

# **Bio-hygienization: a new approach for controlling the development of micro-organisms**

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## Introduction

The SOP<sup>®</sup> ZOOLINE products (SOP C COW, SOP C CALF, SOP LAGOON, SOP C POULTRY, SOP C TURKEY and others) have been created by SOP using its SIRIO OPERATING PROCESS<sup>®</sup> technology.

These products use a completely innovative mechanism: they utilise non ionized electro-magnetic fields to act on biological systems in general and on micro-organisms in particular.

The effect of these electro-magnetic fields has already been highlighted in numerous trials conducted on animals (Goodman et al., 1995), on humans (Smith et al., 1985; Monro, 1987; Smith, 1988; Smith, 1989; Smith, 1994) and also on some yeast like micro-organisms, which also have the capacity to emit electro-magnetic waves in the range of radio frequencies (Smith, 1988; Pollock & Pohl, 1988).

The sensibility of biological systems to electro-magnetic fields regards the narrow range of the E.L.F. (Extremely Low Frequency) spectrum, with frequencies between 1000 - 1500 Hz.

Biological systems are most greatly affected by the frequency rather than the intensity of the field and only in particular “frequential windows” (Weaver & Austumian, 1990; Yost & Liburdy, 1992; Adey, 1993). So far, the sensibility to electro-magnetic fields has been noted in a vast range of tissues and isolated cells, to such a degree as to be considered as a general biological property of living tissue.

## Selective interventions on microbial loads

The “frequential window” is specific thus every microbial species is sensitive to a small number of frequencies and not to others. This characteristic allows the elaboration of selective interventions, capable of acting on some species and not on others, interfering with their “frequential windows”. Thus, for example, it is possible to selectively intervene on toxic or pathogenic species without interfering with other species of the microbial community.

This selectivity of action becomes especially important in environments of great microbiological biodiversity, such as in agricultural and forestal ecosystems. In such environments, the conservation of a large number of species guarantees the stability of the whole ecosystem. This principle is also valid in the case of artificial ecosystems, such as the permanent housing environments of animals.

For example: keeping the microbiological diversity in farms where high quantities of organic materials are present, allows the natural progress of the break down and mineralization of such materials. Consequently the quantity of free ammonia present in the environment is reduced, being absorbed by the increased micro flora and micro fauna stimulated both directly and indirectly by means of the SOP treatments. In this way, ammonia emissions into the atmosphere will be reduced, improving animal comfort and reducing their impact on the environment. For instance, in these environments the elevated presence of mycetes, attinomyces and humifying bacteria promotes the formation of humus which has a great capacity to absorb the liquid part of the animals’ dejections up to 10 times greater than straw. This greater absorption capacity of the bedding materials enables it to last longer and become more comfortable for the animals.

The “frequential window” mechanism gives better results in comparison to non selective chemical disinfectant methods as its action is constant over time.

### Reduction in the selection of resistant strains

Another important characteristic of the “frequential window” mechanism is that it has an effect on some phases of the cellular cycle (Konoplia et al., 2004) without resulting in a complete biocidal action. In this way, the micro-organisms are reduced in number without a selection of the genetic patrimony of the population and therefore the probability of a selection of resistant strains should be reduced.

This aspect is extremely interesting for numerous applications, such as for the treatment of cubicles/stalls with mats, where a high frequency of traditional chemical interventions puts a great selective pressure on the genomic pool of the population, thus increasing the risk of the selection of resistant strains, with the consequent reduced effectiveness of these interventions.

### SOP ZOOLINE

The SOP ZOOLINE products are in the form of fine powders which can be distributed over different areas of the farm (bedding, cubicles/stalls, slats, liquid manure) with dusters or mixed with water.

Micro-crystalline powders are used even if the SIRIO OPERATING PROCESS® technology may also be applied to other inert materials, treating them with a vast range of specific electro-magnetic fields which are capable of influencing the development of some species of micro-organisms.

The dosage per head is very low: from 0.1g (poultry) to 3g (calf) to 10 g (cow) and the product’s action lasts for a long time, with a treatment frequency of between 3 and 7 days (15 days for poultry).

Once distributed within the environment, the products instantly interfere with the “frequential window” of the microbial species in question, altering their growth rates, creating a new equilibrium which remains stable over a period of about a week.

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