

# A natural support tool in the fight against porcine epidemic diarrhoea virus

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Porcine epidemic diarrhoea virus or PEDv is caused by a virus from the Coronaviridae family of the genus Coronavirus. It is characterised by watery diarrhoea, weight loss and vomiting and it closely resembles transmissible gastroenteritis.

It was first observed in the UK and Denmark in the early 1970s among feeding and fattening pigs and has since been reported in major pig rearing countries such as Canada, Belgium, Germany, France, Italy and The Netherlands and it is a major concern in Asia where outbreaks are more severe. It has recently been identified in the USA for the first time.

## Two types of PEDv

There are two types of PEDv; type I affects weaned and older animals, whereas type II affects animals of all ages, including piglets. The severity of the disease is worse during the early life stages, where in some cases mortalities of suckling pigs have even reached 100%.

Typically, mortalities in pigs less than one-week-old can range between 50%-90%. In

pigs older than three weeks, mortalities are rare but morbidity can be high. The disease can spread through the farm over a period of 4-5 weeks or longer and can last for as long as six months.

The infection affects the intestinal epithelial cells; the lower mortality rate in older pigs is thought to be because of the replacement rate of those cells, which has been reported to be three times faster in three-week-old pigs compared to newborns.

## Virus transmission

Transmission occurs via the faecal-oral route. During the infection, viral particles are shed in the faeces. Infection of healthy animals occurs via the ingestion of contaminated faeces.

During the first days of diarrhoea, the virus collects in the tissues of the small intestine, especially at the tips of the villi. This leads to the destruction of mature absorptive cells that are replaced by immature cells from the base of the crypt, resulting in severe villus atrophy.

In addition, this epithelial cell destruction reduces the enzymatic activity in the small intestine which disrupts digestion and cellular transport of nutrients and electrolytes, causing an acute malabsorption syndrome.

The presence of undigested lactose exerts an osmotic force in the lumen of the intestine which causes retention and withdrawal of fluid from the body tissues, thus contributing to diarrhoea and dehydration.

Furthermore, it has been shown that secondary bacterial infections such as *E. coli* and salmonella can further complicate the picture. A lot of current treatments for PEDv concentrate on treating those secondary infections.

There are a small number of licenced vaccines available for this disease but they are only available in South Korea, Japan and China.

Immunoprophylactic agents have also been suggested as a way to treat PEDv. The main method of protection so far has been to deliberately expose sows and gilts early to the disease so that they develop a high level of antibodies prior to farrowing and pass them to the piglets through lactation.

However, after the piglets have been weaned, they are still susceptible and are likely to be infected; especially in cases where the disease has become enzootic.

Also, depending on local legislation, this method can be questioned as it could encourage a further spread of the disease through transportation.

## Supporting intestinal health

Natural products, such as Orego-Stim, made using oregano oil containing the natural phenols of carvacrol and thymol, have been shown to support intestinal health.

The indirect action of those phenols prevents the replication of the virus in the intestinal epithelial cells by speeding up the shedding process of the enterocytes.

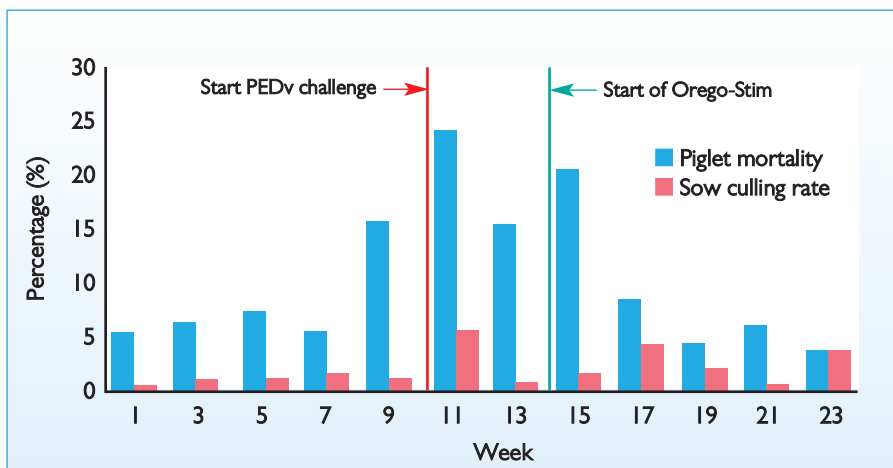
A quick replenishment of these cells creates a hostile environment for the virus disrupting its multiplication, thus controlling PEDv in piglets.

Studies performed in pigs have shown that carvacrol and thymol formulations increase the intestinal dimensions and the villus height-crypt ratio.

The larger villi ensure a more absorptive

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Fig. 1. Pre-weaning mortality rate and sow culling rate before and after the inclusion of Orego-Stim in the diet.



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surface for nutrients and electrolytes, combating villus atrophy and preventing mal-digestion and malabsorption.

Oregano oil can further help with the treatment of those secondary gastro-intestinal infections. It has known anti-bacterial properties and it can kill pathogens within the gastro-intestinal tract, preventing further complications.

It has also been shown to significantly increase intestinal enzyme activity such as alkaline phosphate, leucine, aminopeptidase, maltase, sucrase and lactase within the gut, further aiding digestion and electrolyte nutrient absorption.

When included in the ration of lactating

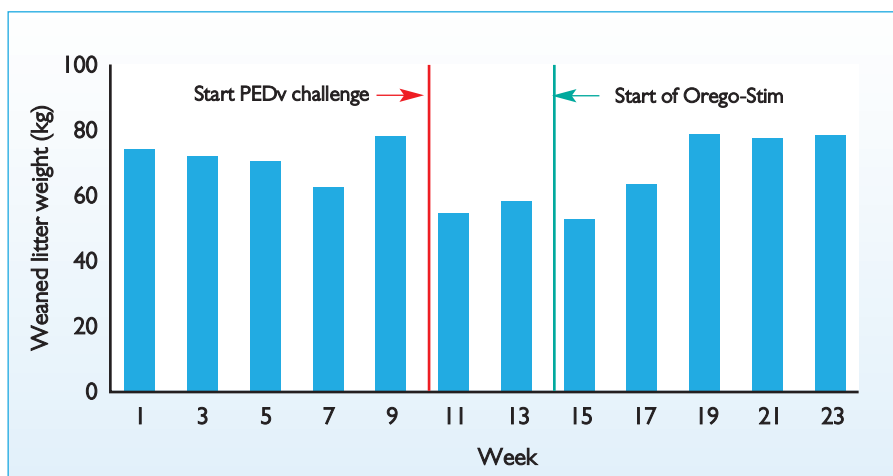


Fig. 2. Litter weight at weaning.

sows, oregano oil preserves the lactation production rate.

The milk yield of the sow is crucial for suckling piglet survivability during the first couple of weeks, as it contains all the essential antibodies needed by the piglet to combat infections.

It has further been shown that the inclusion of carvacrol and thymol in lactating sow diets results in the more efficient utilisation of the feed offered, which then helps the sow to preserve lactation production.

### Thai trial

In a trial that took place between November 2008 and April 2009 in a commercial pig farm in Thailand, where 2000 sows had a PEDv outbreak, it was shown that the inclusion of an oregano oil based product, Orego-Stim, effectively improved the PEDv cases in the farm. The inclusion of Orego-Stim for the sows started one week before farrowing until 25 days after farrowing.

The piglets were supplemented with Orego-Stim Liquid through oral drenching.


From Fig. 1 and Fig. 2, it can be seen that this inclusion offered a reduction in the pre-weaning mortality rate of the piglets as well as a higher weaning weight.

In conclusion, oregano oil, thanks to its phenolic constituents that have proven very valuable in combating intestinal diseases, can prove a valuable tool in the fight against PEDv. It can help reduce the load of secondary bacterial infections on the sow prior to farrowing and thereafter on the piglets.

By minimising the risk for those secondary infections and by creating an environment that is hostile to the life cycle of the virus, the inclusion of this natural product can substantially improve the chances of a successfully weaned, healthy piglet. ■

References are available on request from the author

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