The Old School, Brewhouse Hill, Wheathampstead,
Hertfordshire AL4 8AN, UK
www.ufaw.org.uk

Animal Welfare 2019, 28: 191-203
ISSN 0962-7286
doi: 10.7120/09627286.28.2.191

In-tank underwater cameras can refine monitoring of laboratory fish

T Ellis*†, GSE Rimmer†, S-J Parker†, C Joiner†, M Sebire†, DW Verner-Jeffreys† and J Lines‡

† Cefas Weymouth Laboratory, Barrack Road, The Nothe, Weymouth, Dorset DT4 8UB, UK
‡ Silsoe Livestock Systems Ltd, Wrest Park, Silsoe, Bedford, Bedfordshire MK45 4HS, UK
* Contact for correspondence and requests for reprints: tim.ellis@cefas.co.uk

Abstract

*Laboratory animals need to be monitored to check the status of their health and welfare. Routine checks of laboratory fish are limited to visual observations of physical appearance and behaviour, but for species held in opaque-walled tanks, such checks are compromised by restricted views, poor visibility and provoked behaviour. Here, we report our experience of using in-tank underwater cameras to monitor laboratory populations of salmoniforme, perciforme and cypriniforme fish. A range of cameras and lenses were investigated and trialled. A standard VGA resolution analogue camera with a one-third-inch chip and 3.6-mm lens was selected based on size, picture quality, the proportion of tank in view and cost. A shell for the camera and mounting system were designed to minimise size and cleaning and enable flexible positioning within tanks. Cameras were connected via digital encoders to a server, making video available to the general computer network. Data collected from recordings of rainbow trout (*Oncorhynchus mykiss*) confirmed provoked behaviour, ie a change in distribution and increase in activity in response to direct viewing and feeding. The networked cameras therefore enable remote viewing of undisturbed behaviour in real time, providing clear, lateral views unaffected by water surface effects, and facilitate increased frequency of checking. Case studies illustrate how camera monitoring can aid detection of abnormalities in behaviour (eg lack of feeding, posture, swimming) and appearance (eg clinical signs, such as lesions), enabling earlier interventions. Furthermore, recordings provide a resource for reference and retrospective analysis, and evidence to support severity classification and identify humane end-points.*

Keywords: *animal welfare, end-point, fish welfare, laboratory fish, refinement, remote monitoring*