



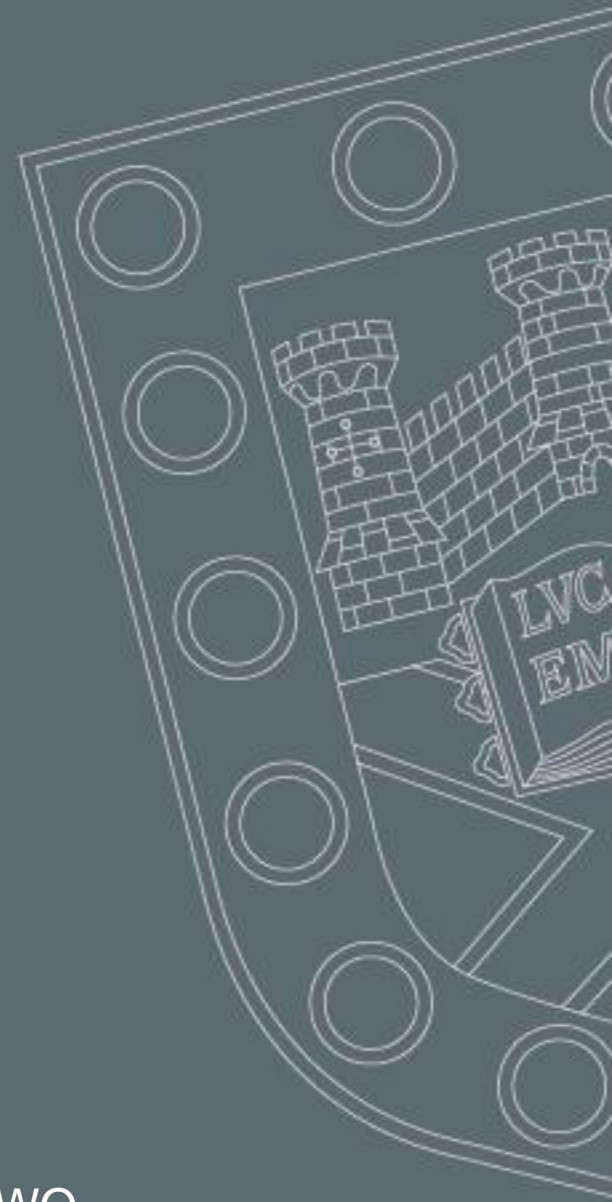
The push and pull between science and husbandry

UK South West Zebrafish Meeting 2020: University of Exeter.

11th September, 2020

Dr Gregory Paull

Aquatic Facilities Manager (Streatham Campus) & NACWO



The push and pull between science and husbandry

- Science meeting:
 - UK South West Zebrafish Meeting 2020: University of Exeter. 11th September, 2020
 - Attendance ~120
- Husbandry Meeting:
 - HCMLF Symposium 2020: Managing Fish Health, Husbandry, and Welfare in the Time of COVID19. August 11-12, 2020
 - Attendance ~ 90
- Number of participants attending both meetings ~ 4
- Reflect disconnect between disciplines?
- Reflect how meetings are advertised/promoted?
- Clearly need some way to attract each other....

The push and pull between science and husbandry

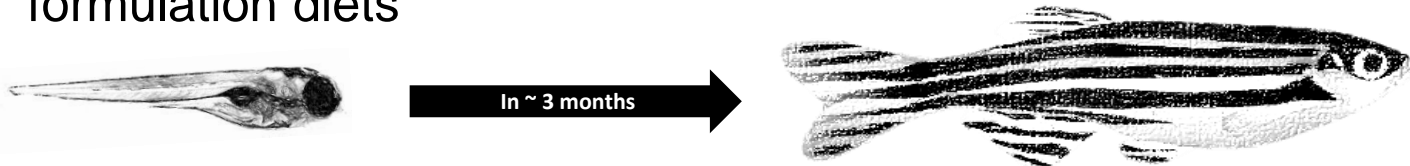
- Good husbandry underpins good science

- good survival
- rapid growth - time to sexual maturation
- high fecundity....and repeat....



- Husbandry and Growth (Watts *et al.*, 2012)

- investigators decreased the variability associated with nutrition in most studies by developing standardized reference and open formulation diets



- Husbandry and Performance (e.g. egg production) (Kent & Varga, 2012; Lieggi, C., 2020)

- both husbandry and underlying health status can significantly affect research outcomes

- Reproducibility! Publish husbandry methods!



The push and pull between science and husbandry

- Science and husbandry often in conflict
- Experimental animals often kept in conditions inconsistent with optimal husbandry
- Zebrafish are now used for scientific disciplines which require specific husbandry requirements
- Requires in-depth knowledge of the study species to balance scientific needs with husbandry of the animals



The push and pull between science and husbandry

Science driving the way our fish facilities look



- Increased tank numbers to cope with the array of zf lines
- Smaller tanks and a higher density of fish/tank
- Still expected to deliver rapid growth, shortest time to sexual maturation and high fecundity....and repeatedly!

The push and pull between science and husbandry

Conflict with Husbandry

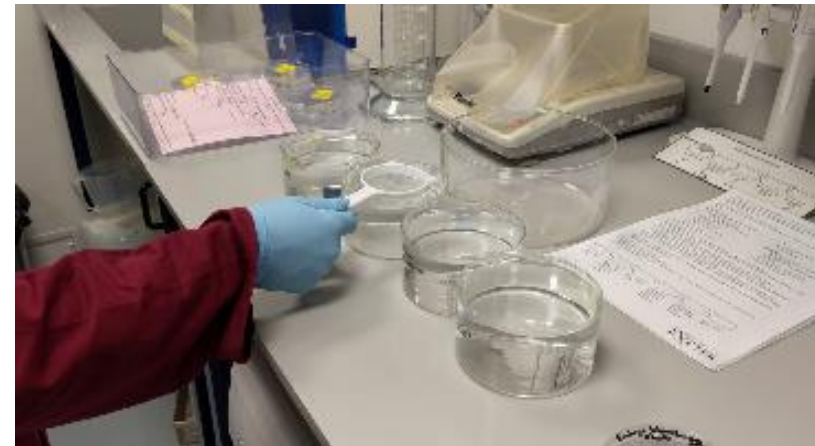
- Intensification
 - thousands of fish held on recirc systems
 - fish shared and shipped between facilities
 - provenance of those fish often unknown
 - health status of those fish at best mixed
- Facilities need to continually adapt/advance their husbandry approaches
 - biosecurity plans
 - quarantine space
 - disinfection methods
 - delay to research activity



The push and pull between science and husbandry

Conflict between Husbandry and Science

- Bleaching embryos
 - surface sanitisation of embryos to remove pathogens
 - bleach/iodine
- Unknown research impacts!
 - stress models
 - epigenetics
 - Microbiome
- Dispensation requests can impact on facility management
 - spread of misinformation by researchers



The push and pull between science and husbandry

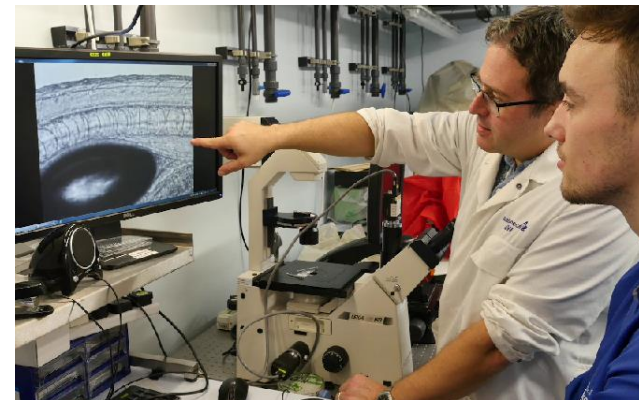
Conflict between Husbandry and Science

- If we do nothing.....impact research outcomes
- Disease impact on brain/behaviour research (Midttun *et al.*, 2020)
 - high prevalence of the microsporidium *Pseudoloma neurophilia* in zebrafish (*Danio rerio*) facilities
 - alters the zebrafish's response to four commonly used neurobehavioral tests
 - caution is warranted in the interpretation of zebrafish behaviour, particularly since in most cases infection status is unknown
- Striking a balance
 - management is often about mitigating risk
- Think about your colleagues' animals - one weak link impacts all!

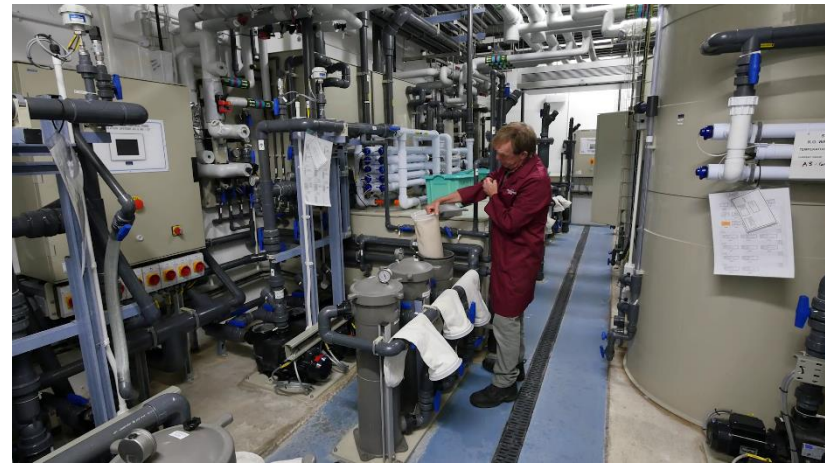
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Better engagement between science and husbandry

- Identify ongoing research that can help us address husbandry questions for which there would otherwise be no funding
- If science requires specific husbandry requirements then it is incumbent to factor these needs into grants/pilot studies
- Approach we should take for all of our needs, whether developing:
 - husbandry protocols
 - procedure policies
 - best welfare practices



References



- Watts, S. A., Powell, M. & D'Abramo, L. R. (2012) 'Fundamental approaches to the study of zebrafish nutrition', *ILAR Journal*, 53(2), pp. 144-160.
- Kent, M. A. & Varga, Z. (2012) 'Use of zebrafish in research and importance of health and husbandry', *ILAR Journal*, 53(2), pp. 89-94.
- Midttun, H. L. E., Vindas, M. A., Nadler, L. E., Overli, O., & Johansen, I. B. (2020) 'Behavioural effects of the common brain infecting parasite *Pseudoloma neurophilia* in laboratory zebrafish (*Danio rerio*)', *Scientific Reports*, 10, pp 1-9.
- Lieggi, C. (2020) 'Health surveillance programs', in Cartner, S. C. et al. (eds) *The Zebrafish in Biomedical Research*. 1st edn. Academic Press. (NB table on p 416)