Impacts of Various Commercial Feeds on Growth and Survival of Red Pacu, *Piaractus brachypomus*

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Project Details

Contract # 2008-201

Duration: 2 years

Funding: $50,000/year

Support: CTSA, Maui County, UH Sea Grant, CTAHR, USDA, NOAA

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Why pacu?

- Rapid growth
- Amenable to high densities
- Hardy to marginal water quality
- Ability to utilize high carbohydrate/low protein diets
- Potential polyculture (tilapia, carp, crustaceans)
- High marketability as a food fish and ornamental fish


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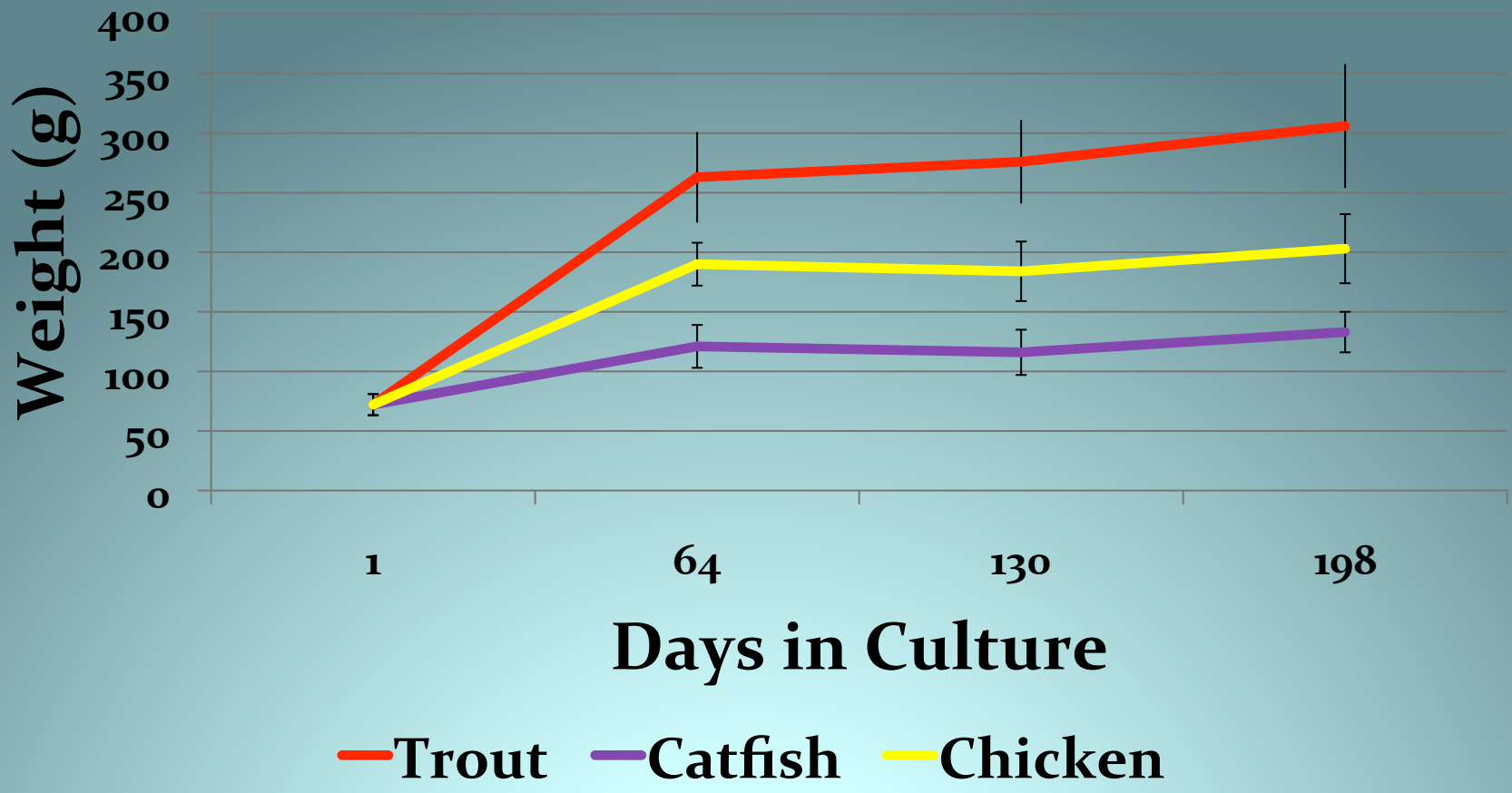
Objective: Characterize growth and survival of juvenile red pacu in closed recirculating systems.

- **Windward Community College facility on January 30, 2012**
- **Four Fish distributed into each of twelve 64 gallon tanks**
- **Four replicates of three commercial diets: chicken feed (egg-layer), catfish feed and trout feed.**
- **Aquaponic set up with culantro**

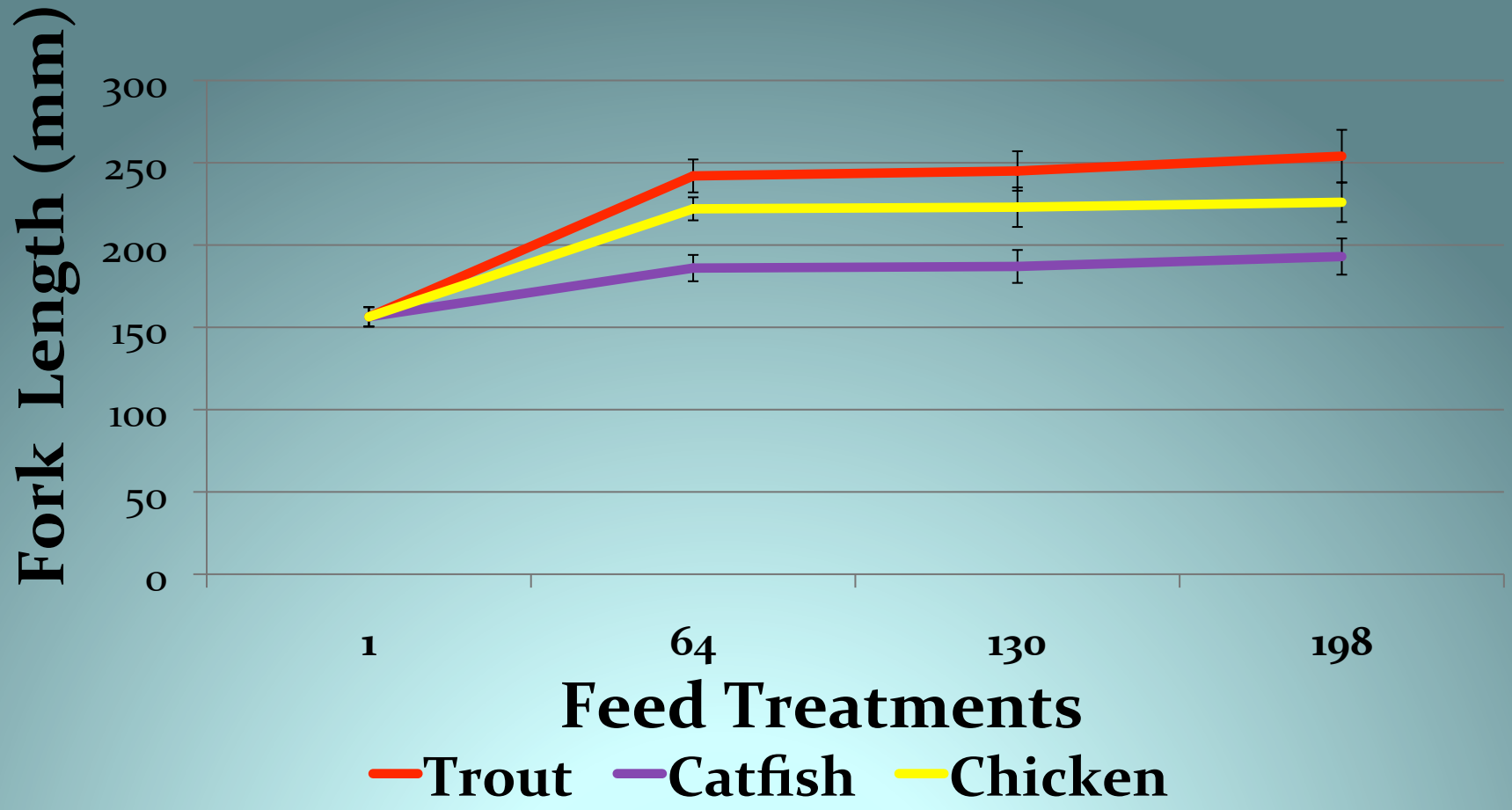
Objective: Characterize growth and survival of juvenile red pacu in closed recirculating systems

- **Body weight and length of pacu (n=4/tank) are obtained at bimonthly intervals**
- **Feed input monitored for each tank.**
- **Temperature, pH, DO, Conductivity, TAN, and Nitrate monitored weekly.**

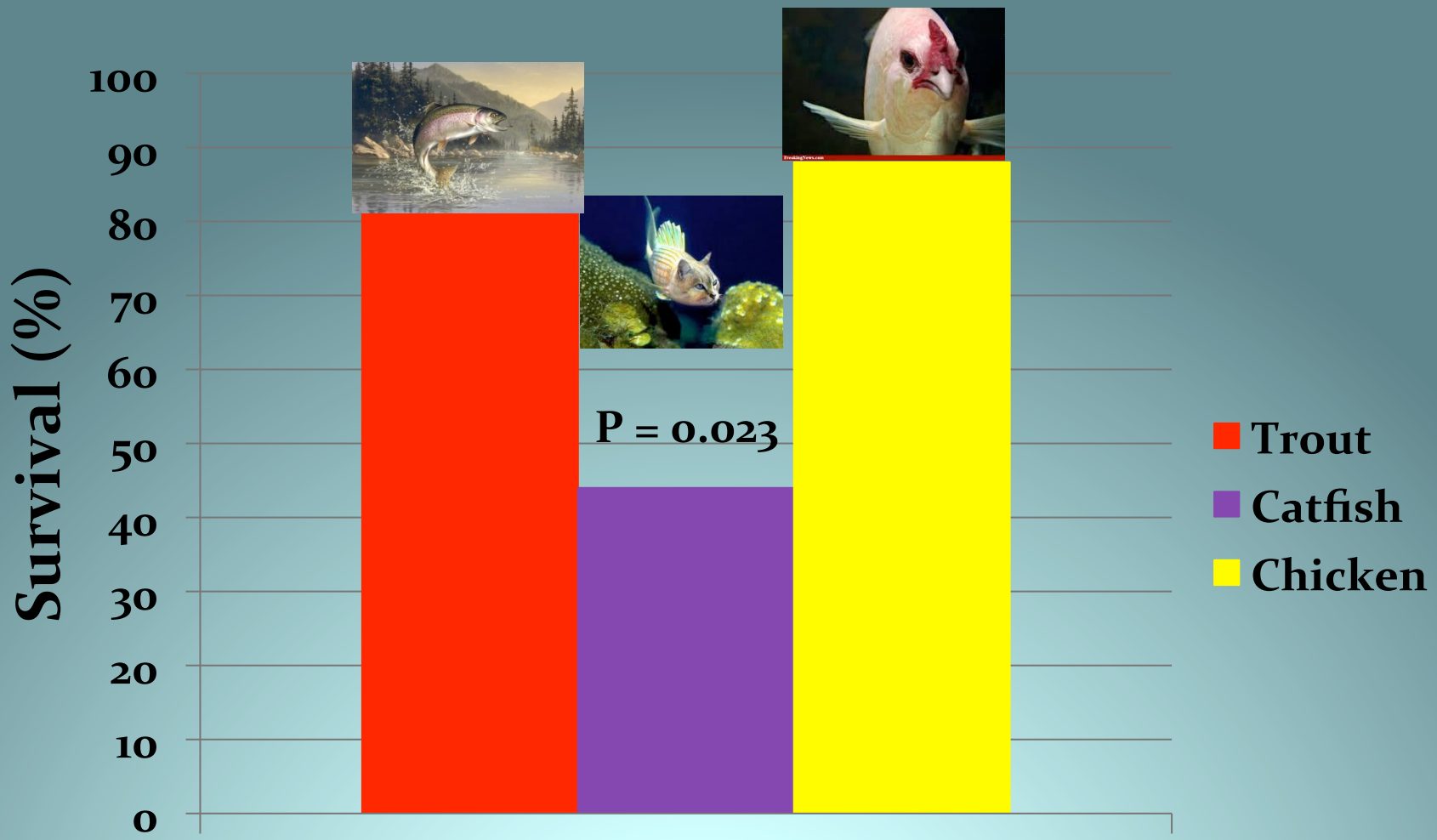
Pacu Growth (BW) versus Feeds



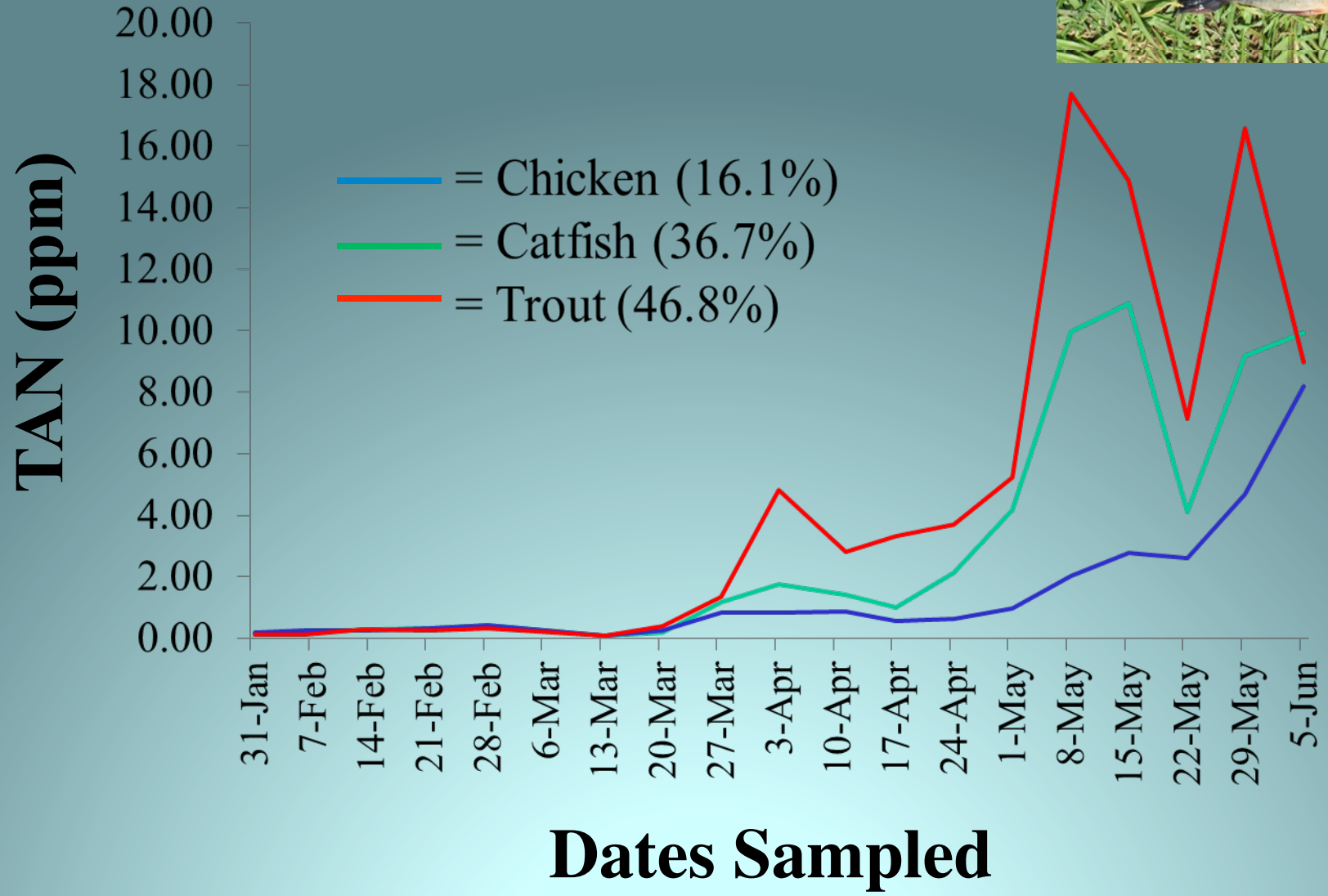
Pacu Growth (TL) versus Feeds



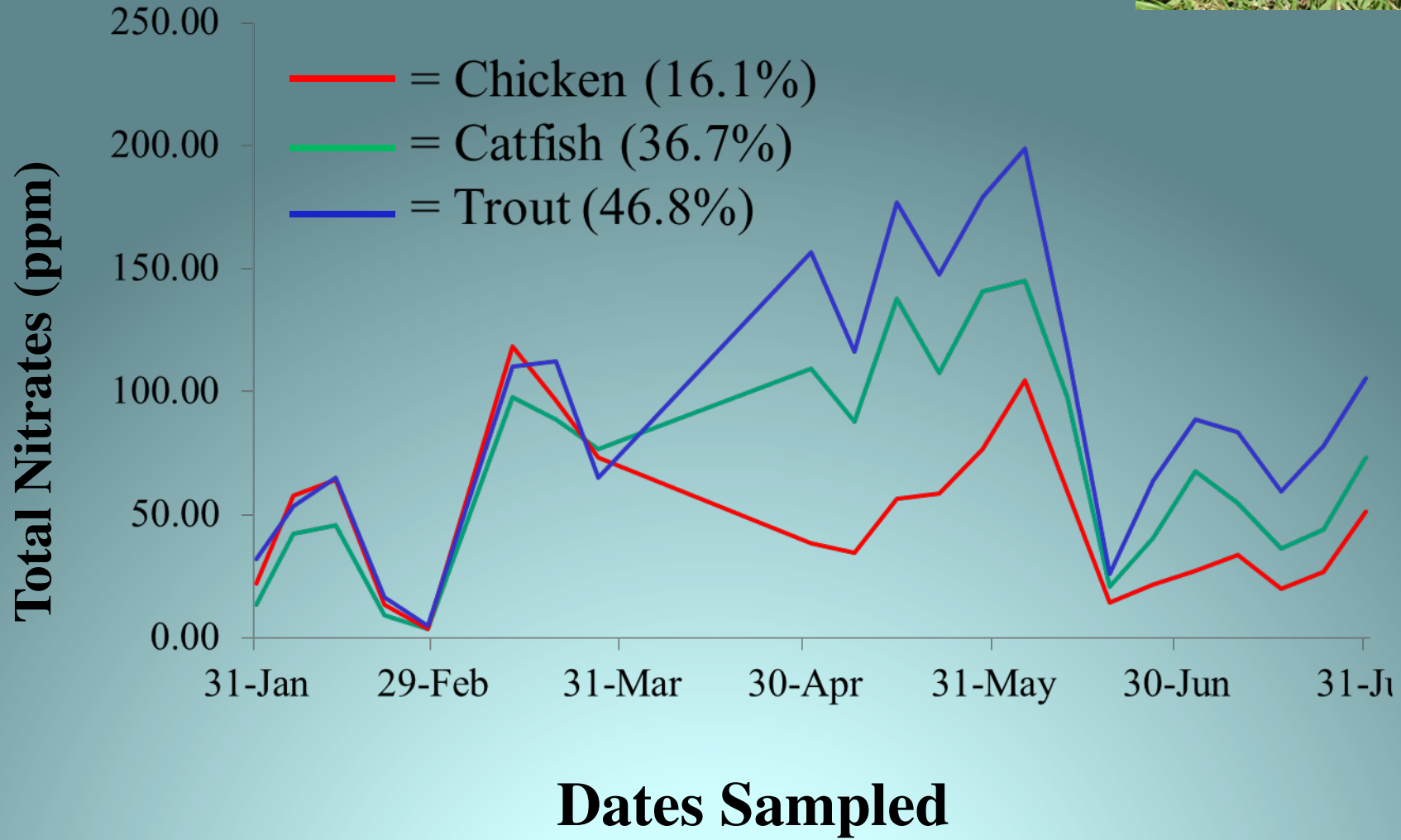
Pacu Survival



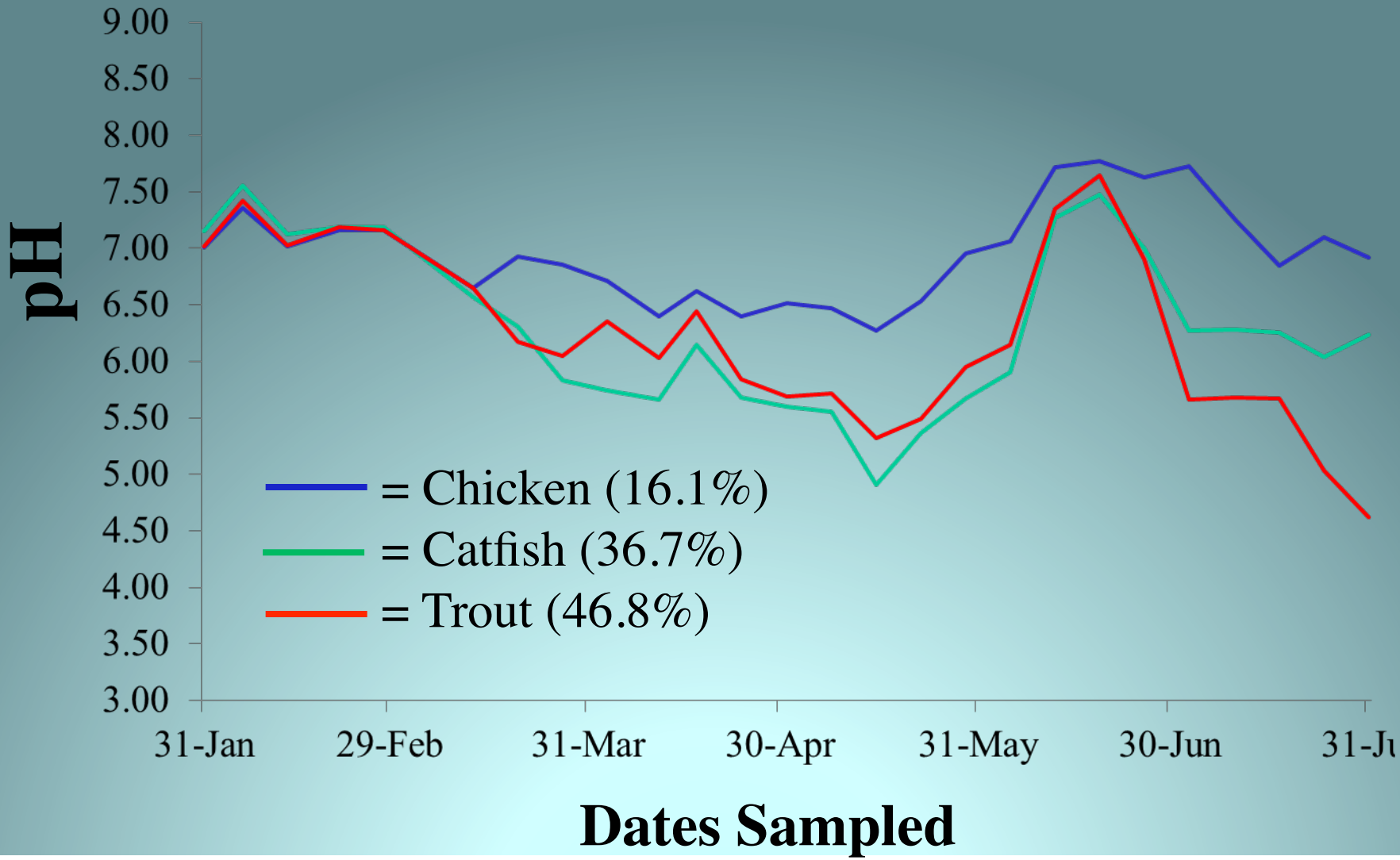
Temporal Changes in TAN



Temporal Changes in Total Nitrates



Temporal Changes in pH



Composition of various commercially available feeds

Category	Chicken	Catfish	Trout
Protein%	16.13	36.72	46.77
Fat%	2.98	4.67	8.54
P %	0.69	1.32	1.64
K %	1.03	1.42	0.90
Ca %	4.25	1.47	3.05
Mg %	0.25	0.31	.021
Na %	0.28	0.22	.031
Bo ppm	12	20	13
Cu ppm	24	12	12
Fe ppm	195	276	288
Mn ppm	120	132	45
Zn ppm	81	145	213

Chemistry of the Nitrification Process

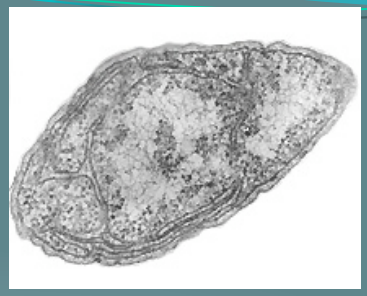


Photo credit: Stan Watson, Woods Hole Oceanographic Institute. 2010

Nitrosomonas

$$55\ NH_4^+ + 5\ CO_2 + 76\ O_2 \rightarrow C_5H_7NO_2 + 54\ NO_2^- + 52\ H_2O + 109\ H^+$$

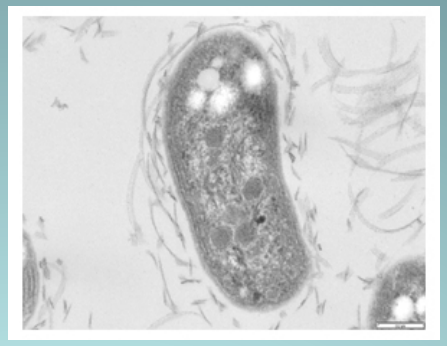


Photo credit: W.J. Hickey, University of Wisconsin-Madison, 2006

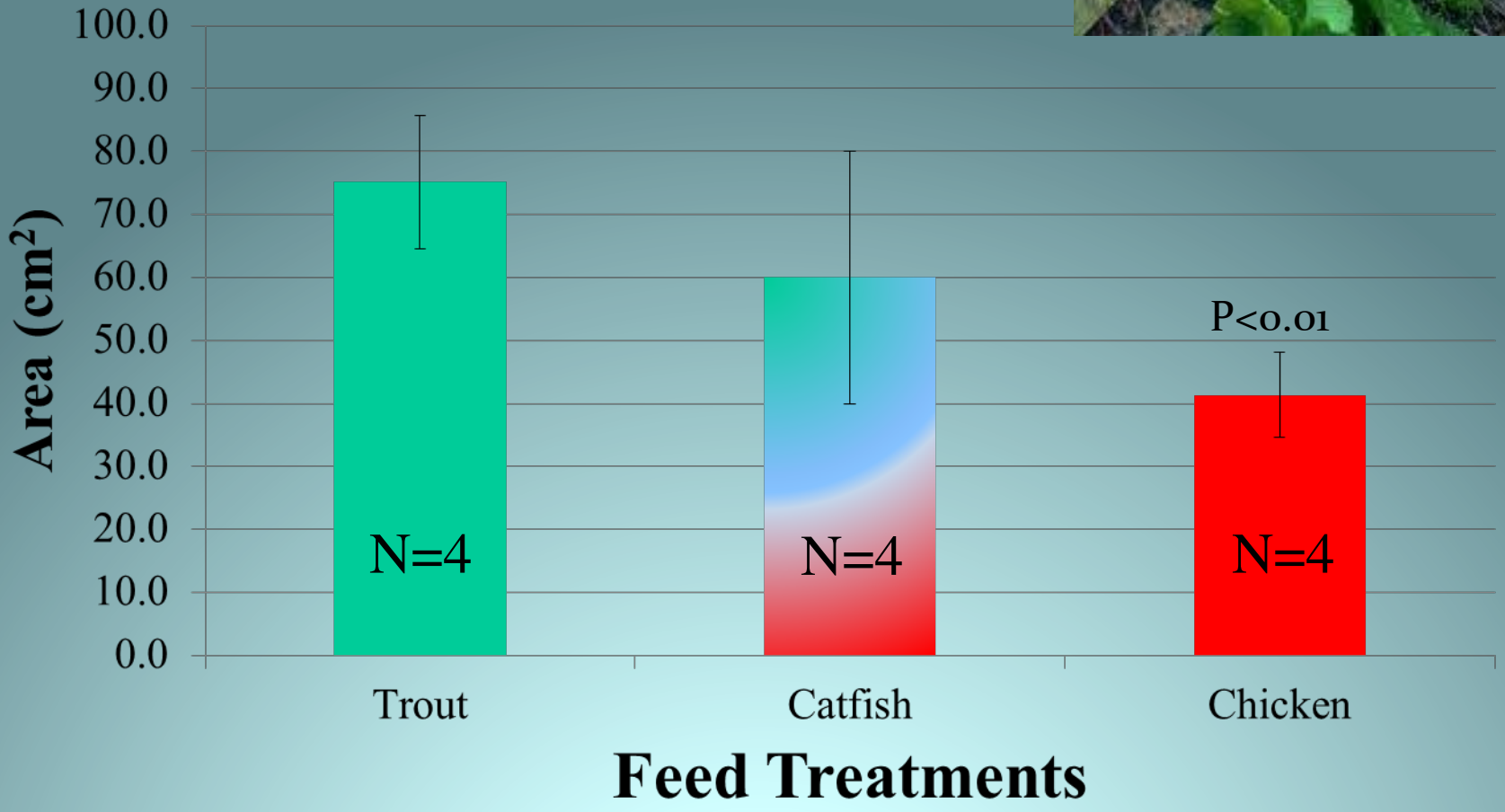
Nitrobacter

$$400\ NO_2^- + 5\ CO_2 + NH_4^+ + 195\ O_2 + 2\ H_2O \rightarrow C_5H_7NO_2 + 400\ NO_3^- + H^+$$

From: Haug and McCarty, 1972

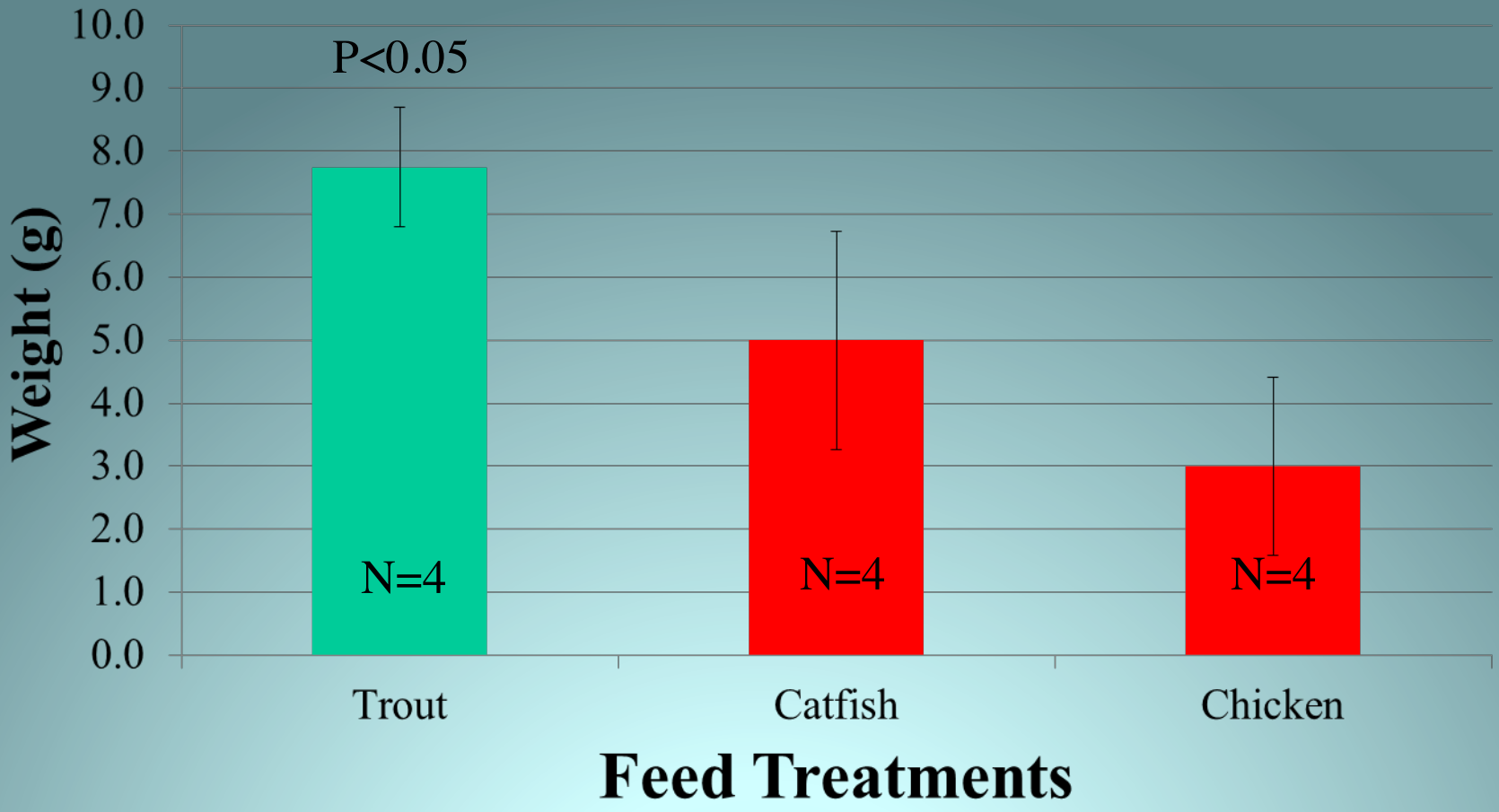
Average Leaf Area

Culantro - *Eryngium foetidum*



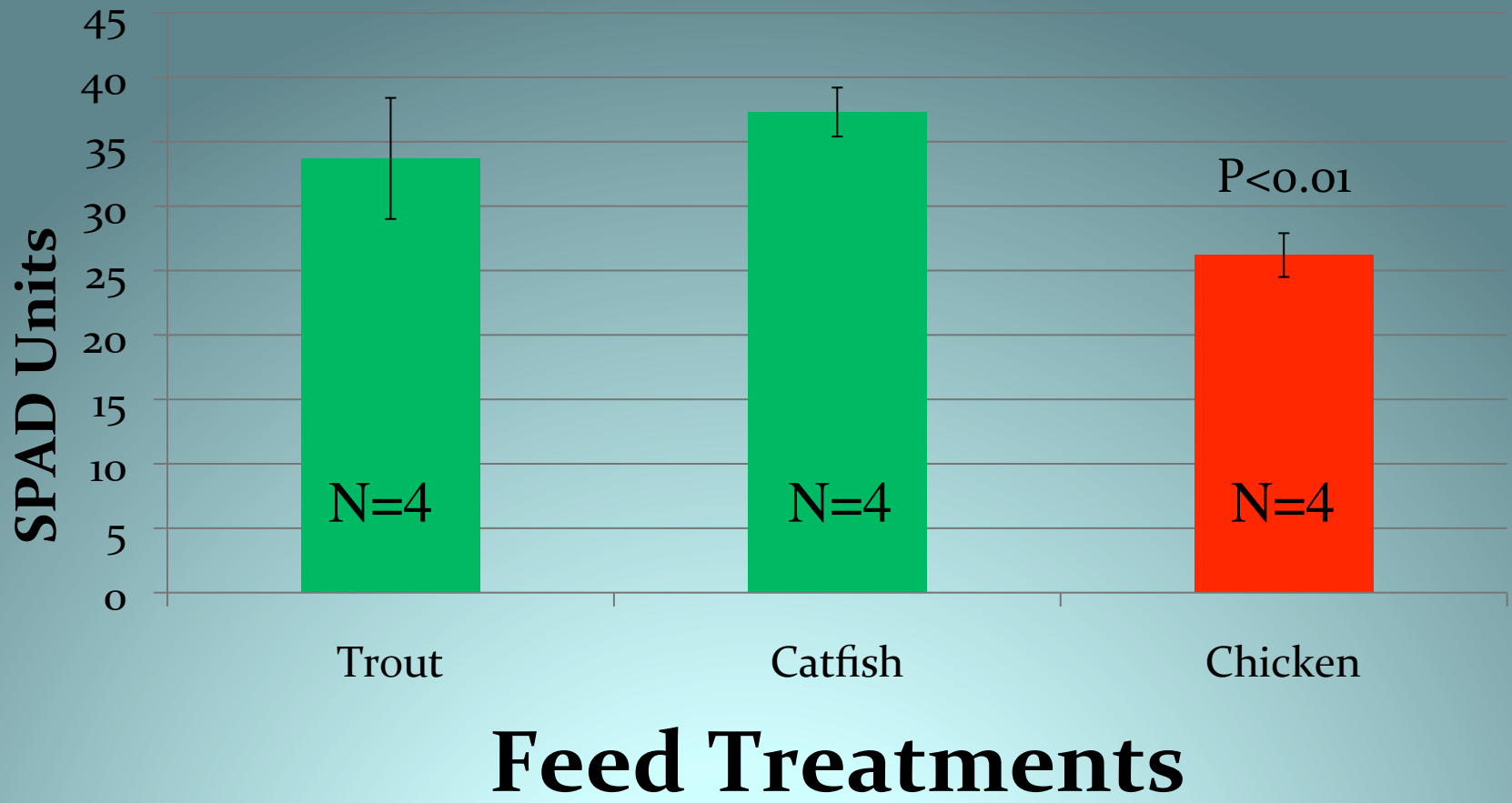
Average Leaf Weight

Culantro - *Eryngium foetidum*



Chlorophly Content

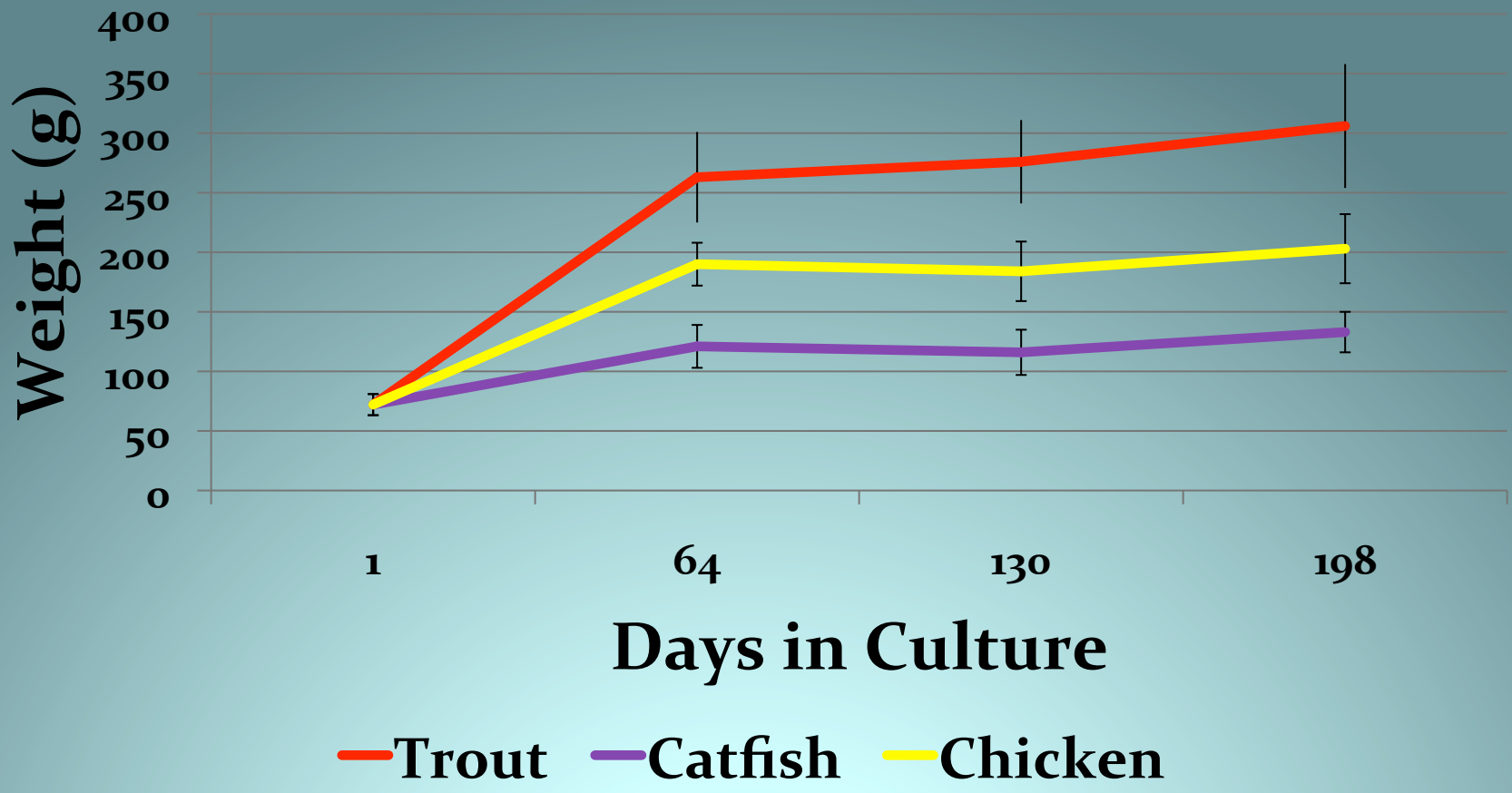
Culantro - *Eryngium foetidum*



Feed Costs

- Silver Cup Trout - $0.82/lb
- Chicken (egg layer) - $0.46/lb
- Rangen Catfish - $0.65

Pacu Growth (BW) versus Feeds



Summary

- Pacu fed trout feed grew significantly greater than other treatments. ($p<0.05$)
- Culantro in aquaponics systems fed trout feed grew best
- Trout feed cost/lb highest
- Chicken Feed produced poorest quality culantro
- Survival lowest with catfish feed
- Result of lower pH (from higher protein diet) did not affect fish survival or growth

Condition Factor