

# Use of live and dry feed during early rearing of Arctic grayling



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# Interior Alaska Sport Fish Stocking

- New Ruth Burnett Sport Fish Hatchery to be completed April 2010
- ~45,000kg production capability
- Produce 6 species for recreational stocking
  - Rainbow trout, Arctic char, Arctic grayling, Chinook and Coho salmon, Lake trout
- Focus on lake stocking – 134 lakes
  - No anadromous releases

# Ruth Burnett Sport Fish Hatchery

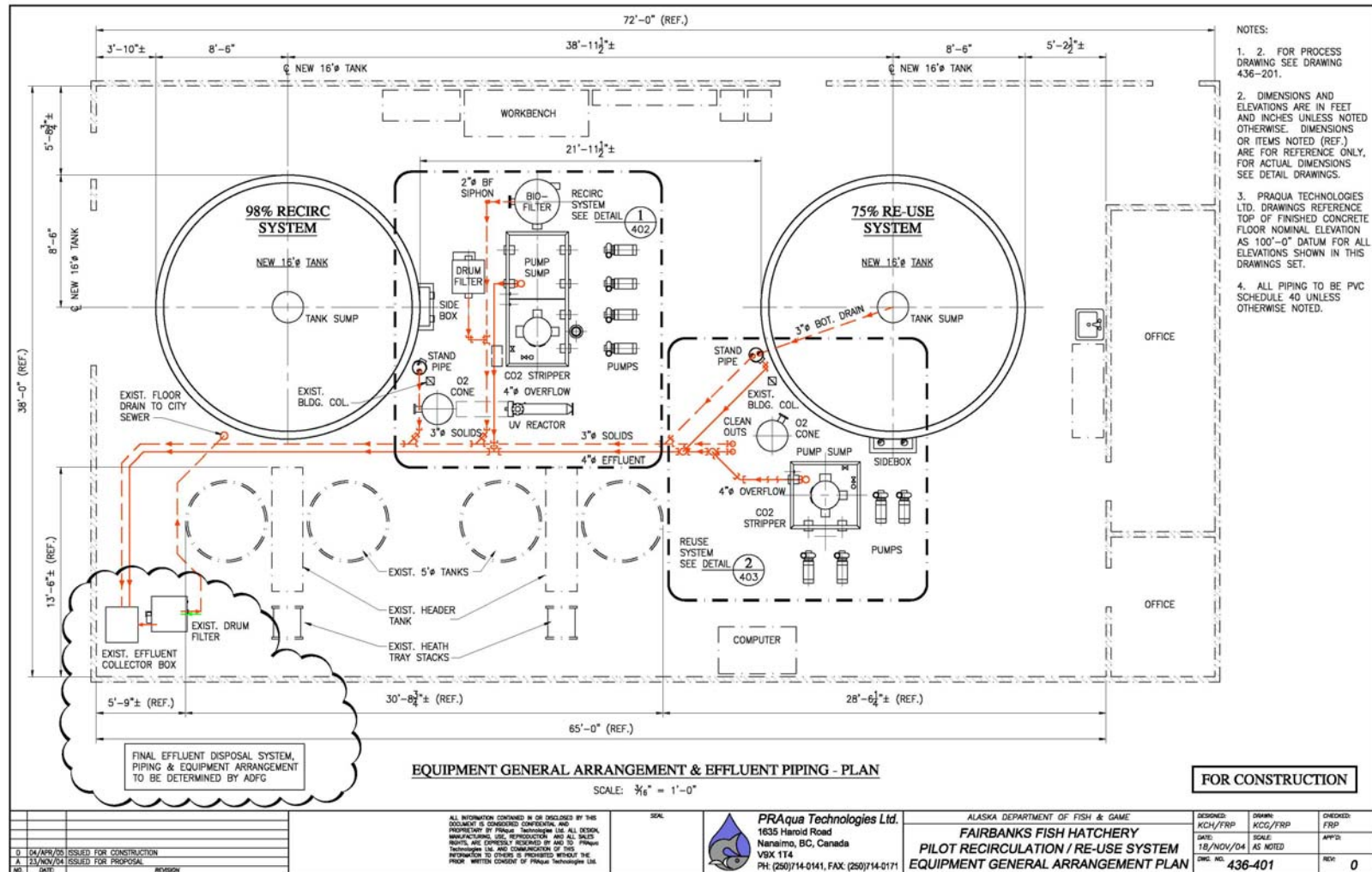


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# Fairbanks Experimental Hatchery

- Initial construction in 2003, expansion in 2005.
  - Set up to test water treatment technologies for iron and manganese removal.
  - Provided resources and space for small scale experiments with direct application to design and operation of the new Ruth Burnett Sport Fish Hatchery.
  - Enabled staff to gain experience with 95% recirculation and 75% reuse systems.
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# Experimental Hatchery Layout





# Arctic Grayling Culture in Alaska

- ✓ Past survivals from 7% to 75%
  - Success is determined by first feeding
- ✓ Traditional starter and new marine micro diets unpalatable to larval grayling
- ✓ Some success by Ft. Richardson Hatchery in Anchorage using live Artemia
- ✓ Continue to look for suitable dry feed as well as refining use of live Artemia to include enrichment

# 2008 Incubation

- Grayling eggs were taken on May 16, 2008
- Iodophor disinfection post water hardening
- Incubated in Mari-source trays at 8-10 deg C for 200 CTU's
- Low egg densities within each tray, ~7,000/tray.
- No chemical treatments.
- Achieved 98.2% survival from green egg to ponding.





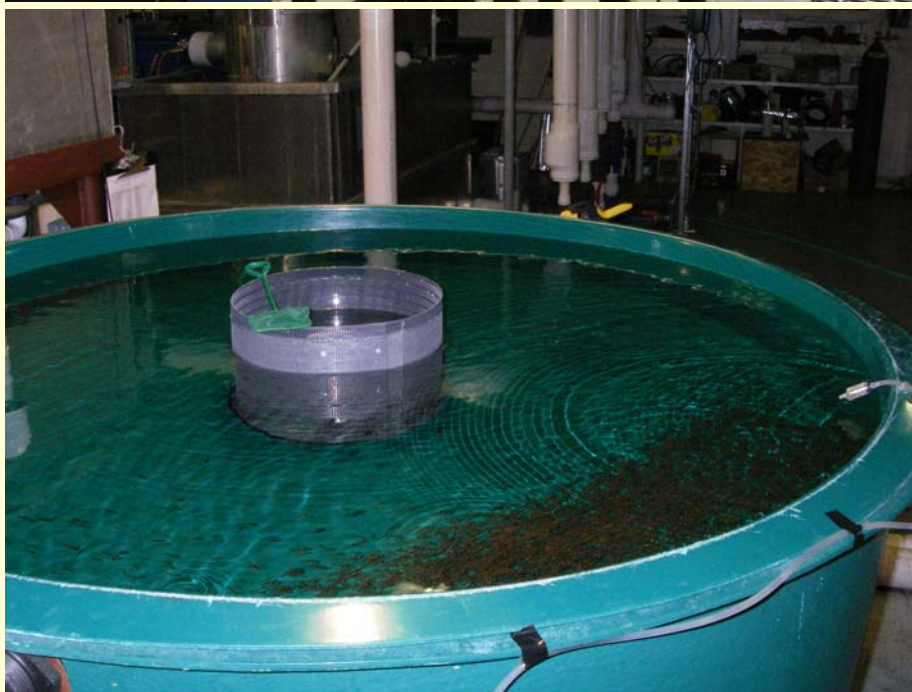
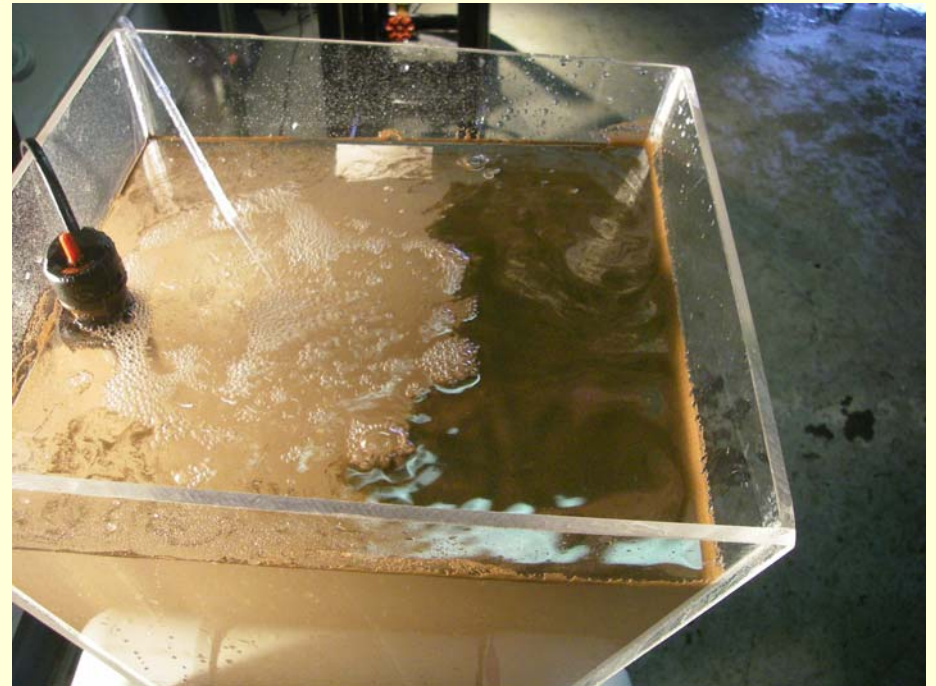
# 2008 Experiment Design

Equipment limited to 4 treatments for 14 days

1. INVE GSL Artemia enriched with Dana Feeds Multigain
2. INVE GSL Artemia enriched with Dana Feeds Multigain supplemented with Dana Feeds Larviva dry feed
3. Dana Feeds Larviva dry feed
4. Argent Laboratories freeze dried Cyclop-eeze

# 2008 Experiment Design

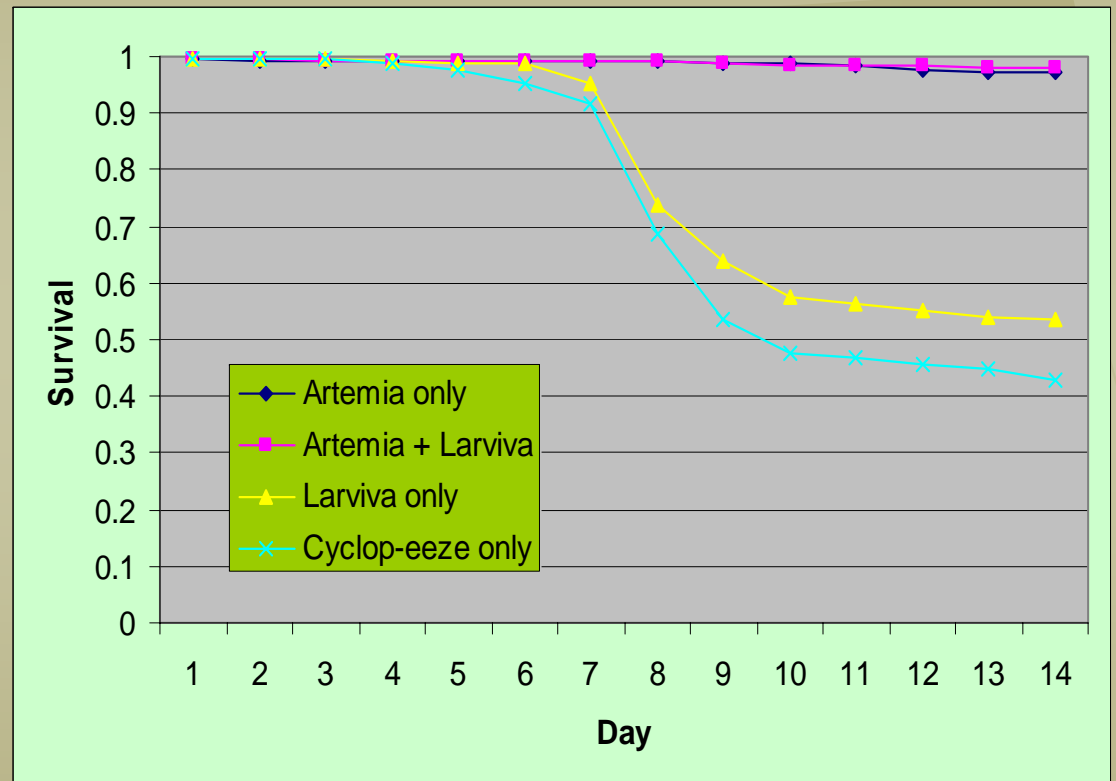
- Fish were ponded into .4m<sup>3</sup> fiberglass tanks on flow through 10 – 11° C water.
- Light was 24 hrs/day at 3,000 lux at the water surface.
- Live Artemia were provided 24 hours a day at a rate of 2.5g cysts/1000 fish.
- Dry feeds were pushed through a 250 micron sieve to ensure proper size. Dry feeds were distributed 24 hrs/day by belt feeder.



# 2008 Early Rearing Results

## Survival

-Artemia:	97.1%
-Artemia + Larviva:	98.1%
-Larviva:	53.4%
-Cyclop-eeze:	42.9%

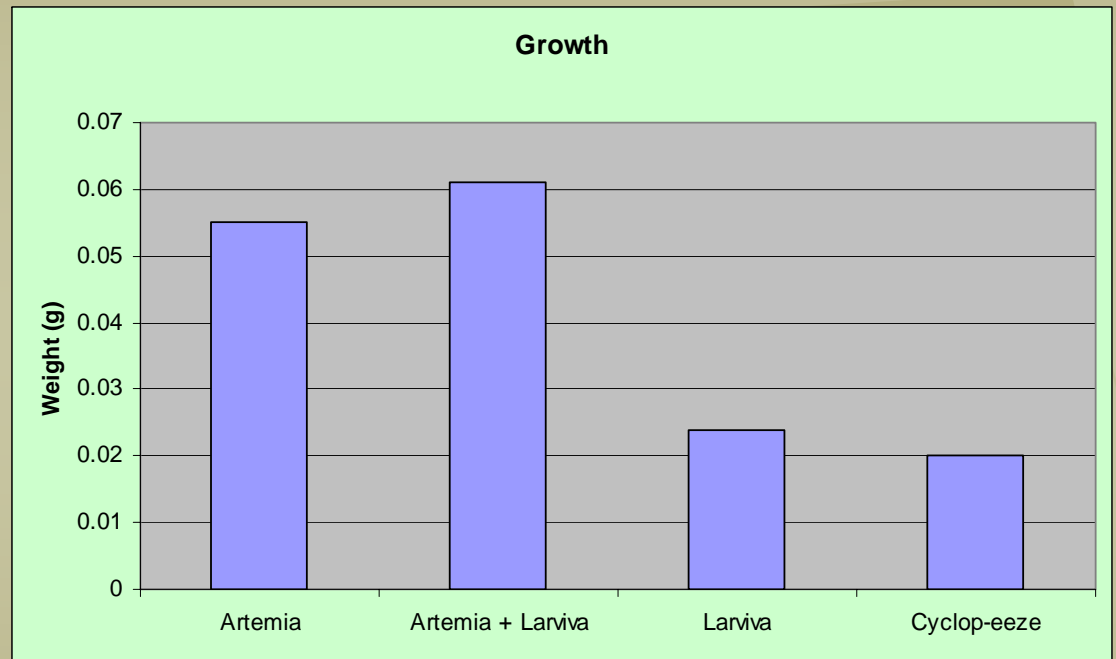




# 2008 Early Rearing Results

Growth – Start .01g

-Artemia:	.055g
-Artemia + Larviva:	.061g
-Larviva:	.024g
-Cyclop-eeze:	.020g





# 2008 Early Rearing Observations

- Fish on dry feed were emaciated, sluggish, and just all around poor performers.
- Poor water quality with dry feed.
- Those fish on Artemia aggressively pursued food and defended feeding areas. Water quality was excellent.
- We think the time required for preparing live Artemia was offset by the time saved in daily tank maintenance.
- The enrichment step requires significant effort.

# 2008 Experiment Design

Rear Arctic grayling in a 95% recirculation system to a catchable (120g) size.

- 20 m<sup>3</sup> Cornell style dual drain tank
- Hydrotech drum filter
- Cyclo-Bio fluidized sand bed biofilter
- Forced air CO<sub>2</sub> column/single chamber LHO
- Trojan UV filter
- Pressurized oxygen cone





# 2008 Extended Rearing Results

- 11.9g fingerling were ponded in 95% recirculation system Oct 28
- Reared for 197 days
- Stocked into area lakes May 15 at ~ 90g
- FCR: 1.2
- Survival:
  - 99.4% in Recirc system
  - 92.1% from ponding to release



Catchables



Fingerlings



# 2009 Incubation

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- Grayling eggs were taken on May 12, 2009.
- Iodophor disinfection post water hardening
- Incubated in Mari-source trays at 8-10 deg C for ~200 CTU's.
- Low egg densities within each tray, ~6,000/tray.
- No chemical treatments.
- Achieved 95.6% survival from green egg to ponding.



# 2009 Experiment Design

- Investigate use of enrichment medias.
  - Doubles the effort and cost
  - End up wasting Artemia with every transfer
  - Increased risk of pathogen transmission.
  - Increased risk of Artemia culture failure
- Evaluate premium Artemia cysts

# 2009 Experiment Design

Same format as 2008, just different treatments

1. INVE GSL Artemia enriched with Dana Feeds Multigain
2. INVE GSL Artemia enriched with INVE Easy SELCO
3. INVE GSL Artemia with no enrichment
4. Argent Laboratories "Platinum" grade SFB Artemia with no enrichment

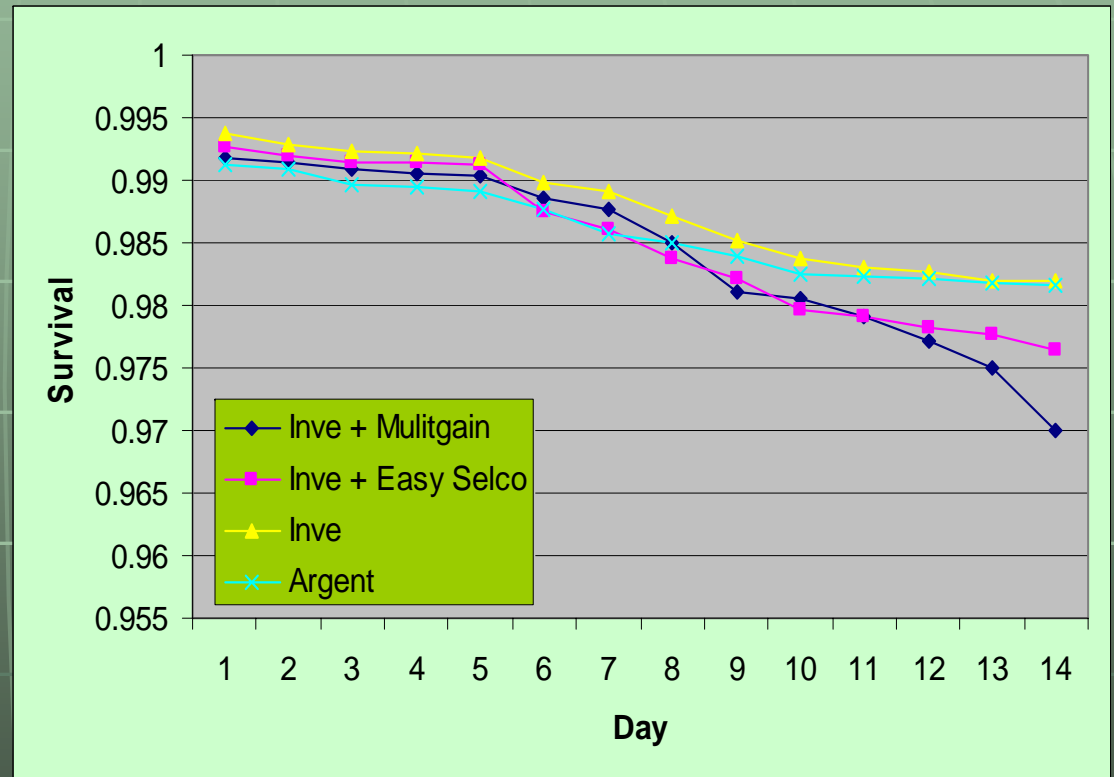


Day 0

# 2009 Early Rearing Results

## Survival

-INVE + MG: 97.0%  
-INVE + ES: 97.6%  
-INVE: 98.2%  
-Argent Platinum: 98.2%





# 2009 Early Rearing Results

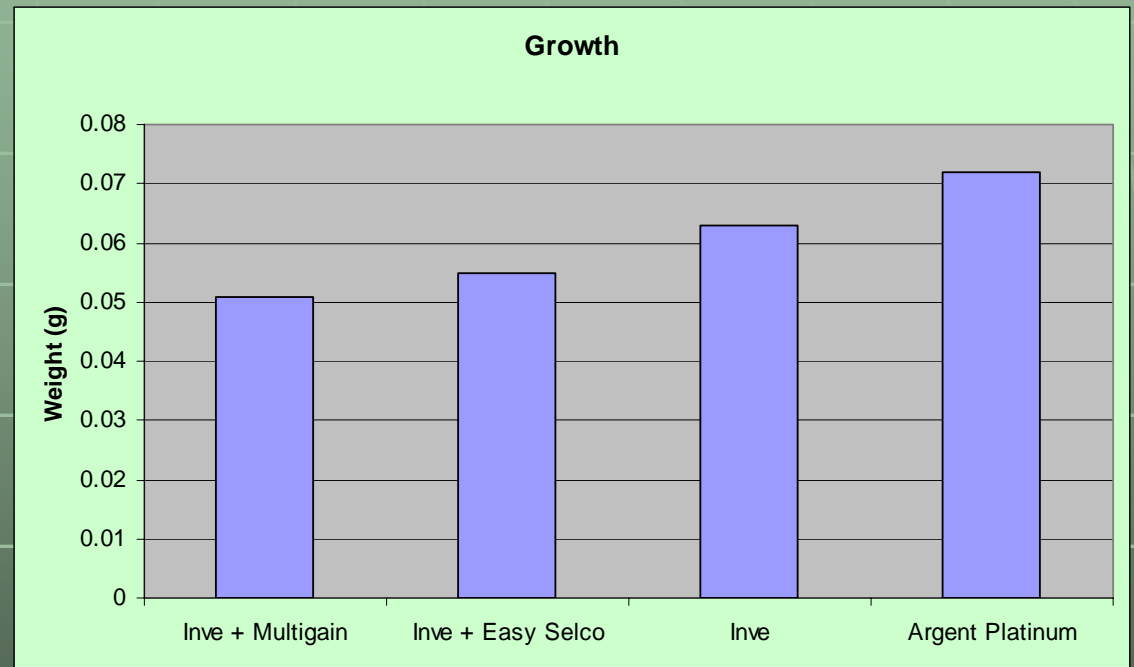
Growth – Start .01g

-INVE + MG: .051g

-INVE + ES: .055g

-INVE: .063g

-Argent Platinum: .072g





Day 14





# Early Rearing Observations

- Fish in all treatments fed well and began feeding within hours of being ponded.
- Development is fast!
- While early feed rates were excessive, by the end of the experiment the fish likely could have eaten more. They are voracious!



# Future Questions

- What is the optimal feed rate?
  - Is the rate based on biomass of live Artemia available or is it tied to prey density?
- While enrichment is not necessary for short term survival and growth, does it play a role in long term health and growth potential?
- Transition period needs to be defined
  - When do you first introduce dry feed?
  - How long do you need to feed Artemia before complete transition to dry feed?



Questions?

