FALCO

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F10: Some applications in Biosecurity, Preventative Health and Treatment of Clinical Cases Relevant to Raptor Veterinary Medicine

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Introduction

F10 was formulated in the UK for disinfection within pharmaceutical manufacturing plants, particularly aseptic fill areas (intravenous fluids, catheters etc). Manufacture started in 1994 and since then F10 has been tested against every significant/index animal/human pathogen.

F10 was introduced to the Falcon Hospitals of the Middle East in 1999 in an effort to augment current treatment plans against respiratory infections in hunting falcons, particularly *Aspergillosis* airsacculitis. This syndrome carries a poor prognosis and is particularly common in this part of the world due to a combination of species susceptibility (Gyrfalcons & hybrids), environmental conditions and poor husbandry practices during the summer /moulting period. (Verwoerd 2001; Bailey 2002). The successes achieved in both treatment of clinical cases as well as in preventative programmes, using a "fogging" approach have generated tremendous excitement further afield in the falconry and aviculture industries and the compound is now widely used by specialist avian veterinarians and breeders in Europe against a wide range of conditions (see website: www.healthandhygiene.co.za).

Clinical Uses

The combination of F10 characteristics has created opportunities to develop integrated treatment protocols; ie F10 usage significantly lowers the levels of pathogenic challenge from infectious organisms to mucous membranes, wounds, skin etc, while correct antibiotic usage reach target organisms inside the infected tissues so that, in conjunction with supportive therapy, therapeutic successes are achieved even in notoriously difficult cases. Note that the use of F10 in clinical cases will never take the place of appropriate antibiotic therapy or immunomodulation (through vaccination and/or immunostimmulation). The following examples illustrate this principle and will hopefully stimulate further uses (*F10 Products other than F10SC Veterinary Disinfectant):

- **Birds**: sinusitis, airsaccullitis , Newcastle Disease Virus outbreaks, wounds, [Fogging, irrigation]
- **Reptiles**: skin & oral cavity infections, wounds, sinusitis [Fogging, irrigation, barrier ointment*]
- **Dogs**: Sinusitis-tracheï tis ("Kennel Cough"), pyothorax, traumatic rupture of intestines , pyometra, dermatophytoses, pododermatitis, wounds [Irrigation, large volume lavage, instillation, shampoo*, barrier ointment*]

Fogging: (not to be confused with "fumigation", the dangerous and outdated practice of using formalin plus potassium permanganate to produce formaldehyde gas)

The particular design of the avian respiratory system that includes large spaces (airsacs) where air becomes humidified at body temperatures approaching 40°C and an absence of a rapid immune response due to the avascular nature of these structures, allows the establishment of bacterial &/or fungal growth when the bird is exposed to high spore concentrations in the inhaled air. This also occurs in highly stressed/sensitive individuals when only low numbers of spores are inhaled. The delivery of antibiotics or antifungal drugs by aerosol to such affected patients has been tried many times, usually with disappointing results. There are essentially three aspects to consider when evaluating the efficacy of such applications:

1. Efficacy of the compound in question against the target organism(s) i.e viral, bacterial & fungal.
2. Safety & tissue compatibility issues.
3. Mechanical, physical & environmental conditions that will determine whether this compound will reach the surfaces where the microorganisms reside.

Efficacy: Refer to Table 1 for efficacy on important avian respiratory agents (other specific results available on request).

Other methods of Evaluation

Several challenge models to study the pathology and immune response of the avian airsac system against bacterial agents, using commercial chickens and *E.coli* obtained from clinical avian airsacculitis cases, are discussed in the veterinary literature. However, no standard protocol for investigating airsacculitis exists due to the extremely variable nature of the syndrome. We therefore have to examine all relevant field performance data of any compound in order to evaluate efficacy, including performance under comparable environmental conditions (temperature, humidity, organic material as growth medium) such as exists in commercial poultry incubator facilities. Under these carefully controlled conditions a number of infectious agents, but particularly *Aspergillus* spp, create a constant challenge to the production of quality day-old chicks and A. *fumigatus* is used as an indicator organism as standard practice in such facilities worldwide. Fluff samples are taken regularly from hatchers and cultured as well as contact plates from specific surfaces.

F10 was recently evaluated in a South African facility that produces a million day-old broiler chicks per week. The trial period was for a total of 38 weeks and was compared to the preceeding 17 weeks when another disinfectant compound had been used (Total period under consideration = 55 weeks). Weekly fluff samples revealed the following pattern: Average colony forming units (cfu) = 43, varying from 0 – 77, over the first 17 weeks of 2001 (before F10 introduction). After the introduction of F10 fogging (20 min per day) this dropped to almost nothing (average cfu's = 0.05 , varying from 0-10) over the next 17 weeks, then the fogger broke and for the following 7 weeks no fogging took place while the *Aspergillus* spp. counts immediately rose to previous levels. When this was corrected the counts once again dropped to virtually 0. This demonstrates the efficacy of F10 in the control of *A. fumigatus* under these environmental circumstances.

Field efficacy of F10 fogging against respiratory syndromes under a range of production environment condi-

Table 1. Results of Internationally Accredited Laboratory Tests on F10.

Organism	Dilution	Contact
Newcastle Disease Virus	1:500	10 min
Pseudomonas aeruginosa	1:500	2 min
Staphylococcus aureus	1:1000	2 min
Aspergillus niger & A. fumigatus spores	1:250	30 min

tions as well as in Avian Hospital cases has now been established in the hands of several different workers (Forbes, 2001; Bailey & Sullivan, 2001; Bailey, 2002; Stanford, pers. comm.; Chitty, pers. comm; Samour, pers. comm).

Safety

Traditional antifungal agents are extremely irritating (Amphotericin B, Ketoconazole), causing severe erosive lesions on the sensitive mucosal surfaces of the respiratory system. F10 has passed all Standard International Tests on eye/ocular mucosa irritation as well as Abraded & Intact Skin Irritation Tests and complies to EU Environmental Safety with a zero rating.

Mechanical/Physical

Explanations of therapeutic failures using a fogging approach usually focus on the physical nature of microdroplets needed to penetrate to the furthest recesses and diverticulae of the avian airsac system. Recommended optimal sizes usually vary between 5-10 microns, necessitating the use of "nebulising" systems. There are however many other variables that determine the integrity and size distribution of microdroplets in any fog, thus affecting their relative penetrating ability into the avian airsacs. Some of these include; 1) relative humidity of the inhaled air, 2) surface tension/chemical makeup of the droplets, 3) nozzle size, velocity of the air/compound pushed through the instrument & 4) still air vs air movement.

The practical realities of treatments in clinics, hospitals and farming environments dictate a pragmatic approach. Consequently we have used commercial "Foggers" suitable for the disinfection of rooms, incubators, hospital wards, etc, that produce a wide range of microdroplet sizes and rapidly create a "standing fog" under any environmental conditions. Patients or surfaces should be exposed to such a fog for approximately 20 - 30 min at a time to achieve effective contact times where the major challenge is *Aspergillus* sp, using F10 Superconcentrate at a dilution of 1:250.

Environmental disinfection

The full spectrum of efficacy of F10 against benchmark viruses, bacteria, bacterial spores, yeasts, fungi & fungal spores has been established during the course of its development (Table 1). Internationally Accredited Test results are available upon request from the Manufacturers and the following is relevant to the current debate on mortalities in hunting falcons in the UAE that are associated with *Clostridium perfringens*.

Clostridial enterotoxaemia is a multifactorial syndrome, with dietary changes, gastro intestinal microflora disturbances, stress, overeating, overconsumption of warm water,

and environmental contamination/build-up of these saprophytic organisms all relevant contributing factors. Clinical falcon cases usually die acutely due to the rapid dissemination of the toxins from the gastro intestinal tract, with only a few successes where affected individuals were successfully treated with (bovine) antitoxin serum i/v plus antibiotics and supportive therapy in the Falcon Hospitals of the UAE. The use of Clostridial toxoid vaccines is well established in cattle, sheep and ostriches, but remains controversial in falcons due to the practical difficulties of producing experimental data to validate and optimise current empirical vaccination recommendations in this avian group. Preventative management is therefore crucial to limit losses to the absolute minimum, and here lowering of the environmental Clostridium load (spores) in facilities constantly used by falcons, forms part of this component of an integrated approach.

F10 was recently (Oct 2002) tested in an Internationally Accredited Lab against *C. perfringens* spores and its vegetative form. An impervious surface was coated with 57000 cfu's, then fogged with F10SC @ 1:250 dilution, using a commercial fogger. After 10 min there was a 94% kill and after 20 min a 98% kill. This was the best result ever achieved in this lab, as very few disinfectant compounds can kill the highly resistant Clostridial spores within practical time limits. F10 can therefore be used in the role of environmental disinfection against this organism with confidence.

References

Bailey ,T.A & Sullivan T (2001) : Use of a novel disinfectant for Aspergillus treatment in falcons. Exotic DVM Magazine 3: 17.

Bailey, T.A. (2002) Aspergillosis: therapy and prevention in zoo animals with emphasis on raptors. Falco 20: 18-22.

Forbes, N. (2001) Aspergillosis in raptors . International Falconer, May , pp 44-47.

Verwoerd, D. (2001) Aerosol use of a novel disinfectant as part of an integrated approach to preventing and treating Aspergillosis in falcons in the UAE. Falco 17: 15-17

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