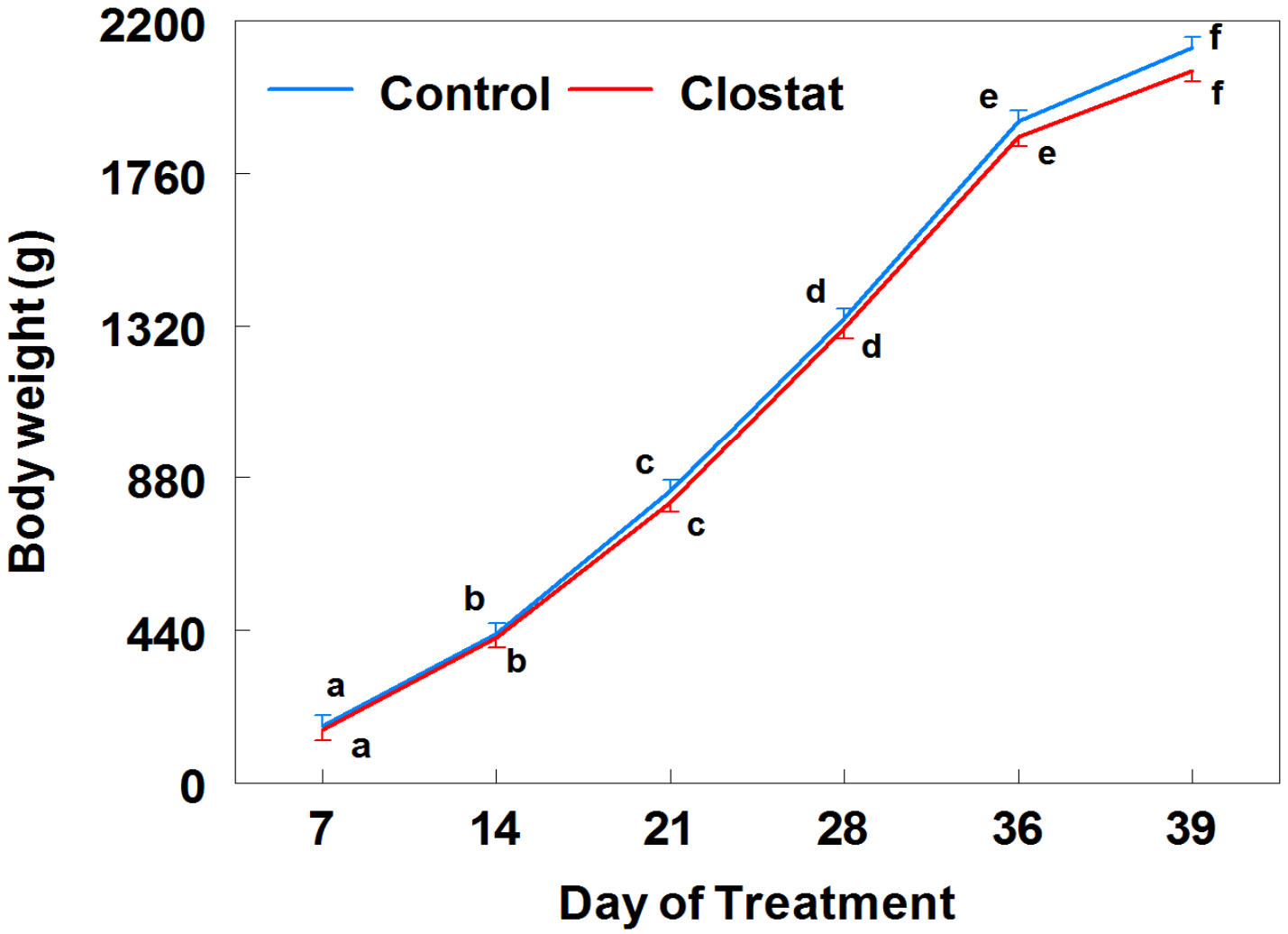
- **Mortality**

  10,7 vs. 7.8%

- **FCR**

  1.88 vs. 1.97

Body weight distribution among treatments in function of time in trial 2



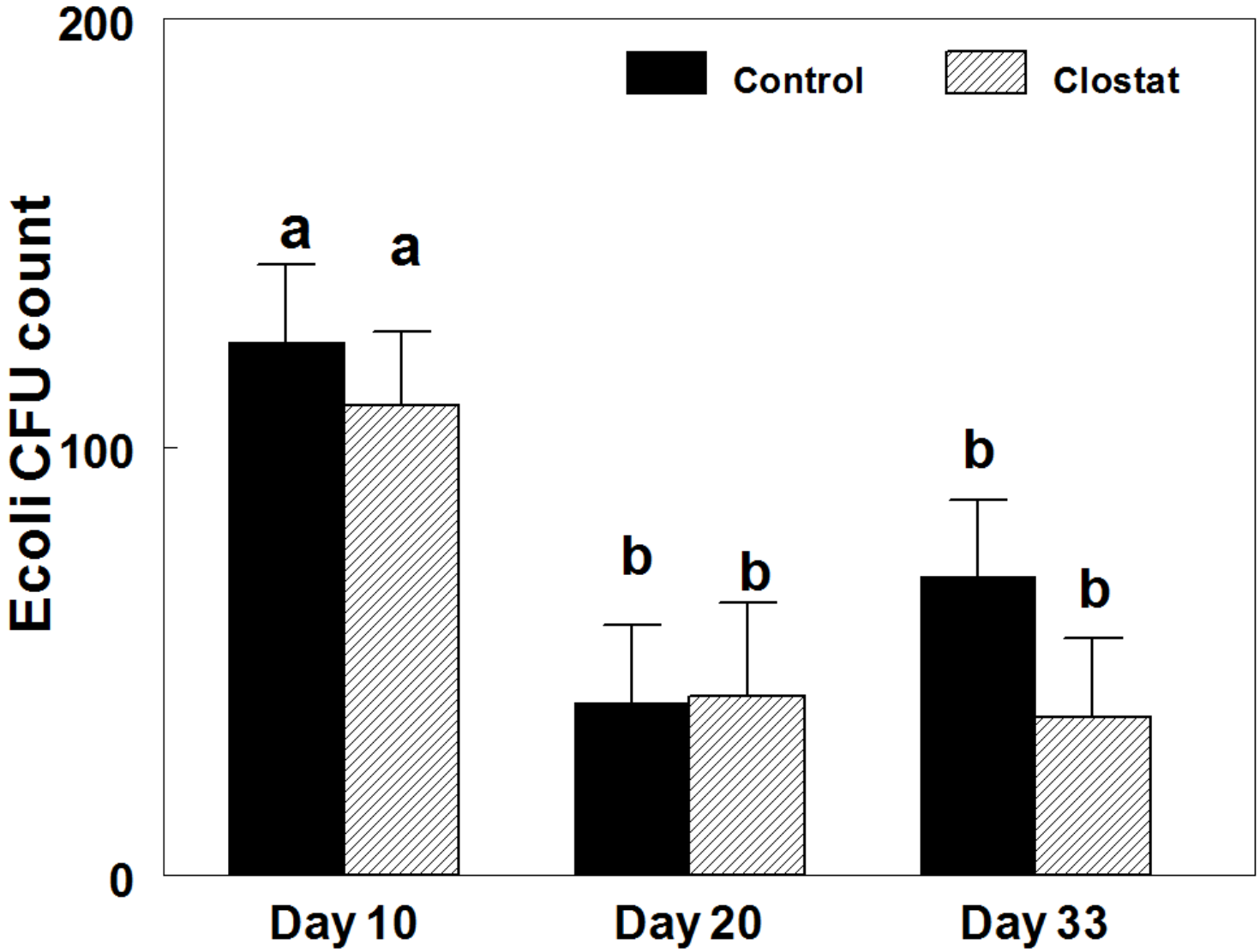
- Mortality

  6.5 vs. 4.7%

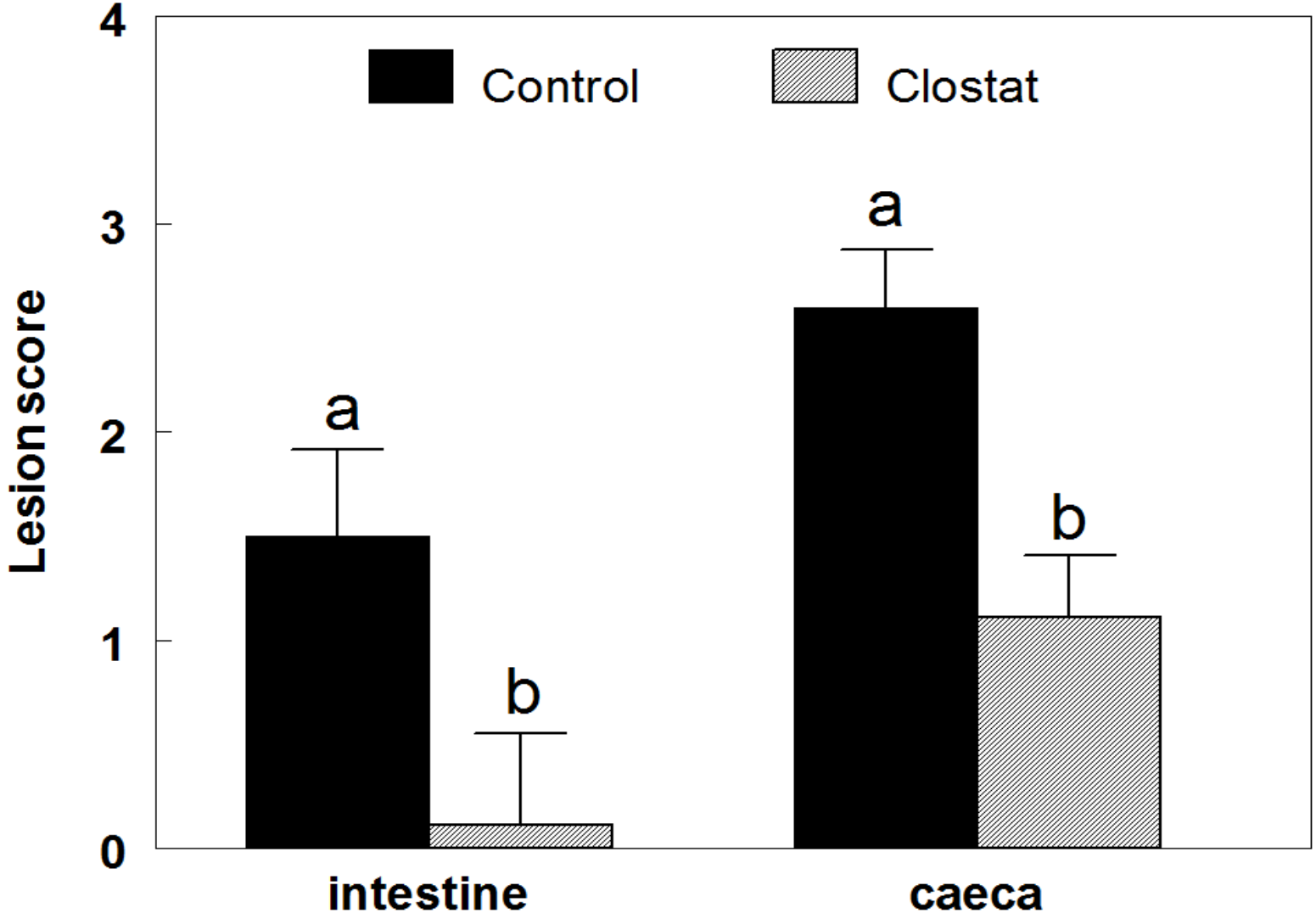
- FCR

  1.87

E-coli CFU count distribution among treatment in function of days



Lesion scoring of both treatments across intestines and ceaca.



Clostridium perfringens

- Very rare on mCP or TSC Chromoselect
  - Only 4 % of our samples had clostridium growth
- Efforts to further enhance clostridial overgrowth on nutrient agar
  - Same results

Conclusion

- Body weight, mortality and FCR were comparable, revealing that Clostat®, by its bacillus subtilis content, is performing similar to antibiotic growth promoters .
- Clostat® and AGPs are both effectively decreasing E-coli and Clostridium perfringens populations within the digestive system.
- Both are promoting an efficient growth, and a healthier bird.

Implications

With current AGPs ban in Europe and soon in the US, clostat, a natural product, equally efficient replacer of AGPs can constitute a great asset to conserve the same levels of growth in the poultry industry while producing a healthier bird, with a potential longer shelf-life.

Questions?

Aknowlegments: Kemin, Hawa Chicken, Saad Saad Farms