

Non-Hatching Decapsulated Artemia Cysts as a Replacement to Artemia Nauplii in Zebrafish Culture

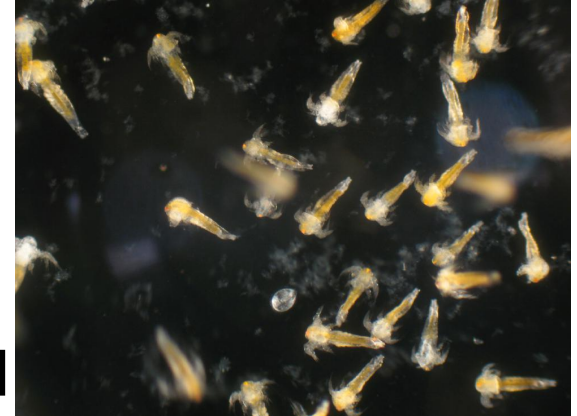
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Nauplii

- Newly hatched *Artemia*
- Cysts in salt water
- 48 hours
- Separate nauplii from un-hatched and chorions (indigestible)
- Common in Zebrafish culture



Non-Hatching Decapsulated Brine Shrimp Cysts

- **Chorion chemically removed**
- **Exothermic reaction**
 - **Nonviable embryos**
- **Commercially available**
- **Can be fed directly to fish**
- **Long shelf life**



http://image.ec21.com/image/tutyfishes/oimg_GC04558848_CA04594834/Artemia_Cysts_-_Brine_Shrimp_Eggs.jpg

Decaps

- **Used for several species**
 - **Golden Shiner (*Notemigonus crysoleucas*) fry**
 - **Common carp (*Cyprinus carpio*) larvae**
 - **African catfish (*Clarias gariepinus*) larvae**
 - **Giant tiger prawn (*Panaeus monodon*)**



Who Cares?

- **Save money**
 - **Reduce feed costs**
 - **Hatching cysts – \$37-\$50/lb**
 - **Decaps - \$15/lb**
 - **Reduced labor**
 - **Hatching**
 - **Collecting**
 - **Cleaning**



Who Cares?

- **Less equipment (more space)**
 - Hatchers
 - Airpumps
 - Airstones/hoses
- **Fewer expendables**
 - Salt
 - Brine shrimp nets



Objective

- **Determine if non-hatching decapsulated brine shrimp cysts are an adequate replacement to brine shrimp nauplii**



Decaps vs. Nauplii

- **200 wildtype zebrafish**
 - 28 dpf
- **Two treatments**
 - Decaps
 - Nauplii
- **10 tanks/treatment**
 - 10 fish/tank
- **Tank = replicate**



Decaps vs. Nauplii

- Fed twice daily for ~17 weeks
 - Nauplii – standard amount (squirt)
 - Decaps - ~0.03g per feeding
 - Same as cysts hatched into nauplii



Data Collection

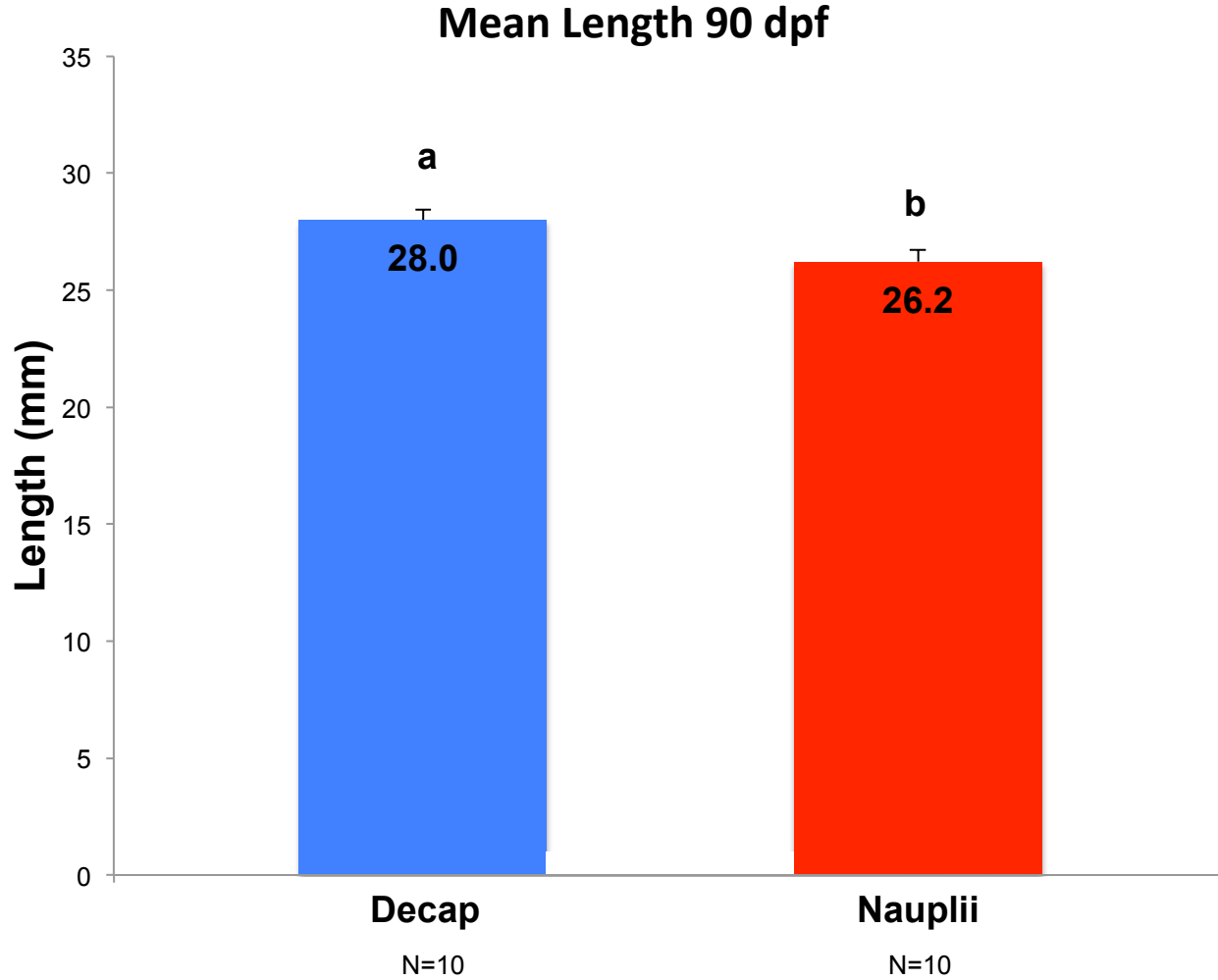
- 1) Growth**
 - 90 dpf
 - Length (mm)
 - Weight (mg)
- 2) Viable embryo production (after 90 dpf)**
 - Set-up once per week
 - 8 weeks
- 3) Survival every week**



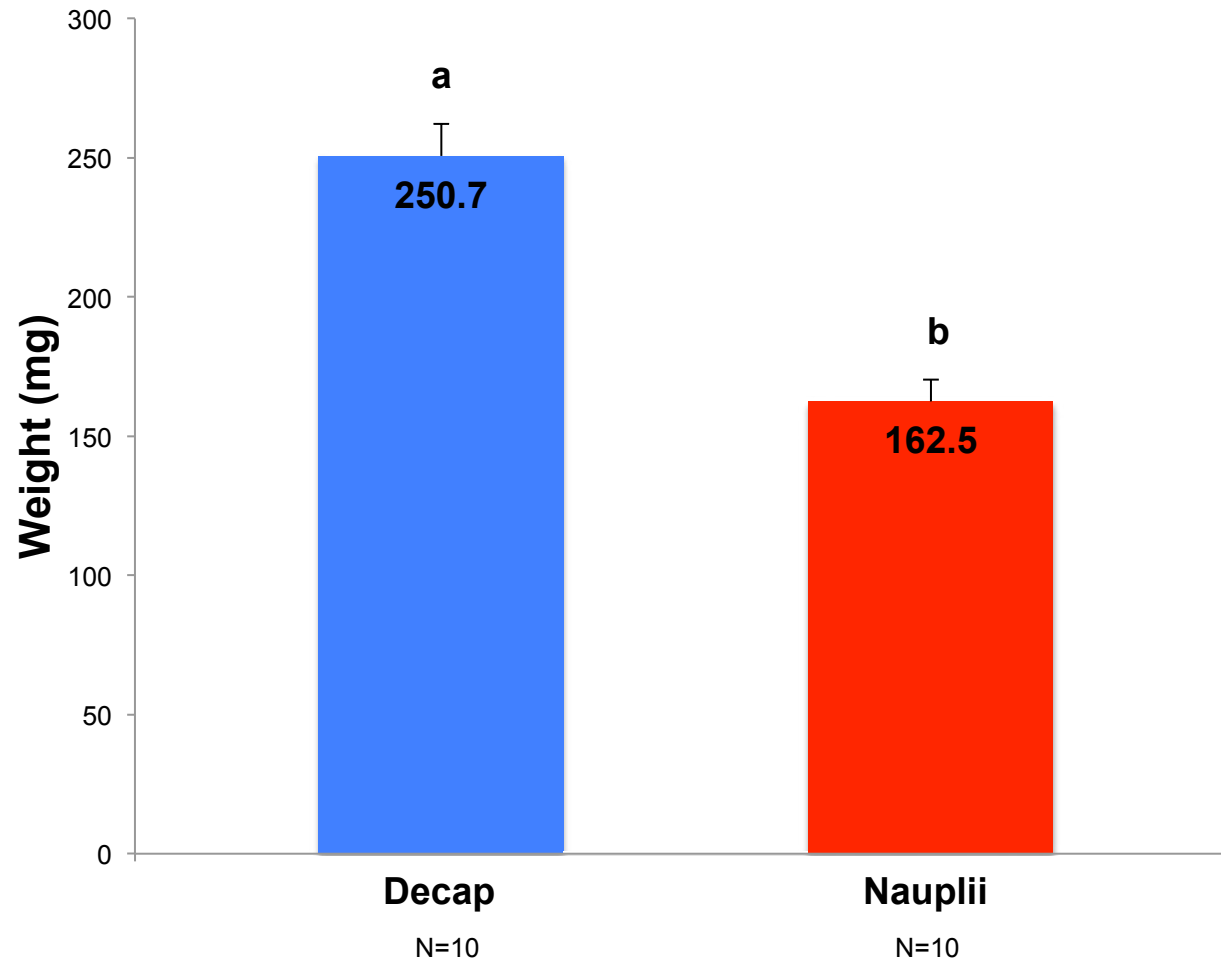
Data Analysis

- **ANOVA (R statistical computing)**
- **Significance at 0.05**





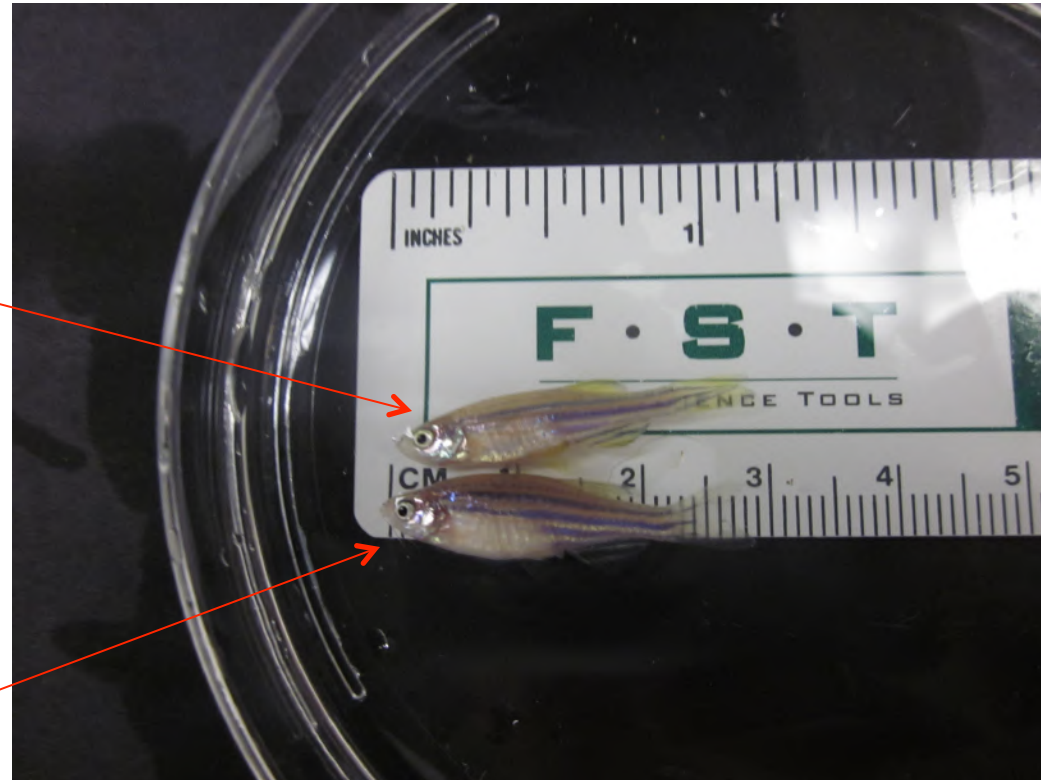
Mean Weight 90 dpf



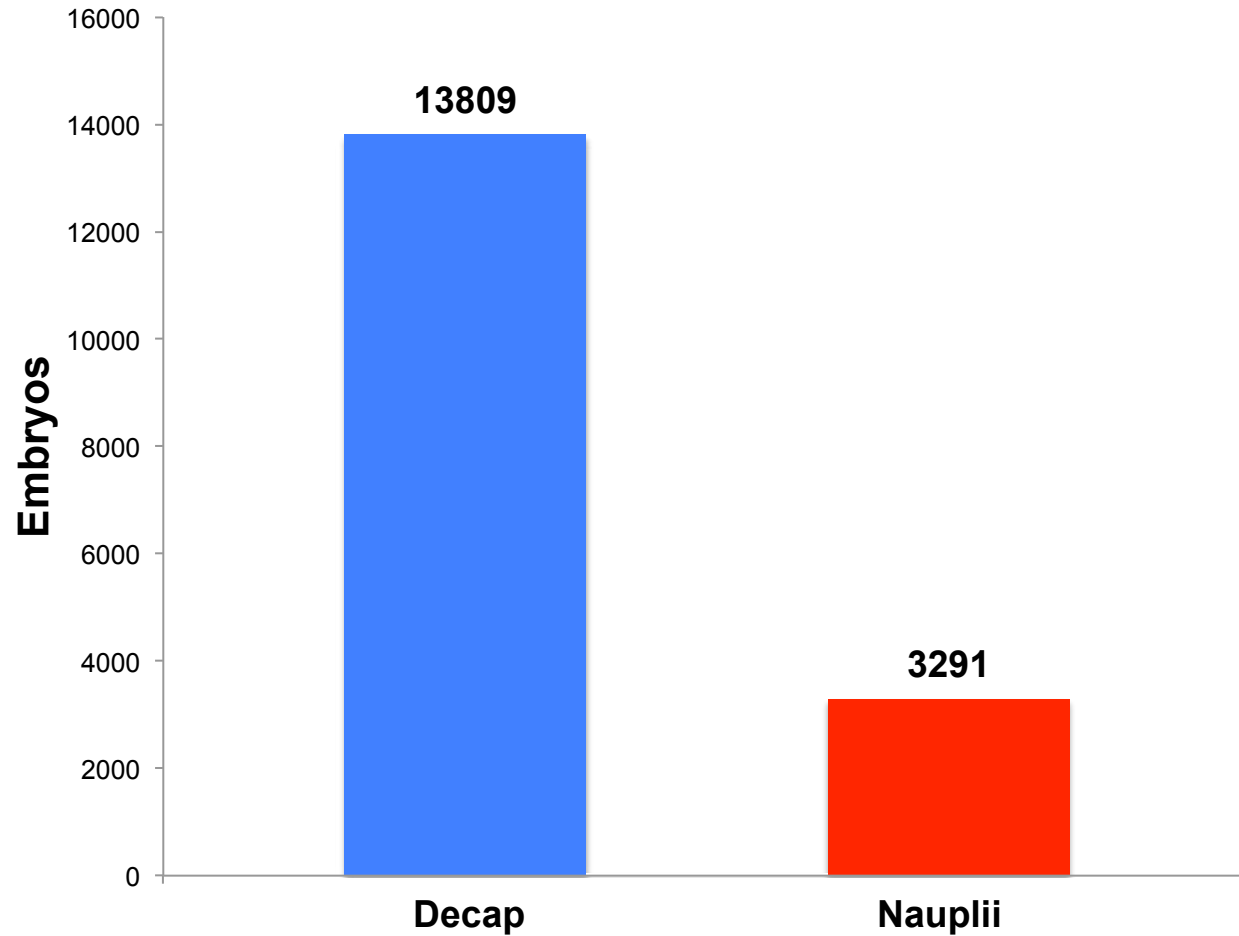
In The Real World...

Avg. Nauplii
26 mm
162 mg

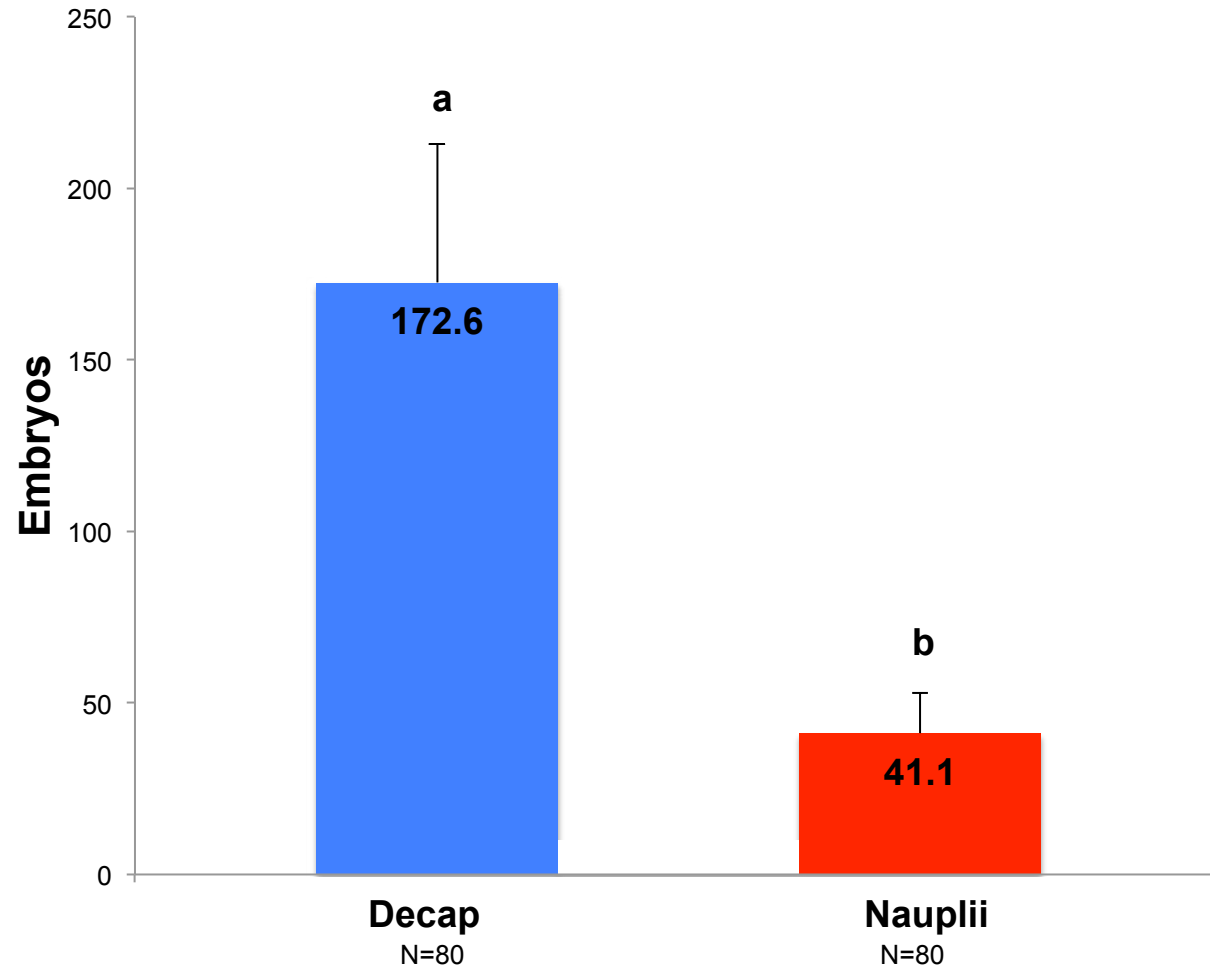
Avg. Decap
28 mm
250 mg



Total Embryo Production

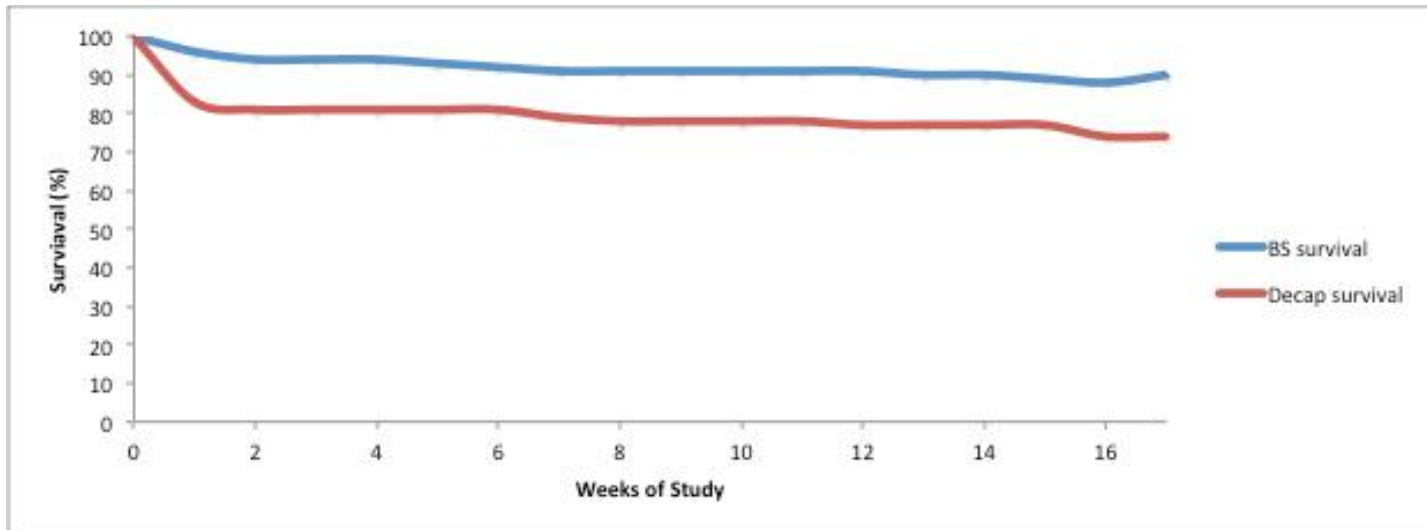


Embryo Production/Tank/Week



Survival

	90 dpf	Final
Decap	0.78	0.74
Nauplii	0.91	0.90
P-Value	0.05548	0.06635



Study 2

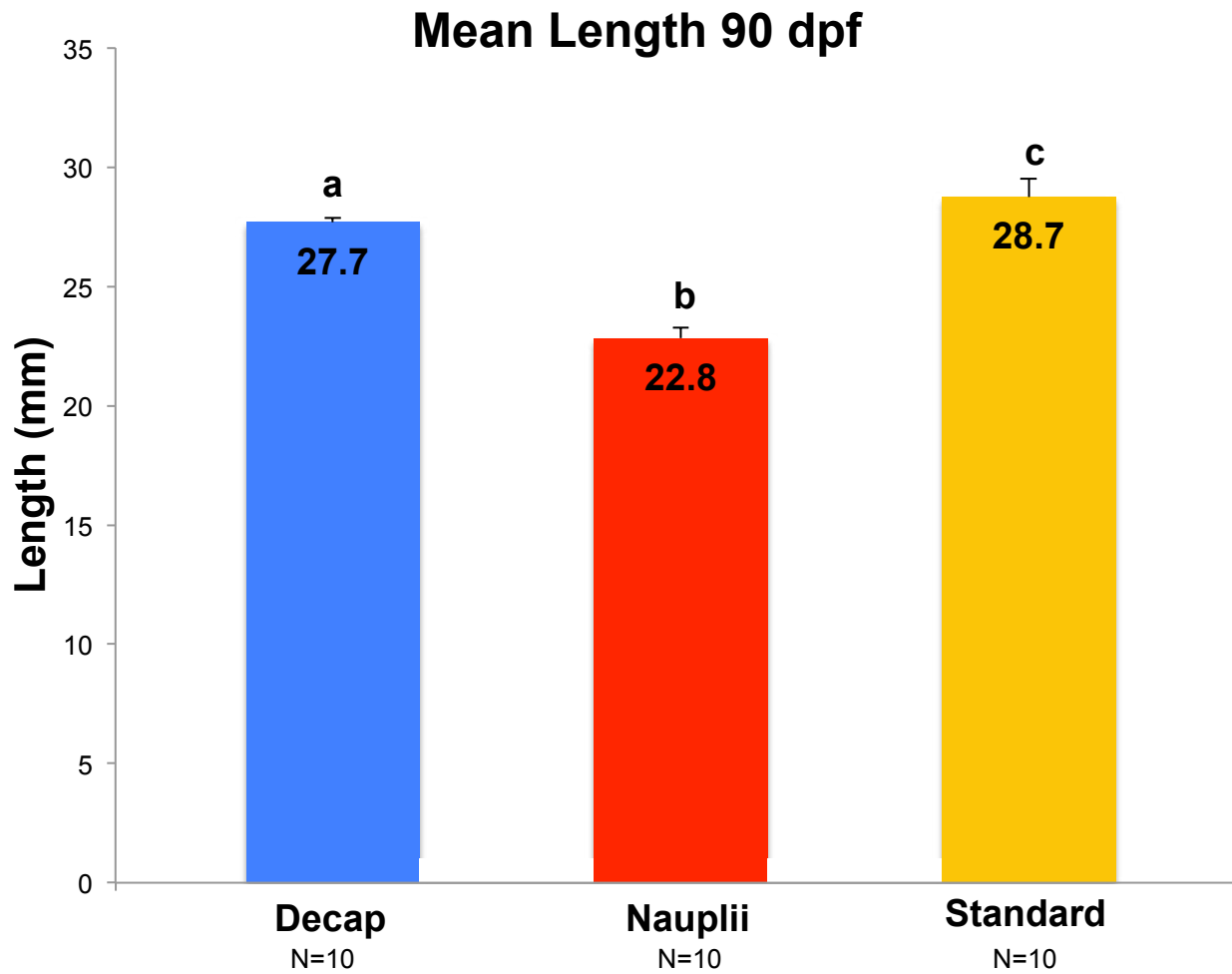
- **3 Treatments**
 - Nauplii
 - Decap – transition for first week
 - U of M standard
 - Nauplii + supplemental granular feed
- **10 tanks/treatment**
- **Fed twice daily for ~17 weeks**



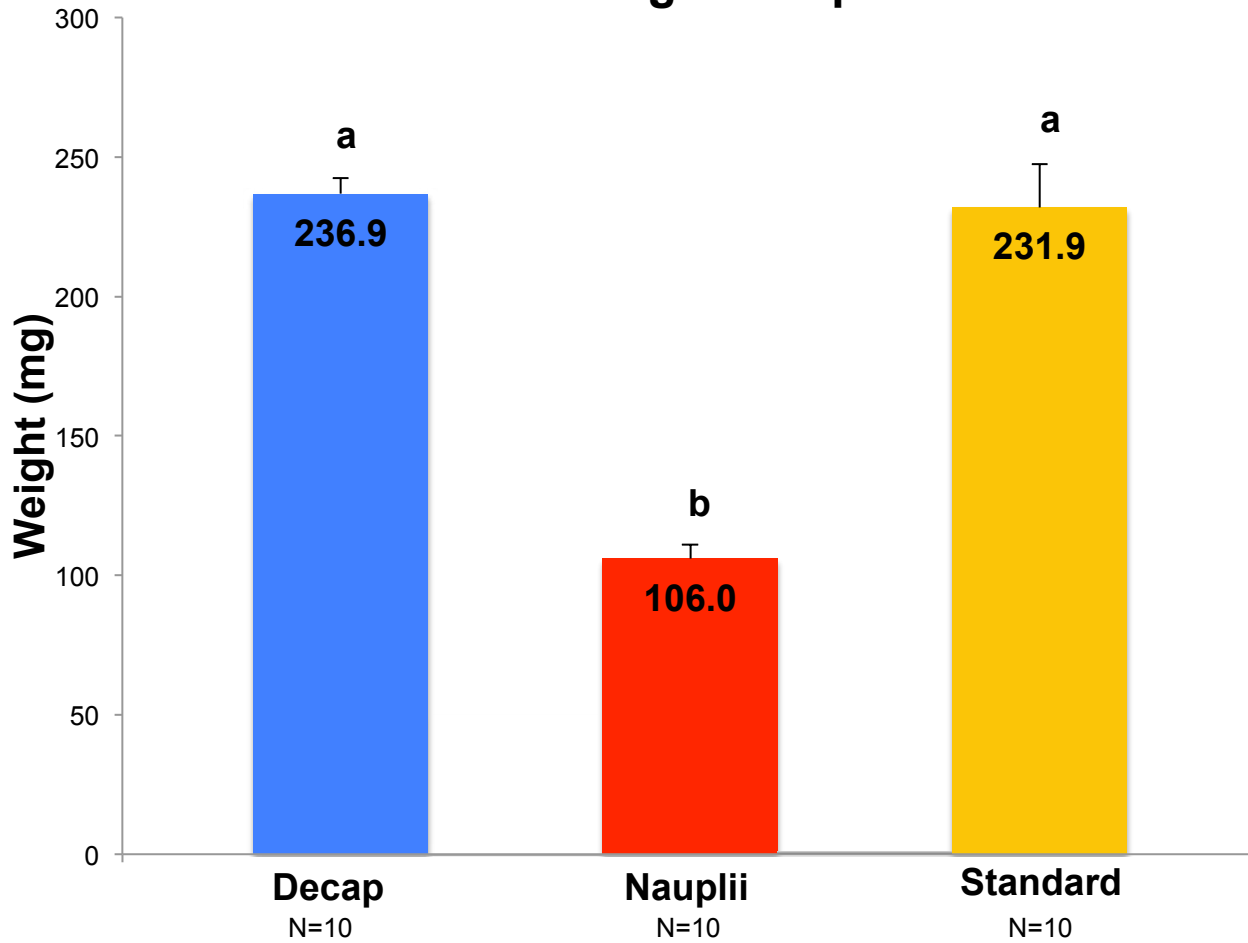
Data Collection

- **Growth at 90dpf**
- **Viable embryo production (after 90 dpf)**
- **Survival every week**





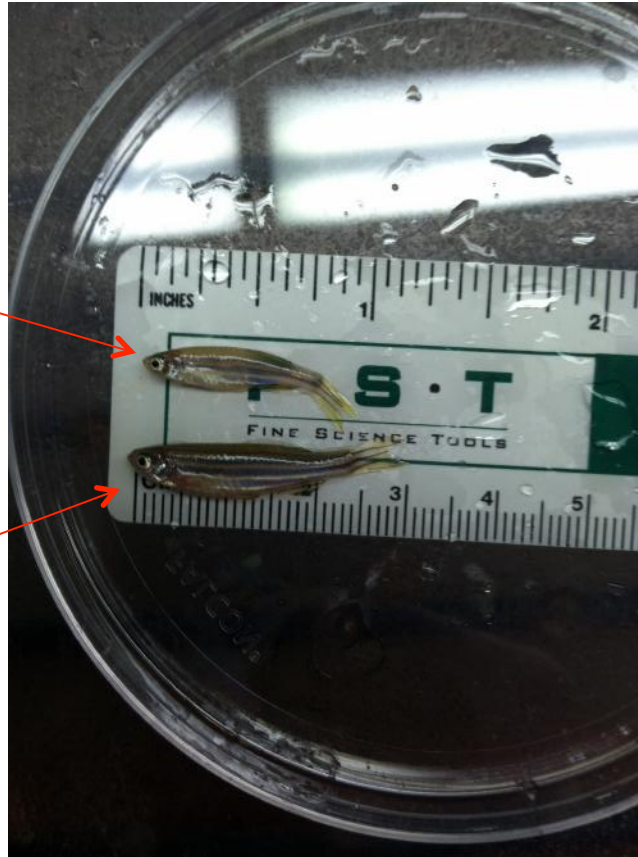
Mean Weight 90 dpf



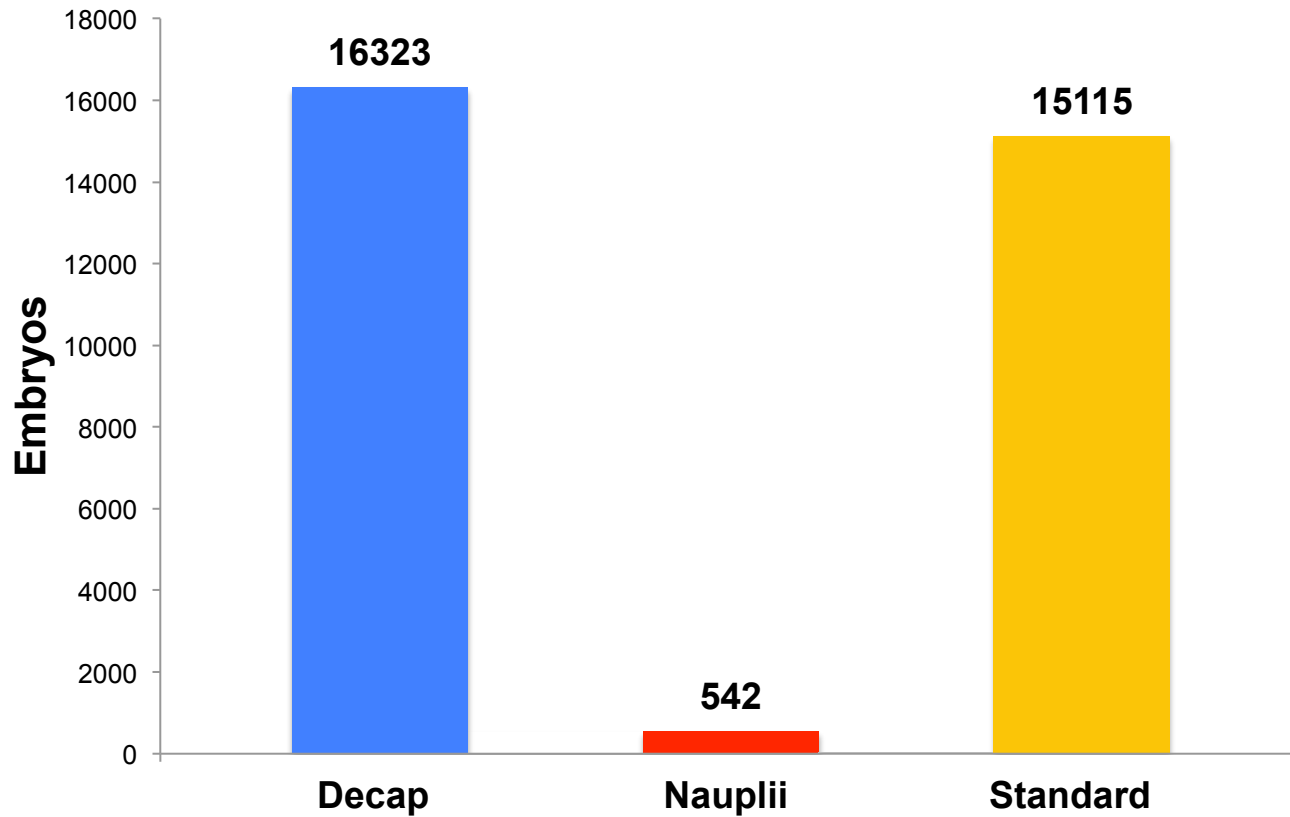
In The Real World...

Avg. Nauplii
23 mm
106 mg

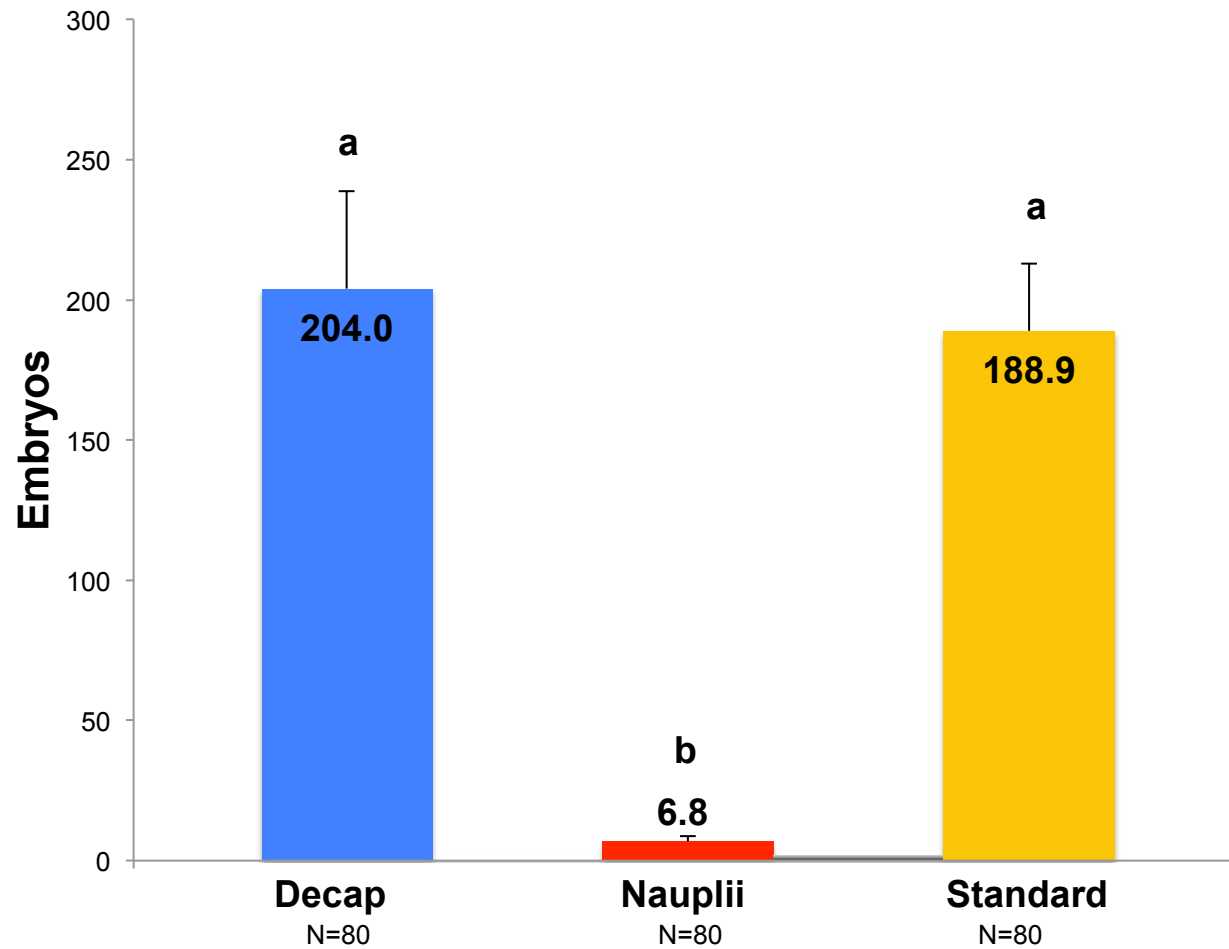
Avg. Decap
28 mm
237 mg



Total Embryo Production



Embryo Production/Tank/Week



Survival

- **Not Significantly different**
 - **$P > 0.10$**

	90 dpf	Final
Decap	0.94	0.89
Nauplii	0.93	0.87
Standard	0.86	0.83



Decaps vs. Nauplii

- **Decaps**
 - **Significantly larger (length and weight)**
 - **Significantly more embryos**
- **What's going on?**
 - **Decaps available in tank longer**
 - **Fewer nauplii (~80% hatching rate)**
 - **Nutritional difference**



Replacing Nauplii With Decaps

Nauplii



Decaps



<http://thumbs4.ebaystatic.com/d1/z25/m/mOicL1JBXgAXxvWJLsYKqA.jpg>
<http://timemachine-tattoosupplies.com/111-163-large/500ml-squirt-bottle.jpg>
<http://image.made-in-china.com/2f0j00HBjagwyRAIqL/Hi-Blow-Diaphragm-Air-Pump-HAP-.jpg>
<http://www.brineshrimpdirect.com/c2/Premium-Grade-Brine-Shrimp-Eggs-c12.html>
<http://img2.wfrcdn.com/fff49/hash/10425/53685031/J.W.-Pet-Company-Smartnet-Brine-Shrimp-Aquarium-Net.jpg>



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Financial Savings

- **Cysts**
 - \$1160/year
 - **Salt**
 - \$206/year
 - **Labor**
 - 15 minutes/feeding
 - \$1350 or used for other services/duties
 - **Misc. expendables**
- \$3000/year**
3% of budget



Decap vs. Standard

- **Standard significantly longer**
 - Only 1 mm
- **Weight and embryo production similar**
 - Decaps higher
- **Replace standard?**
 - Decap + supplemental
- **Do zebrafish “need a variety of food”?**



Conclusion

- **Non-hatching decapsulated brine shrimp cysts can replace brine shrimp nauplii**
- **Decaps show significantly higher**
 - **Growth**
 - **Embryo production**
- **Save \$3,000/year**
- **Decaps results similar to standard diet**
 - **Decaps with supplemental feed**



Questions?

