

EFFECTS OF ANTIBIOTIC PROPHYLAXIS ON THE PERFORMANCE AND GUT MICROBIOTA OF GROWING BROILER CHICKS

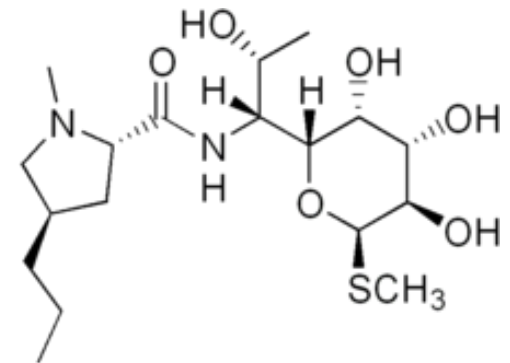


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WHY STUDY CHICKEN MICROBIOTA?

50 years ago...

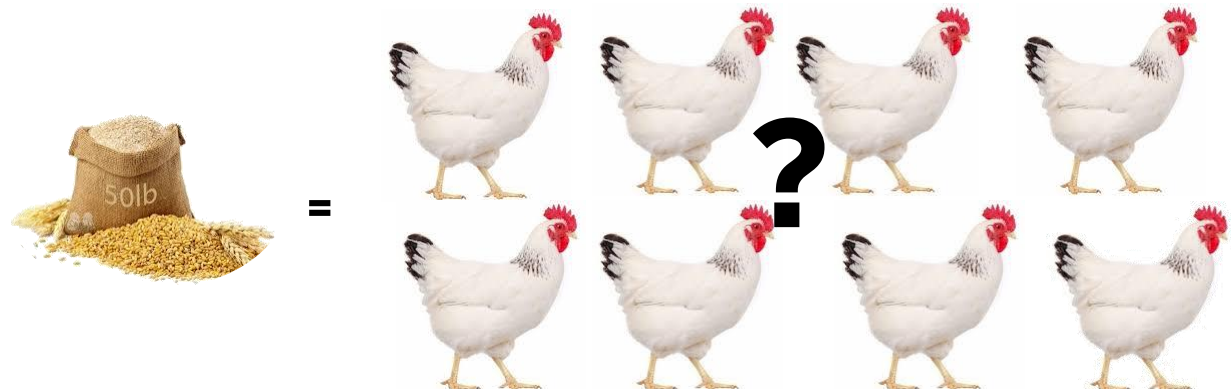


... today



Further enhancement of production efficiency by selection of elite gut microbiota?

... the future?



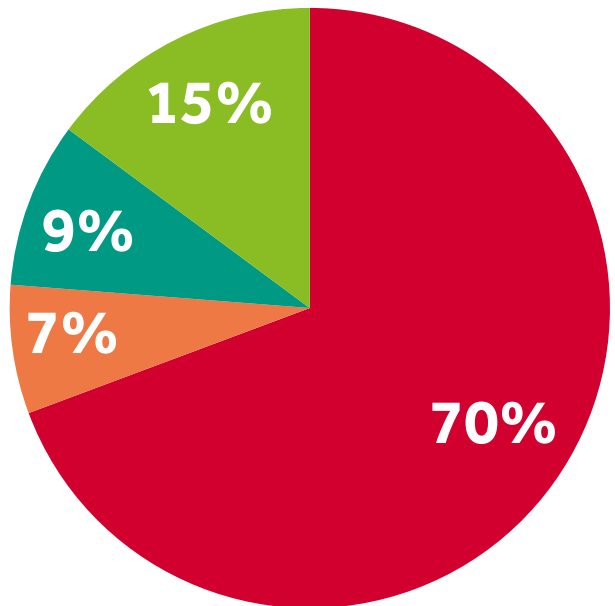
ANTIBIOTICS IN BROILER PRODUCTION



- Routine use at **sub-therapeutic** levels
 - Prevention > cure
 - Reduced inflammation
 - Increase in food security

- Antibiotic prophylaxis decreases feed conversion ratio (FCR)

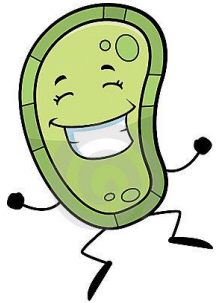
- Increase in resistance – EU ban of AGP in 2006



- Livestock: non-therapeutic
- Livestock: therapeutic
- Human: therapeutic
- Other

Source: Keep Antibiotics Working Coalition

MICROBIOME AND PERFORMANCE



Ruminococcaceae
Lachnospiraceae



Short chain fatty acids (SCFA):

Acetate

Propionate

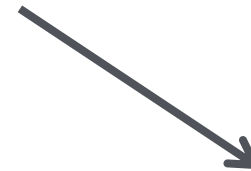
Butyrate



Increased uptake of nutrients:

Proliferation of enterocytes

Increased villus height



Reduced incidence of disease:

Increased epithelial integrity

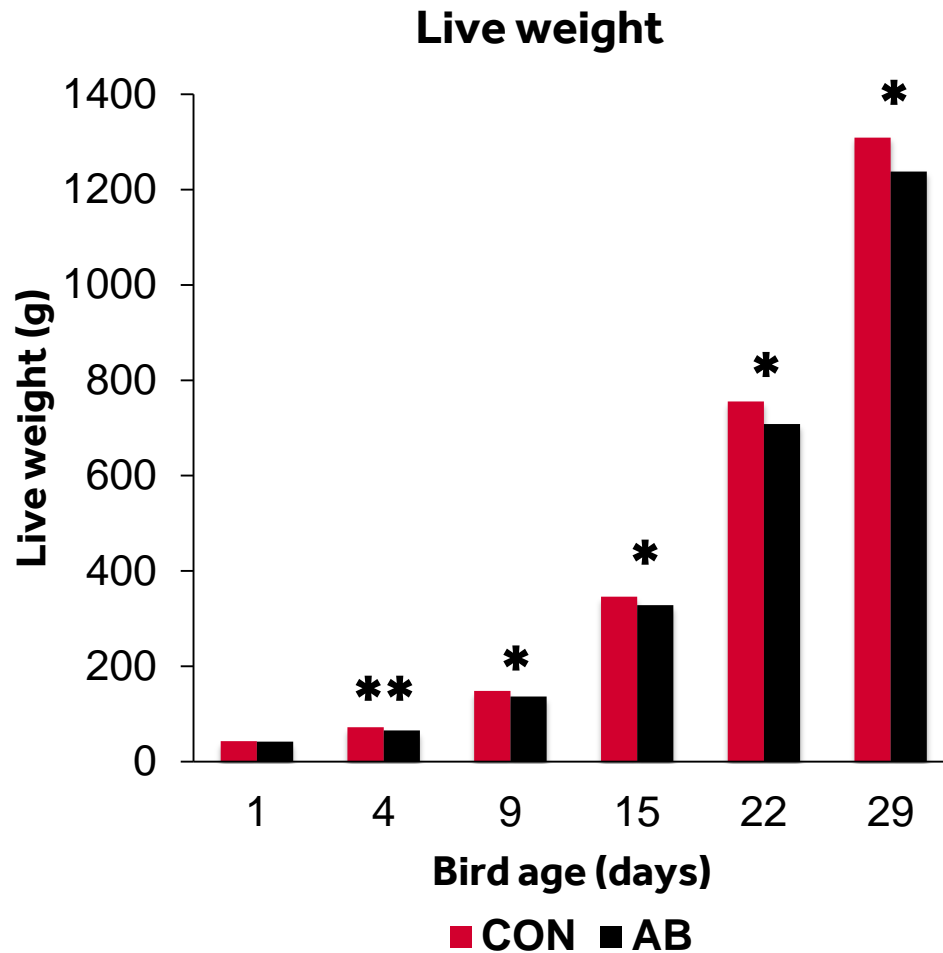
Reduced inflammation

LIVE CHICKEN TRIAL: DECEMBER 2015

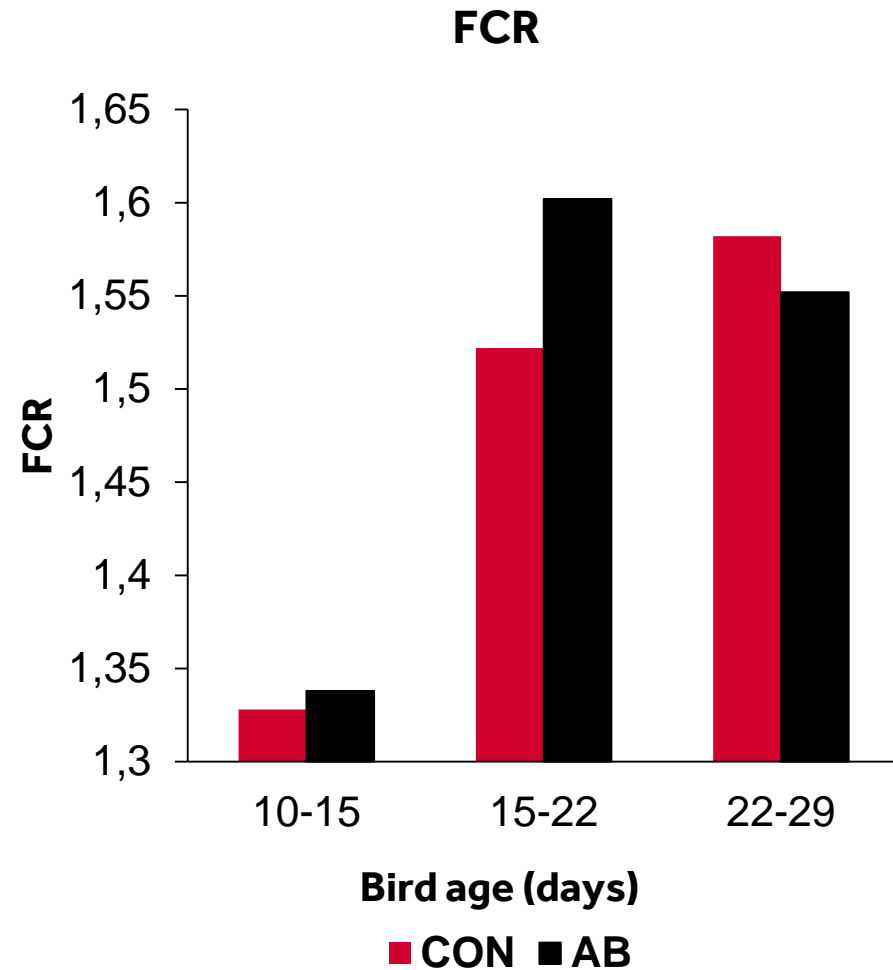
- **108 Ross 308 broiler chicks:**
 - 3x2 arrangement of treatments
- **Antibiotic prophylaxis – Linco-spectin D1-3**
- **Lincomycin:**
 - **Target:** G+ve bacteria (*Streptococcus*)
 - **Mechanism:** binds to 50S ribosomal subunit
- **Spectinomycin:**
 - **Target:** G-ve bacteria (*Proteobacteria*)
 - **Mechanism:** binds to 30S ribosomal subunit



EFFECTS OF LINCO-SPECTIN ON PERFORMANCE



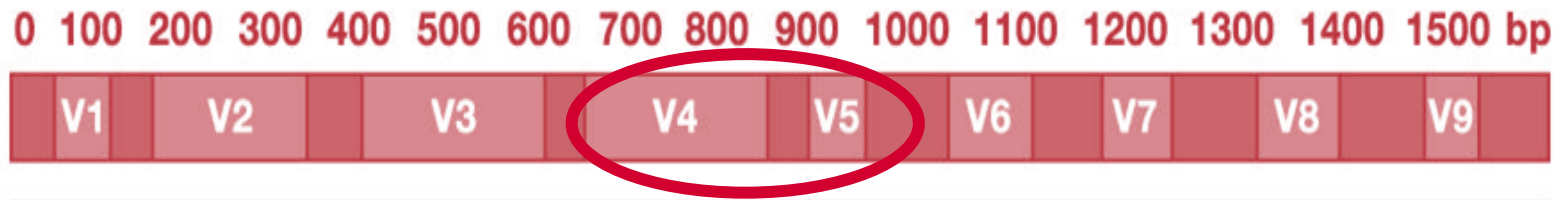
Reduction at all points – $P < 0.05$ at day 4



No significance

16S SEQUENCING

- **DNA extracted** from caecal content – normalised for comparisons
- **Illumina sequencing** target: 16S ribosomal subunit (subunit of 30S)
 - dNTPs added sequentially – incorporation = **fluorescence**
- **Variable regions are unique** to bacterial groups, species etc



CONSERVED REGIONS: unspecific applications

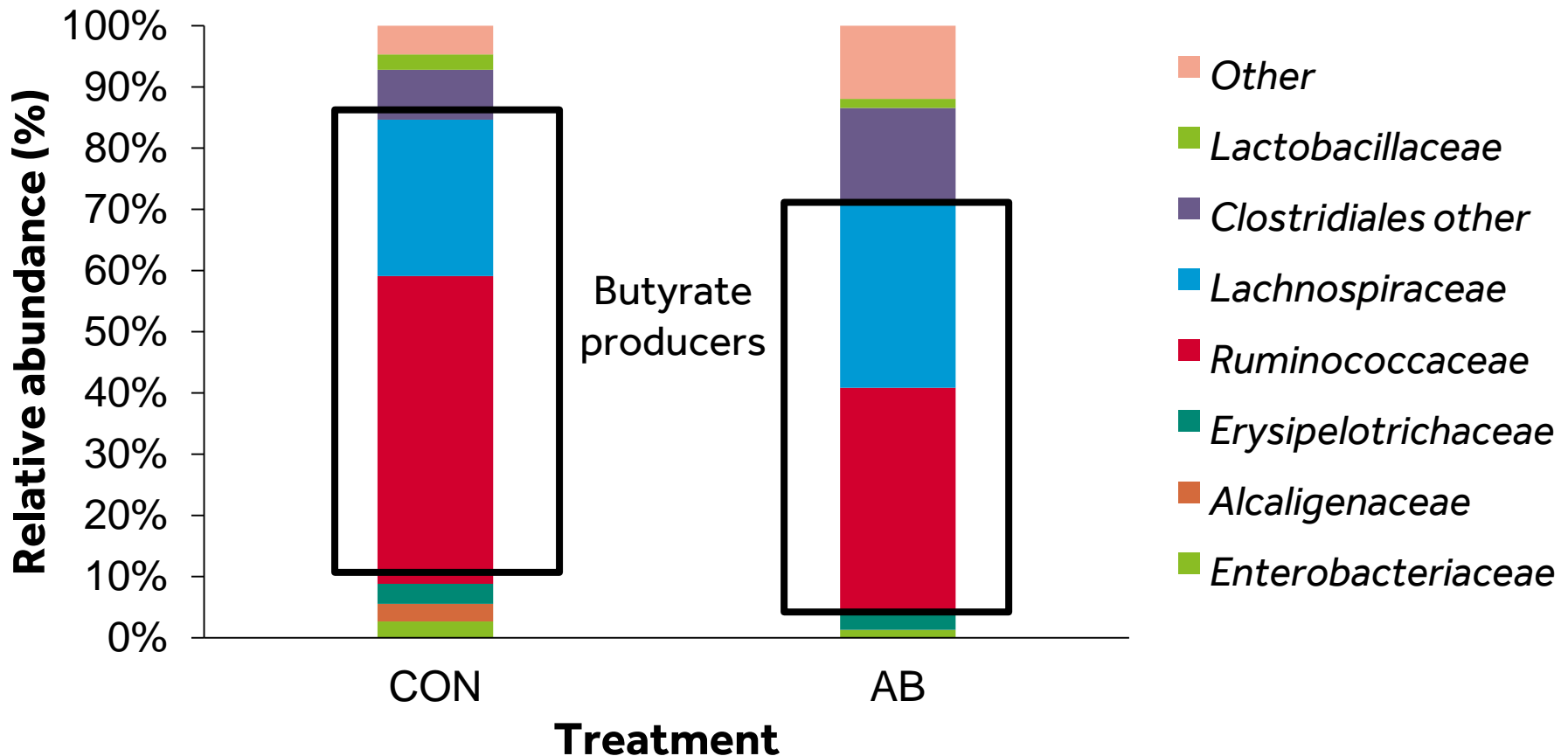
VARIABLE REGIONS: group or species-specific applications

- **Comparison** of sequences to ribosomal database
- Allocation and **relative quantification** of bacterial identities

EFFECT OF TREATMENT ON MICROBIOME

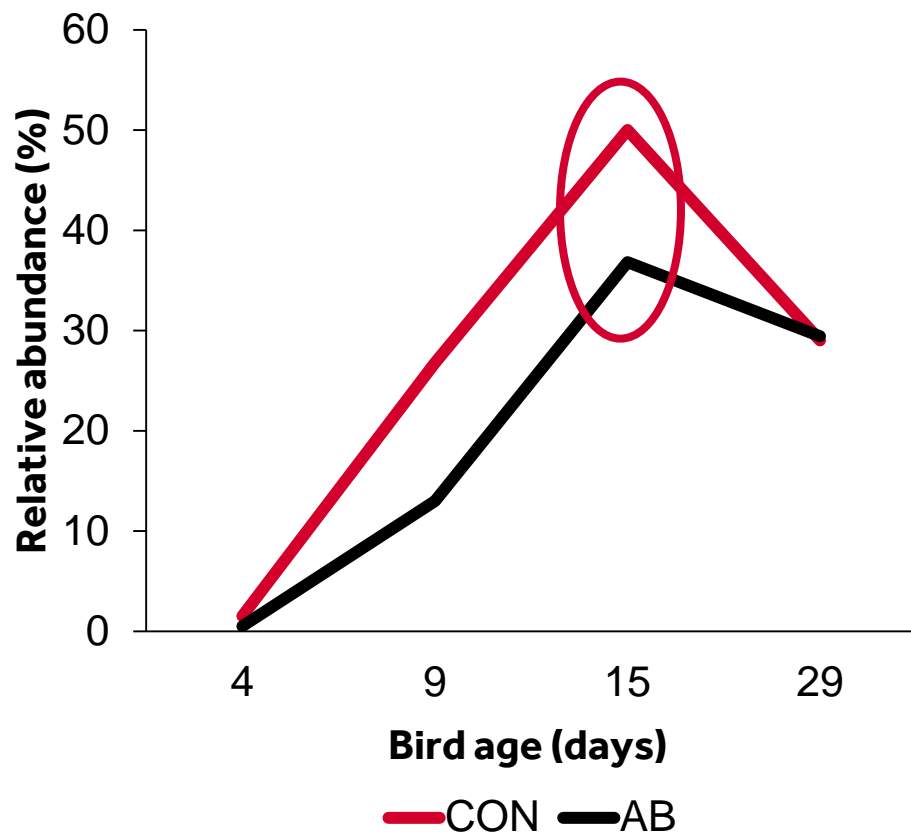
- Linco-spectin altered the profile of the caecal microbiome at all points

Effects of treatment on microbiome: Day 15



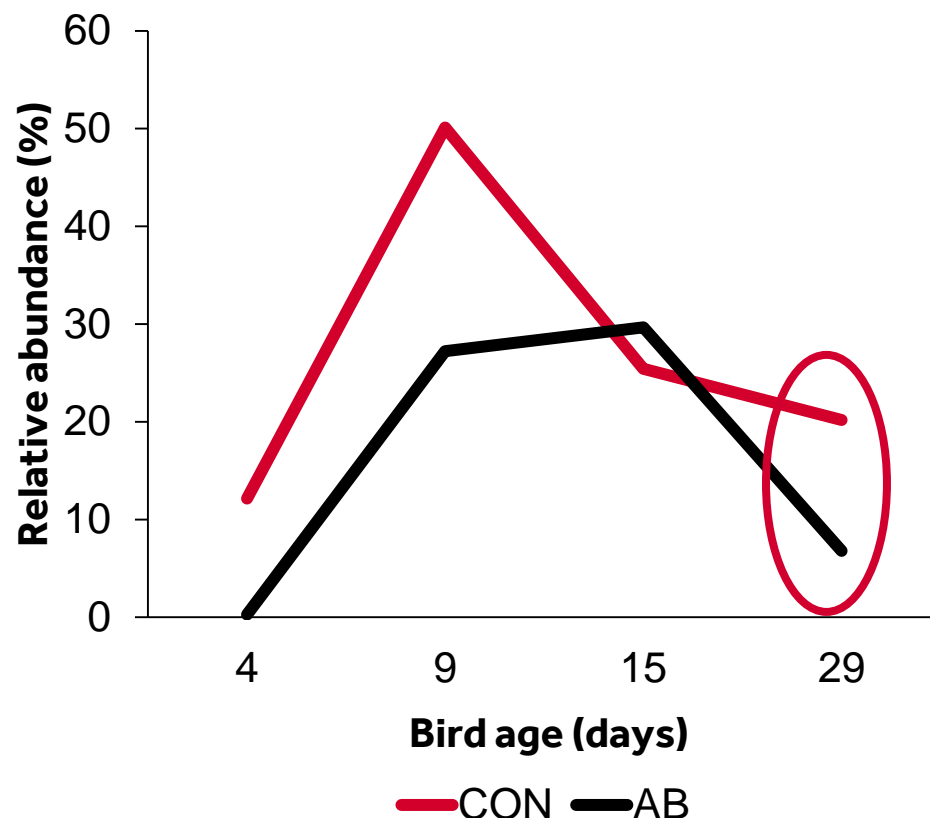
EFFECTS OF LINCO-SPECTIN ON BUTYRATE PRODUCERS

Ruminococcaceae



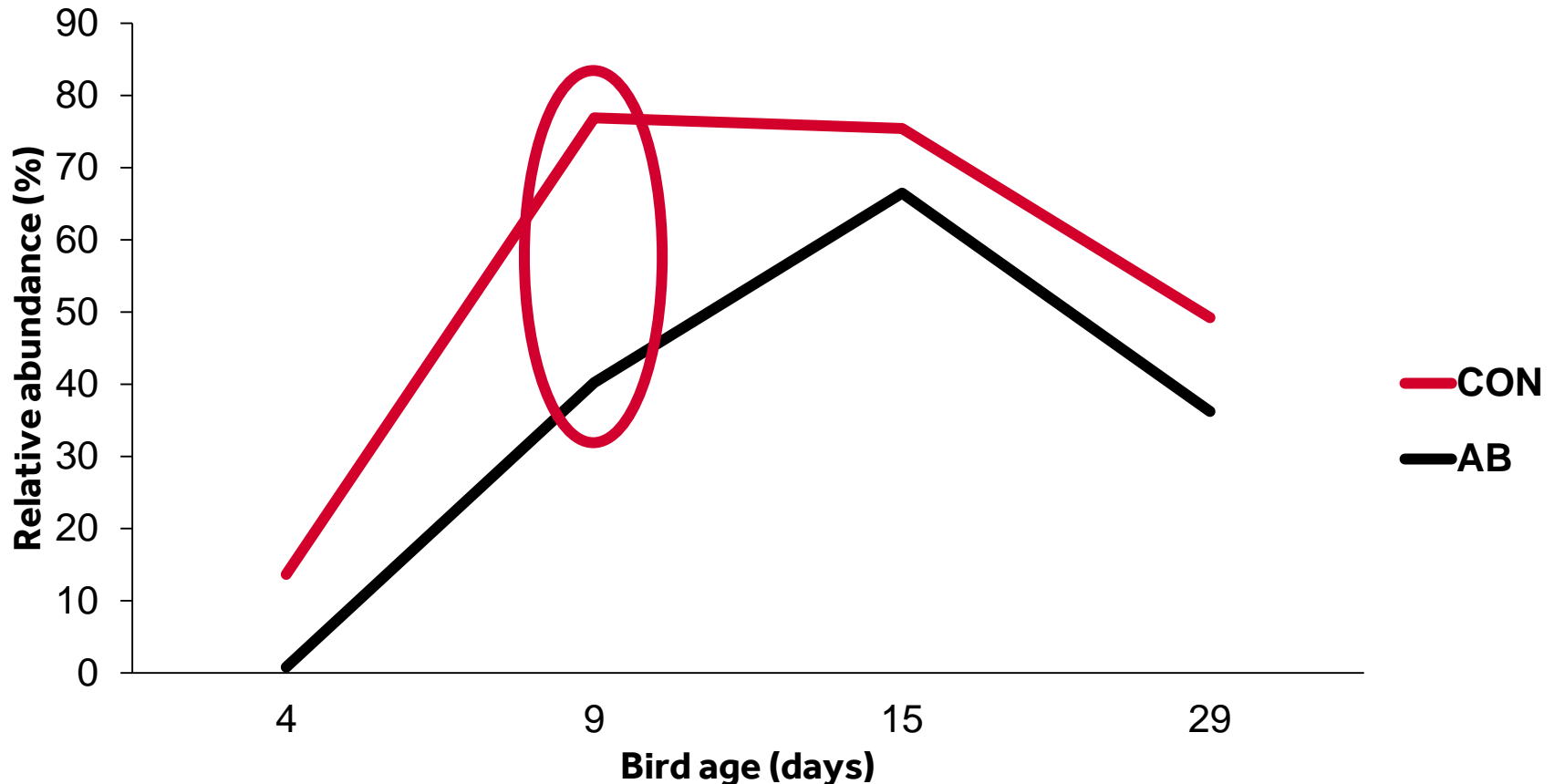
Significance at day 15 ($P = 0.050$)

Lachnospiraceae



Significance at day 29 ($P = 0.035$)

EFFECTS OF LINCO-SPECTIN ON BUTYRATE PRODUCERS



- Significance at day **9** when combined ($P = 0.045$)
- No significance at day **29**

CONCLUSIONS

- **Decrease in LW following administration of Linco-spectin:**
 - Unnecessary – no diseased birds?
 - Shifts in microbial profile
- **Significant differences in butyrate producers:**
 - Reduction in butyrate - effects on ability to utilise feed?
- **Increase understanding of interactions between host/bacteria:**
 - Enhancement of certain species
 - Reduction in antimicrobial resistance – probiotics?
 - Increase in performance = decrease in production costs

ACKNOWLEDGEMENTS



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- Prof Martin Woodward (Food and Nutritional Sciences)
- Richard Ellis (Animal and Plant Health Agency)



- **Experimental setup:**

- Centre for Dairy Research, University of Reading



- **Funding:**

- MERCK



MANY THANKS FOR YOUR ATTENTION
QUESTIONS ARE WELCOME

