Swine dysentery has long been recognized as a major cause of loss to pig industry throughout the world. The causative bacterium was identified back in the 1960s now referred to as *Brachyspira hyodysenteriae*.
B. hyodysenteriae lives in the large intestine and is passed out with the faeces into the manure. This is why it is so easily spread on boots, vehicles, equipment as well as by vectors like rodents and flies.

Due to the specific properties of the pathogen, treatment of infected herds by reliance solely on antimicrobial medication is not sufficient (Heinritzi 2002). This may at least partly be due to the fact that a decrease of antimicrobial susceptibility to the main drugs used against *B. hyodysenteriae* has been observed in Germany (Rohde 2007) as well as in other European countries like Spain (Hidalgo et al. 2011), the Czech Republic (Lobová et al. 2004) and Belgium (Vangroenweghe 2010).

Resistance to antimicrobials can develop if not all pathogens are killed, especially if the treatment duration is not long enough and/or if the concentration given is too low. The latter problem often occurs in acutely infected animals when antibiotics are supplied in-feed because those animals do not eat or drink enough. Consequently, they need to get their correct antimicrobial dose by injection.

As animals discharge in their faeces and urine between 70%-90% of the antibiotic administered unchanged or in active metabolites and most antibiotics remain stable during manure storage, resistance can potentially also develop in the manure and after the manure is spread onto the field (Massé et al. 2014).

Due to the increasing threat of drug-resistant infections in animals as well as humans the European Commission considers antimicrobial resistance (AMR) a priority and has recently published Guidelines for the prudent use of antimicrobials in veterinary medicine (Anonymus 2015a).

One of the key elements for reducing the need to use antimicrobials is the disease prevention by implementing hygiene and biosecurity measures (Anonymous 2015a, chapter 6).
This is especially important for the prevention of *B. hyodysenteriae* as today only a few antimicrobials are effective against these bacteria (Figi et al. 2014).

In case of *B. hyodysenteriae* the most important disease prevention as well as elimination methods are the disinfection of the highly contagious residual liquid manure remaining in the slurry pit after the end of a fattening cycle (Heinritzi 2002) and the eradication of vectors like flies and rodents (Harlizius 2004).

The elimination of the *B. hyodysenteriae* bacteria in the liquid pig manure is also important to avoid the manure becoming a possible source of antimicrobial resistant bacteria as high rates of (multi-) resistant bacteria have already been found in pig manure (Hölzel et al. 2010). Resistance genes can

even be enriched in manure from antibiotic-exposed farm animals, and thus have the potential to survive in soil through horizontal gene transfer events, and to be transported to other environmental compartments (Heuer et al. 2011).

The main advantages of using the biocidal product ALZOGUR® for the treatment of the residual liquid pig manure are as follows:

- Cyanamide, the active substance of ALZOGUR, controls not only *Brachyspira hyodysenteriae* but also eradicates the fly larvae living in the liquid manure (use in PT 18; see separate document on PT 18 use of cyanamide). Therefore, ALZOGUR effectively interrupts the reinfection-cycle in the affected pig houses as otherwise the healthy new piglets would be infected via flies and other vectors.
- Due to this dual effect the application of two different biocides, one against *B. hyodysenteriae* and one against fly larvae is not necessary. Furthermore, one single manure treatment with ALZOGUR against *B. hyodysenteriae* is sufficient to eliminate also the fly larvae. This is a significant advantage with respect to environmental exposure.
- Cyanamide is rapidly degradable in aerobic water/sediment systems according to the CLP criteria (Anonymus 2015b) and has a short degradation time in soil.
- Cyanamide is a multi-site inhibitor interfering with the metabolic system of the bacteria (for example inhibition of the activity of dehydrogenases). This explains why no resistance of *B. hyodysenteriae* to cyanamide was observed during the decades of ALZOGUR use in PT 3. Furthermore, it is not expected that resistance to cyanamide will develop from its use in pig stables in future.
- In contrary to other disinfectants cyanamide is known to be effective also at lower temperatures. This is particularly important during the winter months when *B. hyodysenteriae* can survive in the liquid pig manure for several months.
- Cyanamide remains quite stable under high organic loading (Voelkel 2007). Therefore, it remains effective for the intended uses for a sufficient period of time.
- The efficacy of using cyanamide for residual slurry treatment as an essential element of a swine dysentery eradication programme has recently been demonstrated on a Swiss nucleus sow breeding farm with 170 sows and 600 gilts/fatteners (Figi et al. 2014). The eradication programme not only eliminated *B. hyodysenteriae* from the entire farm but also resulted in significantly higher daily weight gain of the pigs participating in the eradication programme compared to the control animals.

Conclusion on suitability and availability of an alternative

With respect to the relevance of the swine dysentery and the crucial antimicrobial resistance problems and considering the above described advantages cyanamide has to be regarded as a unique biocide. Currently, no alternative biocide is available to play a comparable role as part of an effective and long-lasting biosecurity and hygiene program against *B. hyodysenteriae*.

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