Encapsulated butyrate in the maintenance of broiler gut barrier function applying a dysbacteriosis model

Mohammad Naghizadeh, Tina Sørensen Dalgaard, and Ricarda Margarete Engberg
Department of Animal Science, Aarhus University, Blichers Allé 20, P.O. Box 50, DK-8830 Tjele, Denmark

1. Motivation
- To control gut health of broilers suffering from dysbacteriosis
- To support gastrointestinal health by maintaining gut integrity

2. Material and methods

Animals and treatments
- Day-old male broiler (Ross 308, n=672)
- Three treatment groups and 8 replicates:
  1. Control
  2. Encapsulated butyrate (0.5g/kg)
  3. Ionophore coccidiostat, Salinomycin (69 mg/kg feed)

The dysbacteriosis model
- Grower feed providing 5% rye from day 10
- Oral challenge with a 10 times overdose of an attenuated live vaccine against coccidiosis (Hipracox®, Hipra) on day 17

Intestinal permeability and integrity
- Oral inoculation with 1mL of FTC-d (3–5kDa; 4,17 mg/bird) on day 23
- Plasma samples (2.5 h after inoculation)
- FITC-d concentration in plasma

3. Results

White blood cells
The number of monocytes (Fig. 2a) in all groups started at the same level on day 16 and was followed by a 3 fold increase from day 20 to 28 in the control group and the group supplemented with encapsulated butyrate. Salinomycin tended to decrease monocyte counts during the period from day 20 to day 28 (P>0.05) which may indicate an anti-inflammatory effect of Salinomycin. Throughout the experiment, the number of heterophils (Fig. 2b), lymphocytes (Fig. 2c), and thrombocytes (Fig. 2d) remained stable in all treatment groups. No difference in H/L ratio, a stress indicator, was found between treatment groups during experiment.

Intestinal integrity
Challenged broilers fed with Salinomycin showed the lowest plasma levels of FITC-d (P<0.0001) compared to the other groups (Fig. 2f) indicating protection of gut integrity.

Body weight
Challenged birds fed Salinomycin had higher average body weights (1065 g) at day 23 (P<0.001) compared to birds supplemented with encapsulated butyrate (936 g) and those in the control group (908 g).

4. Conclusion

Under the conditions of dysbacteriosis:
- Salinomycin maintains small intestinal integrity thus preventing weight losses associated with dysbacteriosis
- Encapsulated butyrate did not support the gut barrier function and did not improve body weight gain

References