Reduced antibiotic use in piglets: effects of tannins and salicylate as alternatives in susceptible piglets artificially infected with *E. coli* F4 ac

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Post-weaning diarrhoea and antibiotics

- Post-weaning diarrhoea (PWD): major enteric disease occurring mainly during the first week after weaning.

- Aetiology: Multifactorial but often related to pathogen infection, especially Enterotoxigenic *Escherichia coli* (ETEC) → In 2016 in Switzerland, ETEC was detected in 42.5% of weaned pigs suffering from diarrhoea (Schubnell et al., 2016).

- In Switzerland, 53.3% of *E. coli* isolated from pig farms are resistant to one or more antimicrobials (Arch-vet report, 2016).
Proposed solutions as alternatives

- Sows vaccination against *E. coli* F4 (cf. poster Andreas Gutzwiller)
- Breeding *E. coli* F4 resistant piglets (cf. poster Dou Hu)
- Bioactive compounds as feed additives:
  - Salicylate has been proposed to decrease the severity of diarrhea (anti-secretory properties)
  - Hydrolysable tannins are known to have antimicrobial properties

Goal:
Studying whether a standard diet supplemented with hydrolysable tannins combined or not with sodium salicylate could reduce the prevalence of PWD in susceptible piglets
Experimental design

Composition of the groups:

Standard diet (CO):
18.9% CP; DE: 14 MJ/kg

Sodium salicylate

18 SA-CO

2% tannins diet (TA):
18.4% CP; DE: 14 MJ/kg

Sodium salicylate

18 SA-TA

Organisation of the trial:

D-4: weaning

D0: Infection: ETEC F4ac (10^8 CFU/ml)

D4

D7

D14

Tannins and salicylate as alternative to antibiotics in susceptible piglets artificially infected with E. coli F4 ac

Materials and methods
Measurements

- Growth performances: feed intake per pen, average daily gain for 2 weeks

- Consistency of the faeces (faecal score) using a scale from 1 (dry, pelleted) to 4 (watery diarrhoea) to calculate the percentage of piglets in diarrhoea and the number of days in diarrhoea
Results

Growth performances

Feed intake per pen (g/d) (± SE)

Average daily gain (g/d) (± SE)

P-values:

Week 1:
- Salicylate: $P = 0.33$
- Feed: $P = 0.07$
- Salicylate x Feed: $P = 0.74$

Week 2:
- Salicylate: $P = 0.57$
- Feed: $P < 0.001$
- Salicylate x Feed: $P = 0.16$

P-values:

Week 1:
- Salicylate: $P = 0.63$
- Feed: $P < 0.01$
- Salicylate x Feed: $P = 0.97$

Week 2:
- Salicylate: $P = 0.98$
- Feed: $P = 0.03$
- Salicylate x Feed: $P = 0.65$

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**Results**

- **Days**: $P < 0.001$
- **Salicylate**: $P = 0.18$
- **Feed**: $P < 0.01$
- **Salicylate x Feed**: $P = 0.50$

**Percentage of piglets with diarrhoea**

![Graph showing percentage of piglets with diarrhoea over days for different treatments with p-values]
Tannins and salicylate as alternative to antibiotics in susceptible piglets artificially infected with *E. coli F4 ac*

**Results**

<table>
<thead>
<tr>
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<th>Days in diarrhoea (± SD)</th>
<th>P-values:</th>
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<tbody>
<tr>
<td></td>
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<td>TOTAL:</td>
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<td>- Salicylate: P = 0.21</td>
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<td>- Feed: P &lt; 0.01</td>
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<td>- Salicylate x Feed: P = 0.85</td>
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<td>WEEK 1:</td>
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<td>- Salicylate: P = 0.08</td>
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<td>- Feed: P &lt; 0.01</td>
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<td>- Salicylate x Feed: P = 0.41</td>
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<td>WEEK 2:</td>
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<td>- Salicylate: P = 0.97</td>
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<td>- Feed: P = 0.01</td>
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<td>- Salicylate x Feed: P = 0.36</td>
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Conclusions

- No piglet was treated with antibiotics

- Sodium salicylate supplementation had no effect on growth performances and did not decrease the severity of diarrhoea.

- Tannins supplementation improved growth performances and decreased the severity of diarrhoea:
  - Increase in feed intake and average daily gain during the 2 weeks after infection
  - Decrease in number of piglets with diarrhoea and the duration of diarrhoea (days in diarrhoea)
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Conclusions

Thank you for your attention