

Does piglet coccidiosis cause diarrhoea only?

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Isosporiosis, so called piglet coccidiosis, is a parasitic disease affecting 8-15 day old piglets in the farrowing pens. The most important signs of the disease are pasty and watery diarrhoea and reduced body weight at weaning. The disease can run subclinically as well. The agent is *Isospora suis* which is a very reproductive protozoa with a pre-patent period of 4-6 days. In a short period it completes its internal life cycle and pigs starts shedding new generation oocysts. This means they have already damaged the villous and gut mucosa during the pre-patent period in young and suckling piglets.

The gut is one of the most important organs for all living organisms to absorb and digest nutrients and to withstand the mechanical penetration of intestinal micro-organisms.

For growing pigs in the first few days of life, the gut is especially important to get enough colostrum and milk for regular growth and to build up adequate immunity against herd specific pathogens.

A healthy gut is crucial for growing pigs for a comfortable life and for the sustainability of regular growth and to overcome secondary infections which can complicate the health situation at the initial stage.

Pre-weaning gut health may also affect the post-weaning gut health situations.

In addition, maintaining a healthy gut in all animals means less labour for the farmer and less treatment costs and complications and better yield and more profit which can be expected with each investment.

Impact on gut health

I. suis may cause fibrinous enteritis which mainly affects the middle and posterior part of the jejunum; villous necrosis and atrophy are frequently described.

Serious damage to the villi and gut mucosa due to coccidiosis (Fig. 1) in pigs has already been identified by different scientists.

This may be seen as the primary reason why piglets frequently have bacterial infections during the course of coccidiosis. In a

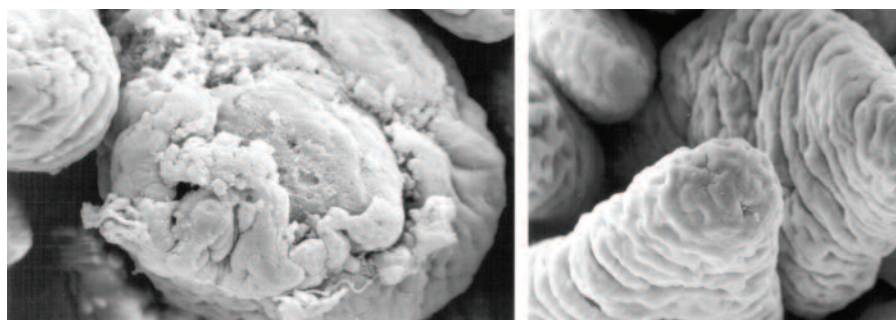


Fig. 1. Ileum of a piglet five days post infection (left) with *I. suis* and the normal ileum of a piglet not infected with coccidiosis (right) (Mundt et al. 2007).

recent experimental study in a sow farm with confirmed *Clostridium perfringens* infection, piglets were experimentally infected with *I. suis* six hours postpartum.

A group of piglets were treated 18 hours postpartum against coccidiosis and another group remained untreated.

Controlling coccidiosis in this farm resulted in a significant reduction of mortality in the first 14 days postpartum due to *Clostridium perfringens* infection compared to 37.5% mortality rate due to necrotic enteritis (Fig. 2) in the untreated control group.

This experimental study confirmed that coccidiosis triggers the infection with *Clostridium perfringens* and causes a higher mortality rate due to the highly destructive effect on the gut villi.

A secondary infection on the elevated gut mucosa was also shown by electron microscopic pictures by Mundt et al. 2007 (Fig. 3).

Fig. 2. Necrotic enteritis due to *Clostridium perfringens* in a piglet infected immediately postpartum six hours with *I. suis* (Mundt et al. 2009).



Coccidiosis can run concomitantly with *Clostridium perfringens*, *E. coli*, rotavirus, adenovirus and salmonellosis.

The primary effect of coccidiosis on gut health is a predisposing factor for the contaminant diseases.

Although coccidiosis does not cause mortality itself the disease can be worsened by secondary infections and, as a consequence, it results in an increased mortality rate.

The economic impact of a damaged gut mucosa and insufficient function leads to poor weight gain and retarded growth even if it is subclinical. Because of the characteristics of the disease, which means it has a pre-patent period where internal stages of *I. suis* damage the gut villous before we see the clinical signs, prevention from coccidiosis make more sense in terms of improving gut health during the critical life time.

Metaphylactic control

An intracellular, long acting and coccidiocide compound 'Toltrazuril' (Baycox 5% oral suspension) is recommended for use as one shot (20mg/kgBW) at 3-5 days of age for the prevention of coccidiosis. Taking into account that there are different types of internal/intracellular stages of *I. suis* (shizogony, merogony, gamogony), a broad, long and intracellularly acting Baycox serves as an efficient control of coccidiosis.

In an experimental study (Mundt et al. 2007), three day old piglets were infected with *I. suis* oocysts and treated either with Baycox 5% two days post-infection (20mg/

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kgBW) as one shot or sulphadimidine (200mg/kgBW) two, three and four days post-infection or diclazuril (2mg/kgBW) two and three days post-infection.

Baycox 5% was able to protect the mucosal villi better than others and provided better weight gain (around 150% positive difference from the other treatment and control group compared as a percentage to day of infection) 25 days post-infection.

In this published study, Vecoxan 2.5% formulated and registered as diclazuril containing product for ruminants was used.

This study confirmed that Baycox metaphylaxis was very efficient in controlling coccidiosis and improving gut health.

German trial

In a sow farm in Germany with a high mortality rate in the first six days of age due to confirmed immediate mixed infection with *Clostridium perfringens* type A and coccidiosis, Baycox 5% was applied to one day old piglets to prevent the very early development stages (pre-patent period) of *I. suis* and to improve gut health. Preventive treatment with Baycox 5% resulted in a significant reduction of mortality (necrotic enteritis) by 64% (Fig. 4) and increased the mean individual body weight of piglets by 326g up to weaning (day 28 of age).

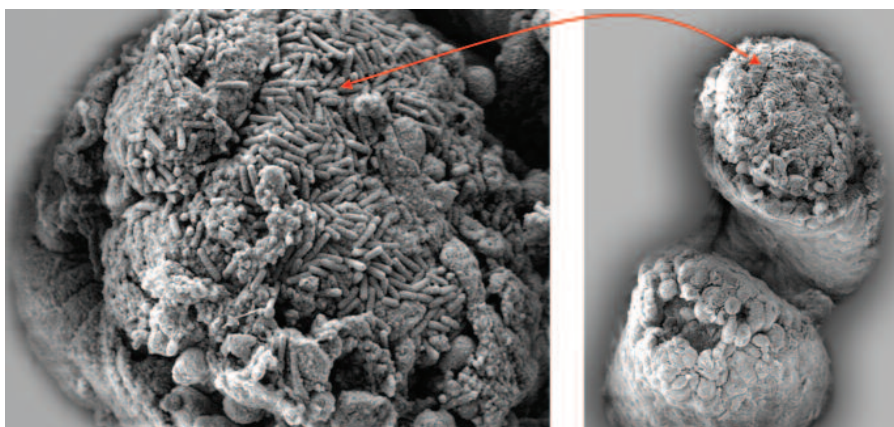


Fig. 3. Secondary infection in a pig after experimental *I. suis* challenge (Mundt et al. 2007).

The incidence of diarrhoea was also significantly reduced in the first six days and up to weaning. This study has confirmed that early preventive treatment with Baycox 5% in farms with immediate postpartum mixed infection with *C. perfringens* and *I. suis* improves gut health and production parameters.

Economic benefits

In four pig herds with subclinical coccidiosis in Belgium, a group of litters treated with Baycox 5% (20mg/kgBw toltrazuril) at 3-5

days of age and another litter remained untreated. Mortality rate and daily weight gain was evaluated until weaning.

The preventive treatment with Baycox 5% resulted in significant high daily weight gain (Fig. 5) up to weaning compared to the untreated control litters. This study has confirmed that even in subclinical coccidiosis, gut health can be impaired and this can lead to insufficient daily weight gain in piglets.

For each of the weaned and treated piglets the economic benefit for the farmers was €0.23 under Belgium conditions.

In Italy, Scala et al. (2009) studied the economic profit for controlling coccidiosis with

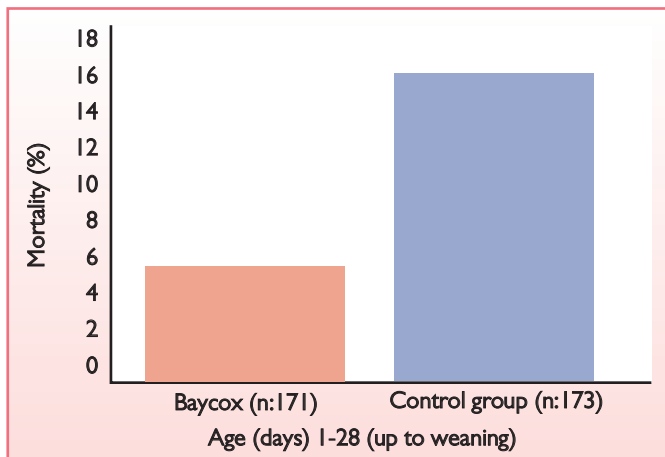


Fig. 4. Mortality rate in piglets up to weaning infected with coccidiosis and *C. perfringens* immediately postpartum and treated with Baycox 5% on day one (Westphal et al. 2007). Difference between groups is significant ($p < 0,05$).

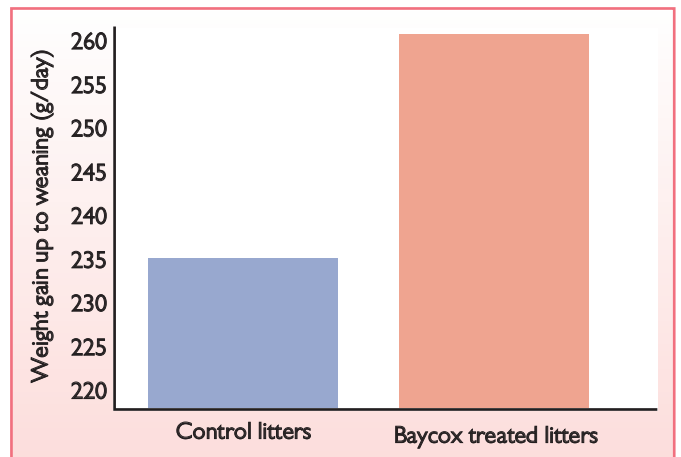


Fig. 5. Daily weight gain of piglets (Maes et al. 2007) with subclinical coccidiosis in Baycox treated or non-treated control litters (the significant difference up to weaning $p < 0,003$).

Baycox or sulpha + trimethoprim combination in piglets. The weight of Baycox treated piglets was 1.07kg higher than the sulpha + trimethoprim group and 670g higher than the control group piglets at weaning (Fig. 6).

The return on investment was +8.6% for Baycox treated piglets and -11.9% for sulpha + trimethoprim treated piglets.

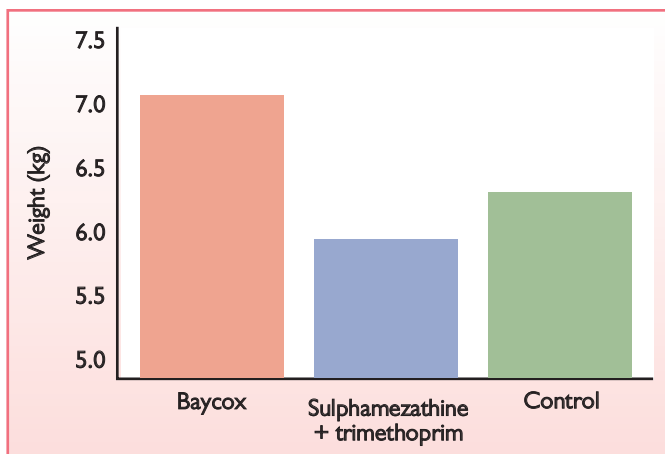
Returns in Euros per piglet was €10,635 for Baycox treated piglets, €8,565 for sulpha + trimethoprim treated piglets and €9,72 for control piglets at weaning.

In addition, the farmer earned around €1,00 per piglet via metaphylaxis with Baycox.

Driesen et al. (1995) also stated that the amount of antibiotic usage, after preventive control of coccidiosis with Baycox 5%, reduced significantly. This indicates a reduced incidence of gut diseases in piglets treated preventively against coccidiosis.

To check the post-weaning feed conversion ratio after preventive treatment with Baycox 5% against coccidiosis in four day old piglets, a study was conducted in Spain.

Fig. 6. Weaning weight of piglets treated with either Baycox, sulphamezathine + trimethoprim or remained untreated (Scala et al. 2009). Difference between Baycox, control and sulpha + trimethoprim group is significant ($p < 0.05$).



It revealed that the protection of gut mucosa from coccidiosis improved gut health and reduced the feed conversion ratio (Fig. 7).

Pigs treated with Baycox 5% preventively showed significantly less seropositivity for Lawsonia intracellularis compared to the placebo control group between the ages of 56-105 days old, which indicated the improvement of gut health in those pigs.

Conclusions

Gut health in young piglets can have a lifetime effect in terms of regular growth and secondary bacterial infection and feed efficiency. Protection of gut mucosa from coccidiosis in young suckling piglets is crucial to prevent retarded growth and economic loss from both preweaning and postweaning gut infections.

The philosophy of the control of coccidiosis is based on the prevention of mucosal villous damage during the prepatent and

patent period which allows the gut health in piglets to be improved.

Efficient prevention of coccidiosis with Baycox 5% in young and growing animals leads to an improvement of gut health and lessens the risks for upcoming infection.

In this sense, Baycox:

- Controls coccidiosis efficiently.
- Controls the diarrhoea morbidity.
- Reduces the mortality rate in co-infections such as *C. perfringens* + *I. suis*.
- Reduces post-weaning FCR.
- Reduces Lawsonia intracellularis infection.
- Increases the daily weight gain and provides a positive return on investment.
- Protects the villous of mucosa from the damage of coccidiosis.
- Maintains the sustainability of mucosal integrity.

In conclusion, Baycox 5% improves gut health and provides a better income and increased profitability for pig producers. ■

References are available from the author on request

Fig. 7. Post weaning feed conversion ratio in pigs (McOrist et al. 2009) treated preventively with or without Baycox 5% at four days of age against coccidiosis (significant difference $p < 0,05$).

