

Tilapia farming in England and Wales and the occurrence of *Francisella* sp.

Keith Jeffery
18th June 2009
Tilapia workshop
Barnsdale, Rutland.

Early development in the 1990s

- Early farms (1990s) < 10 tonnes
- Recirculation / warm water discharge sites
- Research institutes & Colleges



Recent development since 2002

- One major player building systems
- On-growing & supplying fry
- Purchasing fish back for processing
- Sites built for 50 – 400 tonnes production
- Approximately 12 sites built



Current status

- 13 farms mostly Independents
- Several mothballed systems
- Potential 1000 tonnes plus production ?
- Stirling University initiative
- Most fry still imported
- UK hatchery now exists



Disease Investigation Early 2008

Fry losses (0.5g to 5g) @ approx 20%

External

- Flashing, fungal patches, exophthalmia, pale gills petechial haemorrhaging around pectoral fins, lethargy.

Internal

- Empty intestines, enlarged gall bladder, some enlarged granular spleens and one or two enlarged kidneys.

Water quality readings provided appeared OK. 23.9 C

Fibreglass tanks > Concrete tanks
> suspended hapas in raceways.

Bead filters, (No UV or Ozone)



Sampling - January 2008

- Live fish for Parasitology
- Bacteriology - TSA – RIVAOA
- Virology – Spleen, Kidney & Brain > Transport medium – FH's, CHSE's, SSN, BF & EP's & 20 & 25C
- Histology – Kidney, spleen, gill, liver, intestine, heart, eye, skin, muscle & Whole fish > NBF.

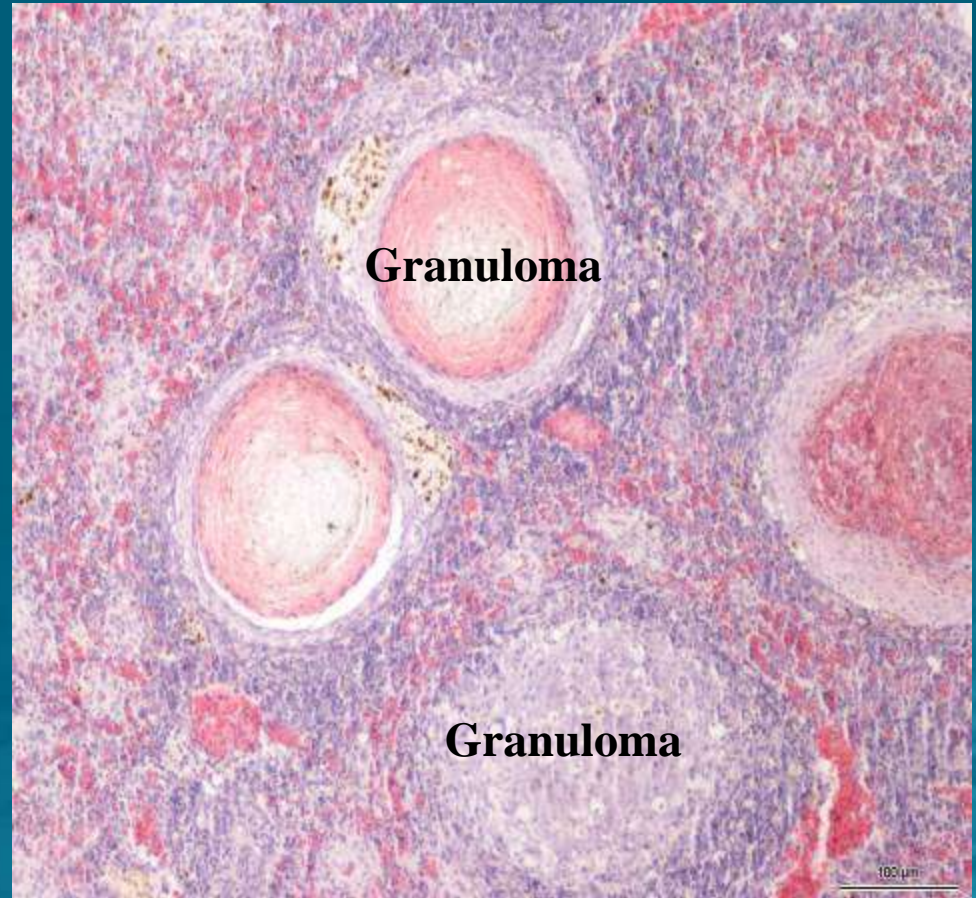


Results January 2008

- Negative for Parasitology, Bacteriology, Virology

Histology

- Lesions present in most tissues of all fish.
- Host response was formation of granulomas.
- Parasites and other pathologies not seen

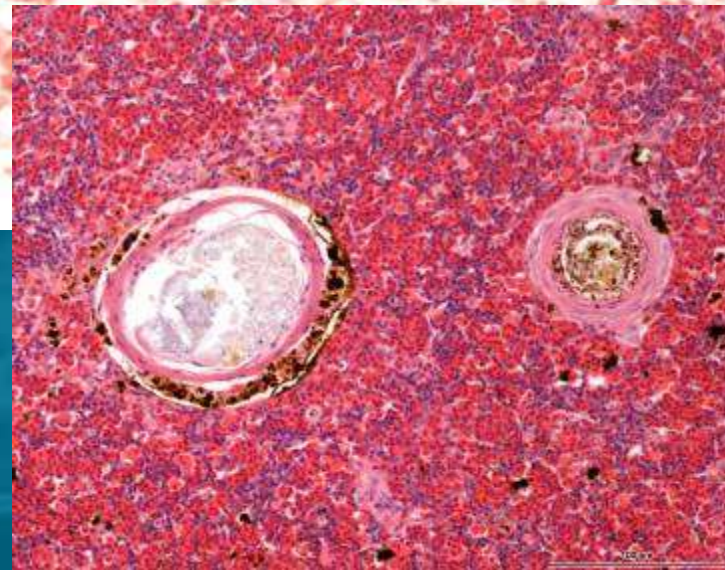
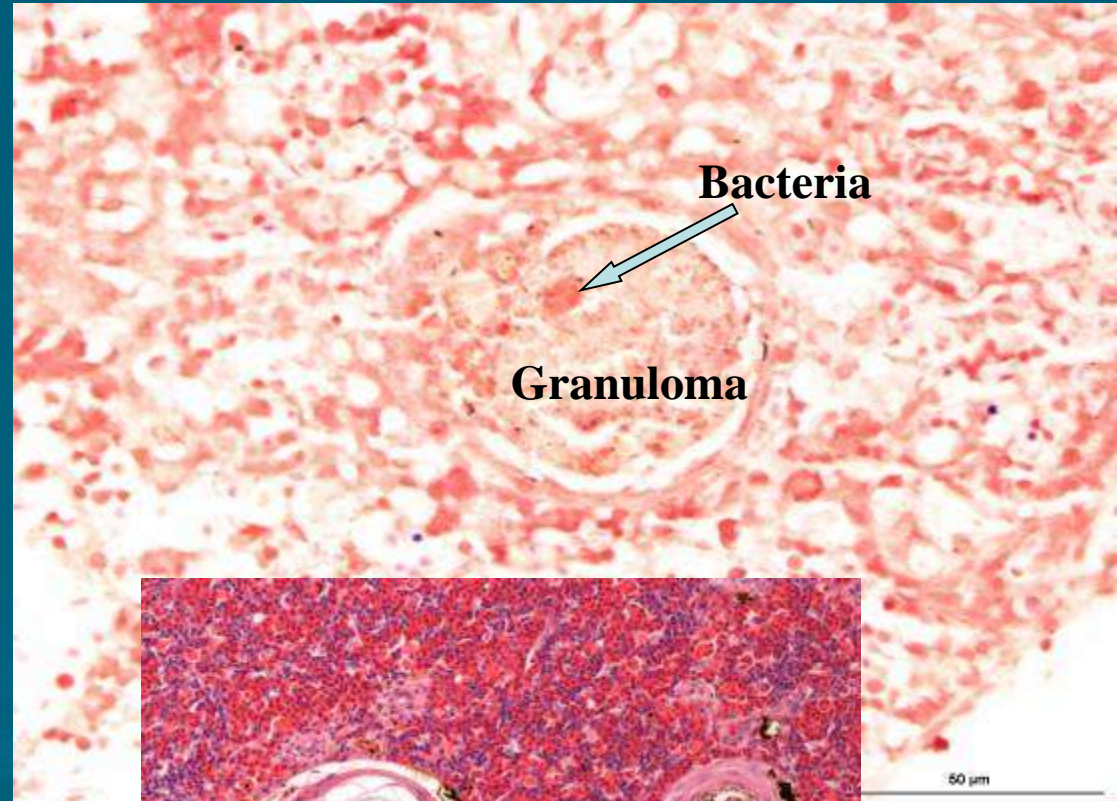


Images from spleen tissues

Cefas

Results January 2008 (cont)

- Reminiscent of mycobacterium
- Re-cuts & ZN staining = no acid fast bacteria
- Some gram -ve bacteria associated with granulomas.
- Necrotic material and macrophage aggregates (melanin) visible.



Presumptive positive for
Francisella sp.

Further Sampling ?

Literature search

- *Francisella* topical in Cod farming
(Cefas north sea wild cod)
- Some papers on Tilapia + other species
- Google *F. tularensis* = Human pathogen ? Bio-weapons?

Second sample

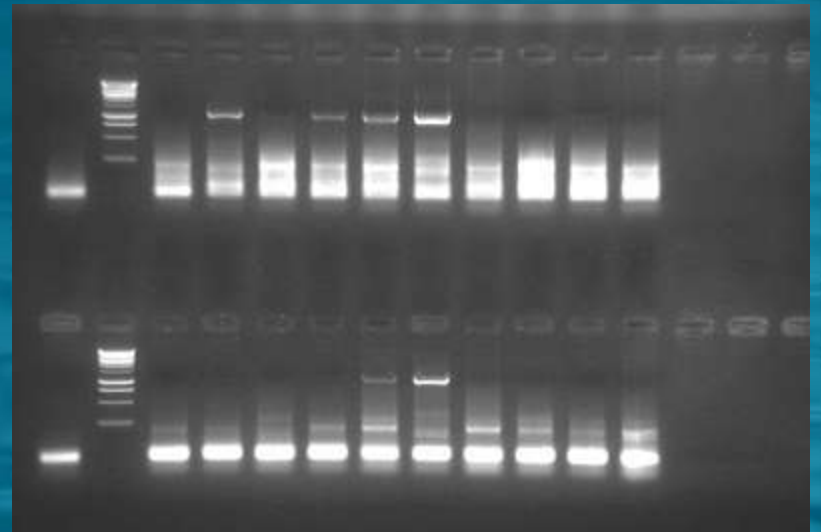
- Bacteriology – CHA & SKDMs
- Histology – Kidney, spleen, gill, liver, intestine, heart, eye, skin, muscle & Whole fish (NBF)
- Molecular biology - Spleen, Liver, Heart & whole fry (Ethanol) and onto ice.
- Additional samples for Health Protection Agency

Results – Second sample

- Additional sample = no evidence of *Francisella tularensis*
- Bacteriology – culture of the organism unsuccessful.
- Histology – Granulomas in the spleens of affected fish
- Newly imported fry showed N.A.D.

Molecular biology

- Products obtained from several fish

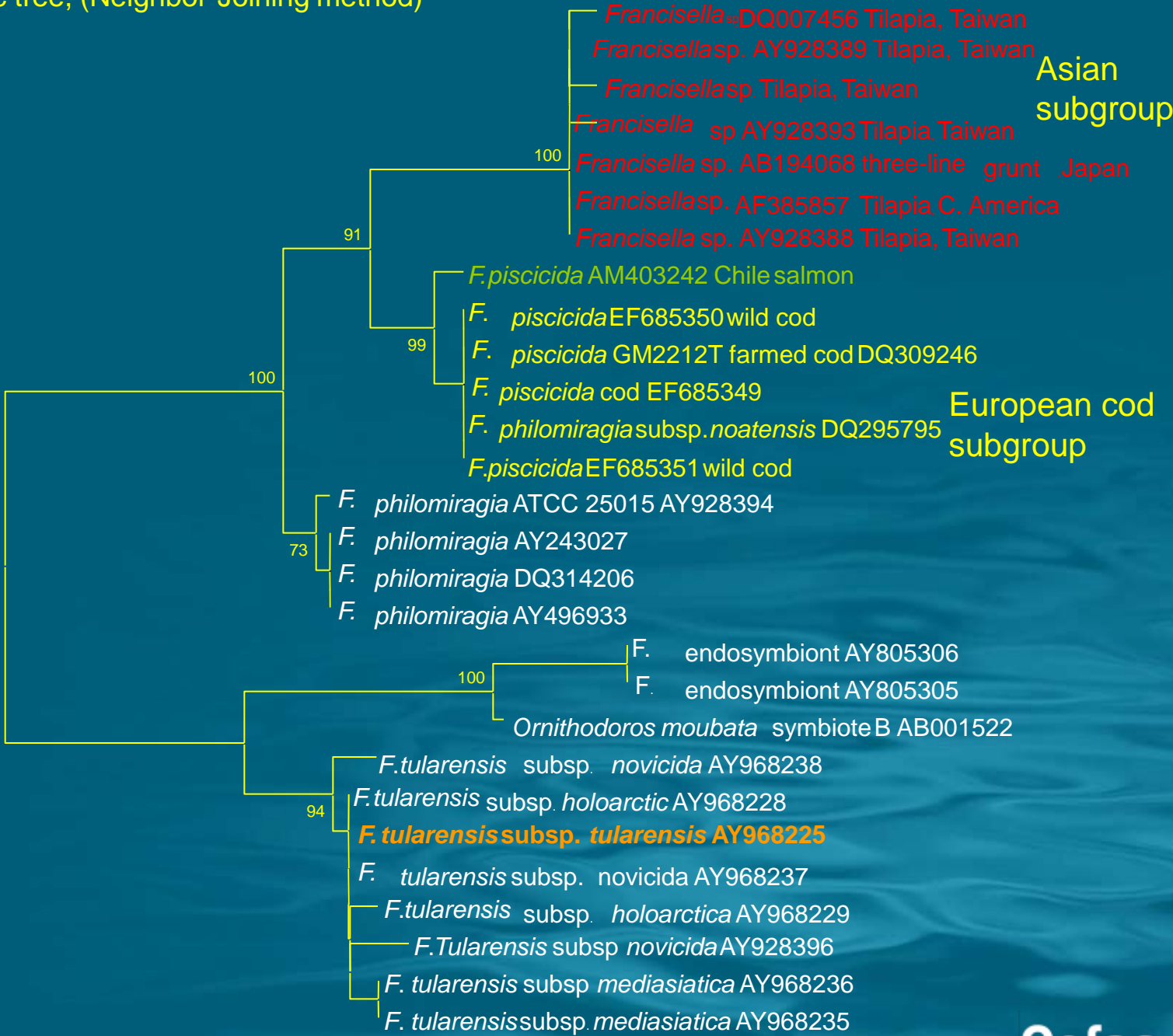


Results – Second sample

- 406 base Sequence obtained
- BLAST at NCBI
- 100% nucleotide identity with a *Francisella* species previously described in tilapia.

Positive for *Francisella* sp.

Unrooted phylogenetic tree, (Neighbor-Joining method)



0.001

Consequences for farmer and industry sector

Voluntary cull & disinfection by farmer

Site now sourcing from a single European hatchery site

Two further +ve samples

A problem in re-circs (Heish, pers comm)

But not maintained above 26.5 C

Increased mortis after moving and increasing temperatures



Further information

- Article published in Fish news
- Note at final draft for journal article
- Further culture work ongoing at Cefas
- Taxonomy complicated *F. orientalis* ?
- FHI contact with another country who has experienced similar problems in recirculation systems

FHI need to notified of any abnormal mortalities.

Feed back from farmers would be very valued

Acknowledgements

David Stone and Cefas Molecular biology team
Stephen Feist and Histopathology Team

Research on emerging diseases funded by Defra through
contracts F1166 and FA001



Thank You