

Cyanamide as potential candidate for substitution in PT 18

What cyanamide is used for:

The biocidal product Alzogur®, containing the active substance cyanamide, is used in pigsties for the control of pathogenic enteric bacteria *Brachyspira hyodysenteriae* (PT3) and house fly larvae (*Musca domestica*) (PT18).

Both target organisms are controlled equally well by treating the liquid manure under the slatted floor with 3 L Alzogur® /m³ liquid manure.

Thus, *Brachyspira hyodysenteriae* as well as house fly larvae can be controlled by just one Alzogur® application. This benefit of “killing two birds with one stone” is one of the reasons this biocide has been continuously used in Germany for more than 40 years.

Cyanamide use in PT18

Modern pig operations are using an all-in/all-out (AIAO) system in order to minimise the spread of infectious pathogens from infected pigs of previous fattening cycle to the newly housed-in batch. Piggens therefore are carefully cleaned and disinfected after removal of the previous batch of pigs. In theory, a perfectly cleaned pigpen would eliminate any food and breeding substrate for house flies. However, under real-life conditions even in thoroughly cleaned piggens there is still a place which serves as a breeding ground for house flies: the residual liquid manure under the slatted floor. Hence, according to our experience, a successful and sustained house fly control in piggens requires not just the control of adult flies by appropriate insecticides but in also the elimination of house fly larvae in the liquid manure through an application of cyanamide. The results of an Alzogur® application are visible within a few days as the active substance cyanamide effectively disrupts the house fly life cycle, which in turn leads to a complete breakdown of the fly population.

According to practical experience, the insecticidal effects of cyanamide to house fly larvae in liquid manure lasts for several weeks, although a decrease of the cyanamide concentration occurs naturally due to gradual breakdown and a progressive dilution through fresh animal faeces. This experience is supported by SCHOLZ et al. (2011) who compared the efficacy of different larvicides to house fly larvae.

They observed a prolonged suppression of house fly populations if cyanamide was used. These observations are likely to be due to a reduced formation of “swimming crusts” (= house fly breeding ground) on the surface of liquid manure, after Alzogur® has been applied.

Alzogur® application is done once, in contrast to other larvicides, which need to be applied two or several times per fattening cycle in order to sufficiently suppress the house fly population. Avoiding a repeated larvicide treatment reduces stress for workers and animals, prevents unwanted exposure and reduces the risk of resistance build-up.

Are there feasible alternatives for cyanamide?

In practice, technical and constructional barriers on the one hand and excessive workload on the other hand make preclude a complete removal of faeces from pigsties. Hence, as there is no feasible non-chemical alternative on the market to date, a larvicide application is inevitable for farmers to control house fly populations effectively and economically.

The option of controlling only adult house flies via scatter baits, hang-ups, etc. is only a one-side approach, as mentioned above, with regard to the fact that house fly populations are found at ratios of 20 % and 80 % of adults and larvae/eggs, respectively (Jürgens, 2013). Hence, new house flies continuously develop from their breeding grounds on liquid manure. The use of larvicides in piggens is therefore essential to control house fly populations effectively.

Other larvicides used in pigsties are diflubenzuron and cyromazine. Due to the high frequency of application required for an effective fly larvae control, resistances to these active substances have been observed in fly populations and is building up further (Kristensen and Jespersen, 2003, Hildebrand, 2016). Thus, alternating the use of diflubenzuron and cyromazine with cyanamide is crucial to prevent the build-up of further resistances. As cyanamide is a multi-site inhibitor which – among others – inhibits enzymes like catalase (DeMaster, 1986) and aldehyde dehydrogenase (Deitrich et al. 1976), it is very unlikely that *Musca domestica* will be able to develop resistance to this biocide. This is supported by the fact that despite more than 40 years of use as larvicide, no resistance of *Musca domestica* to cyanamide has been observed. Thus, considering the very limited number of active substances approved for the control of fly larvae in liquid pig manure, cyanamide is considered an essential biocide for an effective control of *Musca domestica* larvae.

Conclusion

Due to its unique mode of action (multi-site inhibition) cyanamide is considered an essential biocide for the control of *Musca domestica* larvae in liquid pig manure.

Other larvicides approved for the same use are limited and are generally characterized by a specific mode of action entailing the risk of resistance build-up.

Thus, in order to ensure an adequate chemical diversity to minimise occurrence of resistance in the target organism, the continued use of cyanamide for the control of *Musca domestica* larvae in pig slurry is indispensable.

References:

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