FEATURE

Terminal Disinfection

5 SMART TIPS FOR KEEPING YOUR TANKS CLEAN AND YOUR FISH HEALTHY

By Andrew McCool

Your biosecurity program already recognizes that disease is perhaps the greatest threat to the efficiency and output of your hatchery operation. A key element in your biosecurity program is the disinfection of tanks and equipment. This routine disinfection process is typically performed throughout the production cycle, but when tanks and raceways hold fish the ability to apply more thorough disinfection procedures is limited. Terminal disinfection, applied when raceways and tanks are empty, is a more aggressive approach to this task. With the fish out of the way and the tanks empty, you can use terminal disinfection techniques to get into previously inaccessible areas where pathogens may be hiding. The objective of terminal disinfection is to reduce these pathogen reservoirs and prevent any transmission of disease to the next group of fish. Here is how you can set up and accomplish successful, cost-effective terminal disinfection.

1 CLEAN FIRST, THEN DISINFECT

Prior to disinfection, the application of an appropriate detergent combined with physical scrubbing to break down organics and biofilm is an inexpensive and effective way to improve this biosecurity task. The removal of all visible organic soiling with a detergent is essential because mouldy feed, fish waste and biofilm may contain high levels of contamination and potential pathogen reservoirs. Cleaning before disinfection will allow the disinfectant to effectively contact and cover the exposed surfaces.

Before applying the detergent, remove equipment and expose surfaces to be disinfected. With a pressure washer, apply the detergent solution at the manufacturer's designated application rate per square metre of surface area. Ensure coverage, and rinse all surfaces thoroughly with pathogen-free water. Alternatively, pre-soak all surfaces thoroughly with the detergent at low pressure using a mister/sprayer, leave for 20-30 minutes, or for at least the minimal required contact time, and then rinse all surfaces with clean water. The level of pathogens present after cleaning can still be high enough to offer a serious disease challenge to the new stock, so it is crucial to follow up with disinfection.

2 SELECT THE DISINFECTANT

Selecting the best disinfectant for your job will be determined by its ability to destroy the pathogens that are of concern to you and your fish. It should be specifically designed to work in hatchery situations and have approval from the appropriate regulatory authorities. The right choice will mean your efforts are well spent. The wrong choice will mean that your time and costs will not produce the benefits you seek.

The contact time between the disinfectant and the surfaces containing potential pathogens is an important feature of the disinfection process. The product must be in contact with the surface long enough to kill the target pathogens. Therefore, selecting products that require a short contact time to achieve this is obviously preferred for terminal disinfection tasks. A product like bleach, which often requires a 30 minute contact time, is therefore very difficult to use effectively. So, plan your disinfectant application based on achieving the required contact time.

The disinfectant you apply should also be safe for staff, not harmful to equipment and have minimal environmental impact. Older products, for example: bleach or quaternary ammonium solutions, while inexpensive, may not meet all of these considerations.

3 SELECT THE APPLICATION EQUIPMENT

Consider the materials, composition and condition of the surfaces you want to clean and disinfect. You will want to use application equipment that will not cause any damage to the surfaces being disinfected. The equipment must allow you to get the disinfectant into all the corners, cracks, seams and porous surfaces. Pressure sprayers are available in several formats. Backpack sprayers or cart-mounted sprayers are well suited to apply the proper disinfectant dilutions and the flexible hose allows you to direct the spray into all of the tight spots you will encounter. Scrub brushes and sponges are also useful for smaller areas.

Spraying, misting or fogging equipment for low volume dispersion of disinfectants can increase the effectiveness of the product in some applications. By spraying a fine mist or very small droplets, excellent coverage can be achieved and the contact time enhanced. The air bubbles in the mist spread the product out allowing it to access those hard to reach places and stick to surfaces.

4 CALCULATE THE APPLICATION RATE AND VOLUME OF DISINFECTANT

Disinfectant label instructions describe the product concentration required to kill specific pathogens within a stated contact time. This suggested concentration should be delivered to all of the applicable surfaces for terminal disinfection. Applying a reduced concentration to save cost risks not effectively eliminating target pathogens, weakening your biosecurity programs defences and potentially wasting all of the effort and money you put into the program. Alternatively, using a higher concentration will not achieve any better results and the consequence will be higher costs than necessary. Test methods are available for many products to measure the actual applied concentration.

Coverage and application rates are stated on most product labels. In addition, many suppliers can assist by providing calculation spreadsheets and additional application information to ensure the correct volume of product is applied to all surfaces and to help determine

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Terminal Disinfection - Tank Application Tables

Syndel Laboratories Ltd
An Aquatic Life Sciences Company

SITE INFORMATION	
SITE	Hatchery
MANAGER	John Smith
DATE	2007

TANK INFORMATION						
TANK ID	# OF TANKS	TANK DIAMETER	TANK DEPTH	CONDITION FACTOR (*CF)	VOLUME	SURFACE AREA
6 M TANKS	5	6	1	1.25	176.72	234.53
10 M TANKS	3	10	3	1.25	883.58	647.36
3 M TANKS	3	3	1	1.25	26.51	61.85
	0	0	0	1	0.00	0.00
	0	0	0	1	0.00	0.00
	0	0	0	1	0.00	0.00
	0	0	0	1	0.00	0.00

*CF - CORRECTION FACTOR TO REPRESENT ADDITIONAL SURFACES TO CONSIDER FOR CLEANING AND DISINFECTION BASED ON A 1 - 2 SCALE WHERE 1 = NO ADDITIONAL SURFACES TO CONSIDER AND 2 = AN EXTENSIVE AMOUNT OF EXTRA SURFACES TO CONSIDER

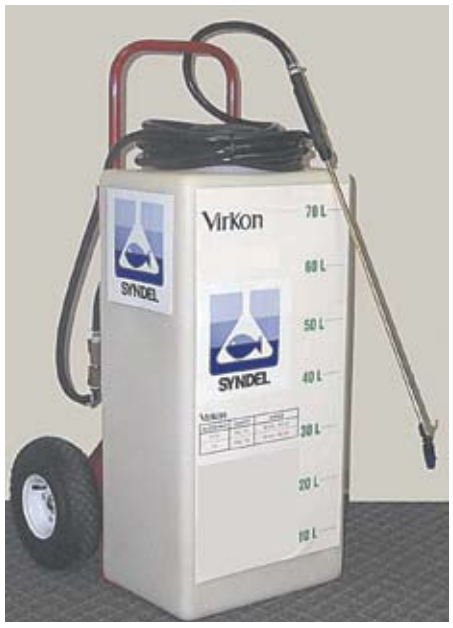
TOTAL VOLUME 1086.80 cu m

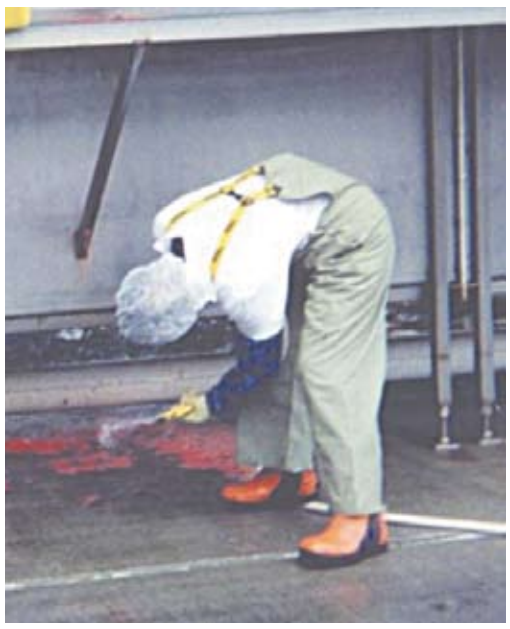
TOTAL SURFACE AREA 1004.33 sq m

CLEANERS AND DISINFECTANTS				SOLUTION VOLUME		PRODUCT QUANTITY		APPLICATION COST	
DUPONT BIOSOLVE	SPRAYED	5 ml/L	500 ml/m²	502.165	L	2.511	L	$	16.22
	SPRAYED	10 ml/L	500 ml/m²	502.165	L	5.022	L	$	32.44
	FOAMED	20 ml/L	250 ml/m²	251.083	L	5.022	L	$	24.33
DUPONT BIOFOAM	SPRAYED	10 ml/L	500 ml/m²	502.165	L	5.022	L	$	32.44
	FOAMED	20 ml/L	250 ml/m²	251.083	L	5.022	L	$	32.44
HYPERGE	SPRAYED	4 ml/L	300 ml/m²	301.299	L	1.205	L	$	11.66
	FOGGED	10 ml/L	15 ml/m³	15.065	L	1.506	L	$	1.46
VIRKON AQUATIC	SPRAYED	10g/L	250 ml/m²	251.083	L	2.511	kg	$	62.14
	FOGGED	10g/L	10 ml/m³	10.043	L	0.100	kg	$	2.43

NB: FOR WATER LINE CLEANING AND DISINFECTION, PLEASE REFER TO SEPARATE SPREADSHEET

FIGURES IN THE TABLE ARE EXPRESSED IN METRIC LITRES OF PRODUCT / WATER EXCEPT VIRKON AQUATIC WHICH IS IN KILOGRAMS / WATER





There are various types of pressure sprayers available to hatchery operators: Backpack or cart-mounted sprayers are good for applying the proper disinfectant dilutions and their flexible hoses allow users to direct spray into tight spots. Scrub brushes and sponges are also useful for smaller areas.

costs. The volume of product used, the concentration applied and the method used for application should ensure that the disinfectant is applied to all the surfaces for the appropriate contact time. Again, if too little product is used to maintain the contact time, the whole effort may be wasted.

5 RECAP AND REVIEW

During regular production, the ability to apply intense disinfection efforts is limited by the presence of fish. Employing more aggressive terminal disinfection procedures at the end of the production cycle, when fish are absent, can eliminate pathogen reservoirs prior to re-stocking. The application of terminal disinfection follows these basic steps.

- Expose all surfaces to be disinfected
- Scrub and clean surfaces with a detergent
- Rinse with clean water
- Use a disinfectant that is effective and safe
- Follow label directions
- Use the proper concentration and the required volume
- Apply with appropriate sprayers and equipment to ensure all surfaces receive the correct coverage and achieve the effective contact time

Use terminal disinfection as an important component of your biosecurity program.

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