DENSITY-YIELD RELATIONSHIP FOR CHANNEL CATFISH REARED IN A BIOFLOC TECHNOLOGY PRODUCTION SYSTEM

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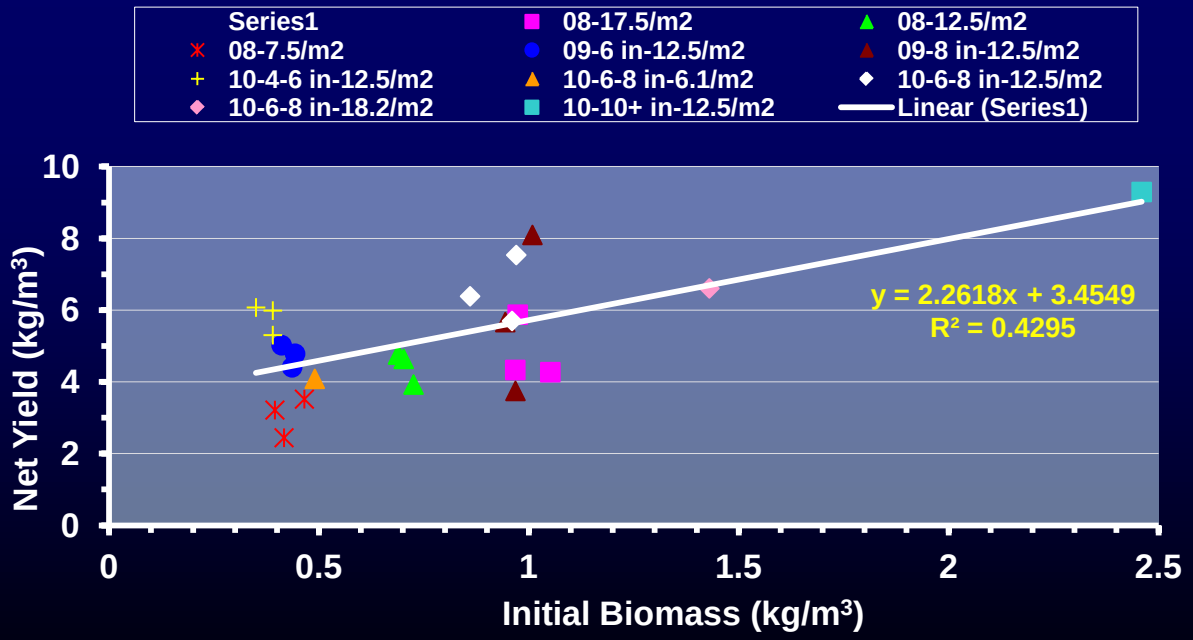
Channel Catfish in BFT System

- Generally used for tilapia or penaeid shrimp
- Previous work investigated production of market size channel catfish.
- Determine the initial fish biomass on production characteristics of stocker catfish, solids concentrations and water quality in a BFT production system.



Experimental Units

- 9 HDPE-lined (18.6 m^2, 15.5 m^3) tanks
- 1.865 kW (2 hp) regenerative blower per 3 tanks
- Well water seeded with plankton & fertilized
- Dried molasses added
- $NaHCO_3$ added as needed to control pH
- Maintained 100 mg/L Cl^-
- No water exchange, but evaporative losses replaced
- Solids (TSS and settleable) intentionally not managed

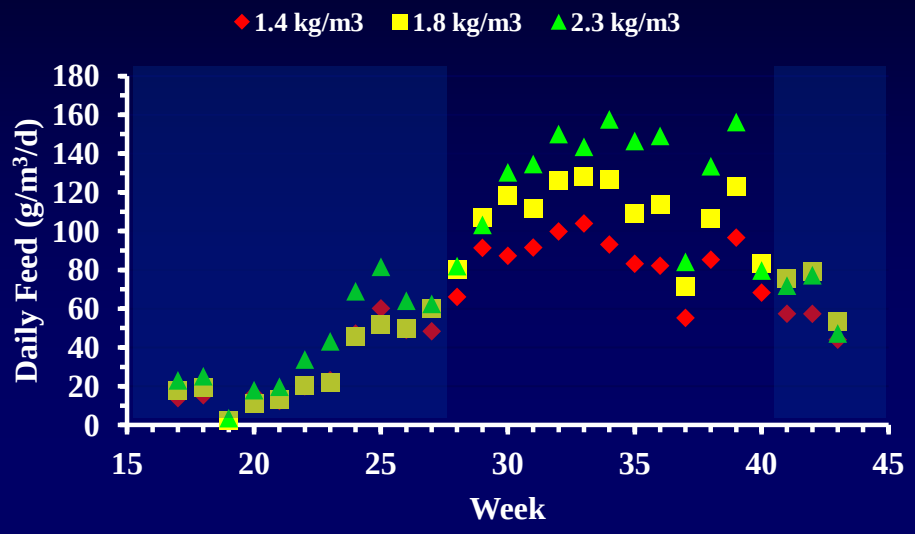
Stocking

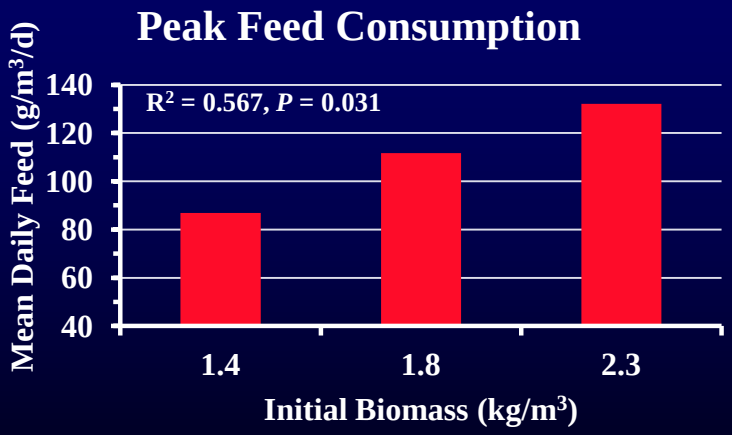
- Channel catfish stocked at initial biomass of 1.4, 1.8, or 2.3 kg/m^3 (26, 35, or 44 fish/m^2)
  - 48 g/fingerling
  - 183-d duration
- 32% protein floating feed
- Disease outbreak
  - *Ichthyophthirius multifiliis* (Ich)
  - 50% of population died in 1 tank
  - Tank excluded

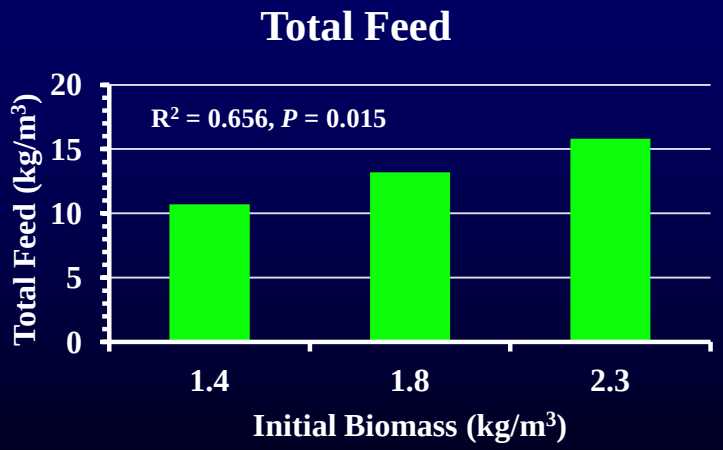
Water Quality Analyses

- TAN, NO_2-N, NO_3-N, SRP
  - Flow injection analysis
- Chlorophyll *a*
  - Chloroform-methanol extraction
- TSS, TVSS, Settleable Solids, Total Alkalinity, pH
  - Standard methods
- DO, Water T
  - Data logger

Feed Loading







Mean Nitrogen Concentrations

LS Means SE

Initial Biomass	NH_4-N (mg/L)		NO_2-N (mg/L)		NO_3-N (mg/L)	
1.4 kg/m^3	0.21	0.02 [a]	0.44	0.10 [a]	62.24	4.18 [a]
1.8 kg/m^3	0.23	0.02 [a]	0.47	0.12 [a]	79.37	5.12 [ab]
2.3 kg/m^3	0.22	0.02 [a]	0.58	0.10 [a]	86.33	4.18 [b]
P - Value	0.756		0.598		0.024	

ab means within column followed by same letter do not differ significantly, $P > 0.05$.

Water Quality

LS Means SE

Initial Biomass	PO_4-P (mg/L)	Total Alkalinity (mg/L $CaCO_3$)	Chlorophyll *a* (mg/m^3)	Settleable Solids (mL/L)	TSS (mg/L)	TVSS (mg/L)
1.4 kg/m^3	24.9 1.2 [a]	132.5 2.4 [a]	1,137.1 74.5 [a]	57.6 5.3 [a]	647.8 44.5 [a]	532.9 42.9 [a]
1.8 kg/m^3	27.8 1.4 [ab]	137.3 3.0 [a]	1,060.3 91.2 [a]	63.4 6.5 [a]	724.0 54.5 [a]	600.4 ± 52.6 [a]
2.3 kg/m^3	32.2 1.2 [b]	129.6 2.4 [a]	1,009.4 74.5 [a]	58.4 5.3 [a]	759.4 44.5 [a]	641.1 ± 42.9 [a]
P - Value	0.019	0.229	0.522	0.777	0.289	0.288

ab: means within column within study followed by same letter do not differ significantly, $P > 0.05$.

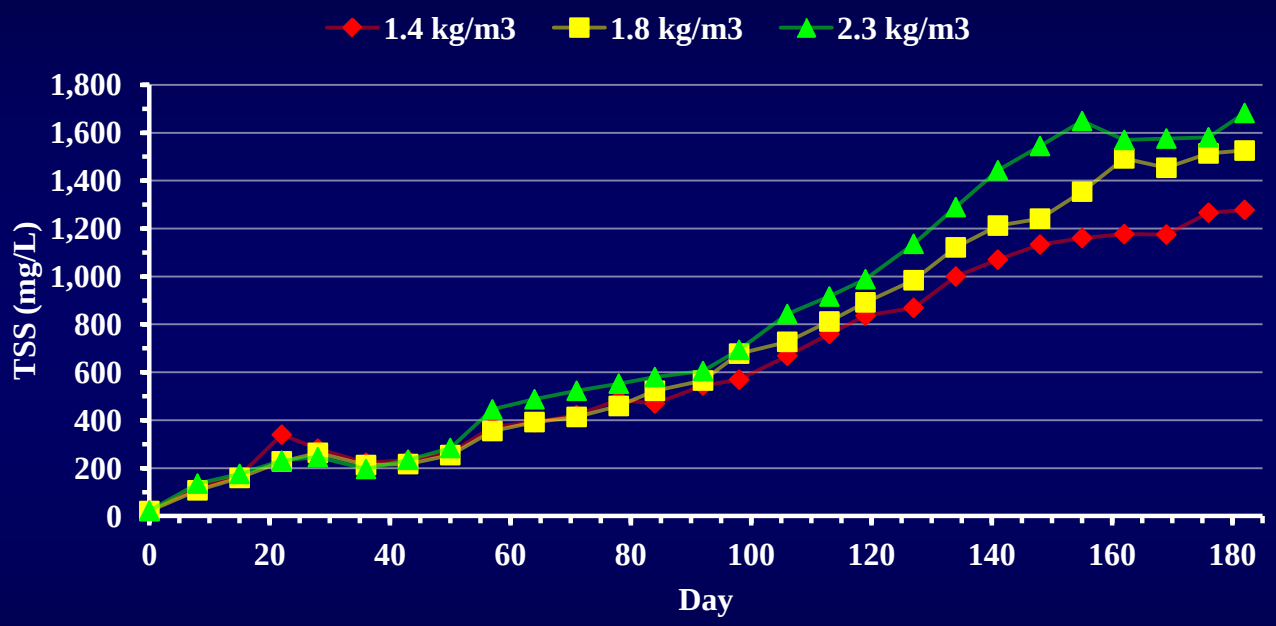
Production Data

LS Means SE

Initial Biomass	Yield			Average Weight	Survival	
	Gross (kg/m^3)	Net (kg/m^3)	Net Daily (g/m^3/d)	(g/fish)	(%)	FCR
1.4 kg/m^3	4.9 ^{b}	3.5 ^{a}	19.1 ^{a}	172.6 ^{a}	96.8 ^{a}	3.1 ^{a}
1.8 kg/m^3	5.9 ^{ab}	4.1 ^{a}	22.3 ^{a}	150.8 ^{a}	96.3 ^{a}	3.2 ^{a}
2.3 kg/m^3	7.1 ^{a}	4.8 ^{a}	26.0 ^{a}	145.5 ^{a}	97.8 ^{a}	3.4 ^{a}
P - Value	0.010	0.082	0.082	0.149	0.939	0.862

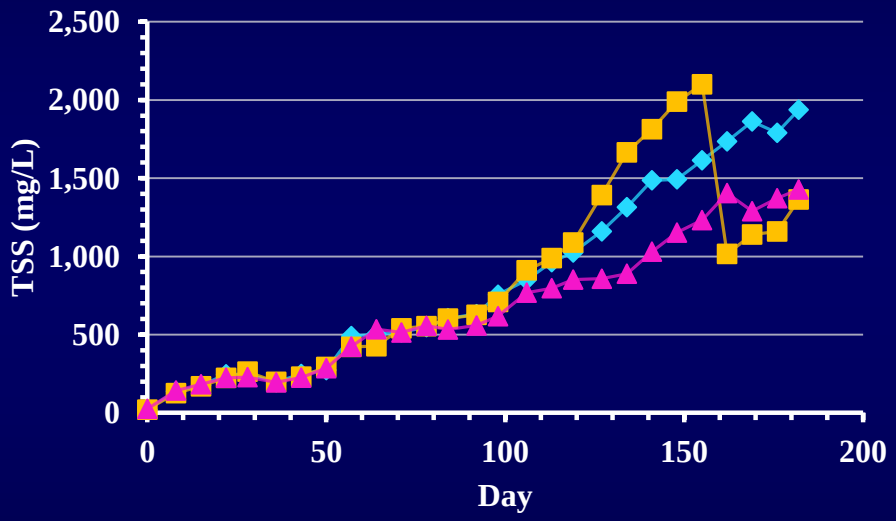
ab: means within column within study followed by same letter do not differ significantly, $P > 0.05$.

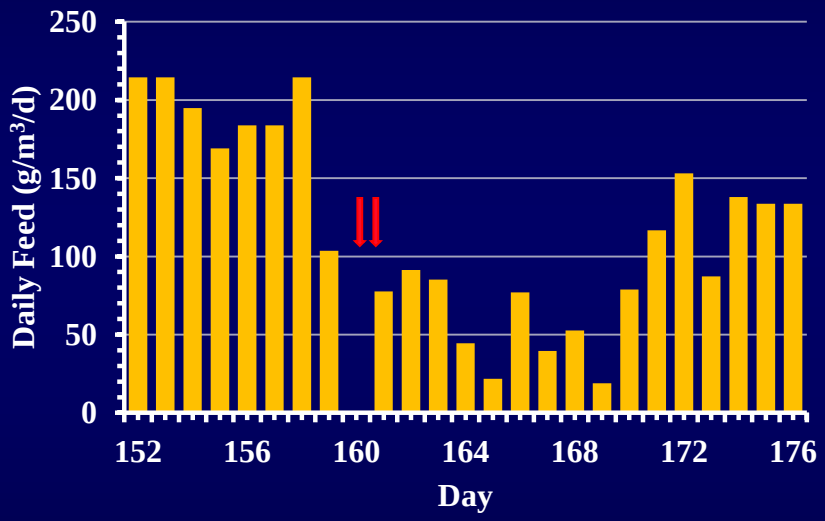
Mean TSS


1.4 kg/m3
1.8 kg/m3
2.3 kg/m3
TSS (mg/L)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
0
20
40
60
80
100
120
140
160
180
Day

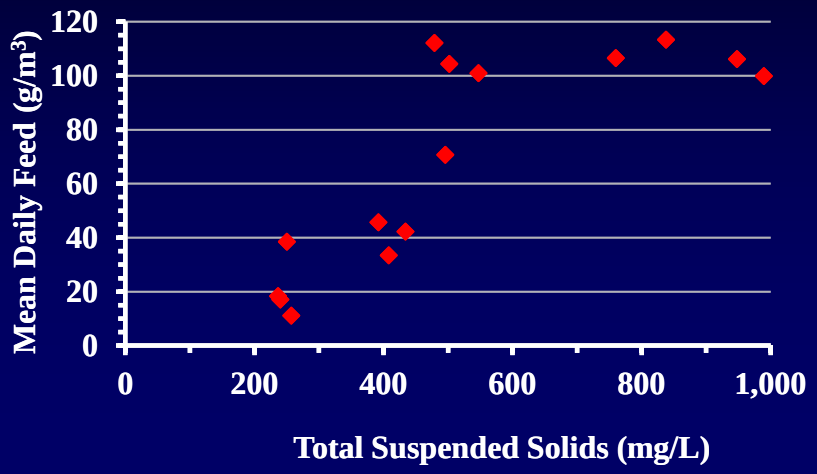
TSS

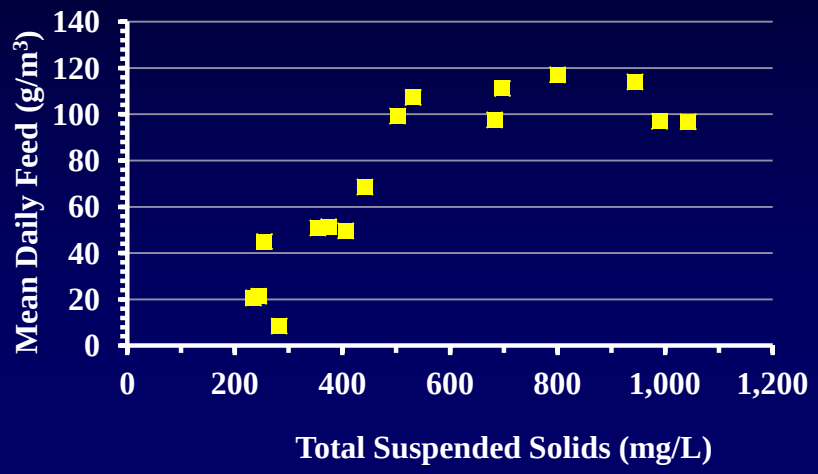
2.3 kg/m^3 Initial Biomass Treatment

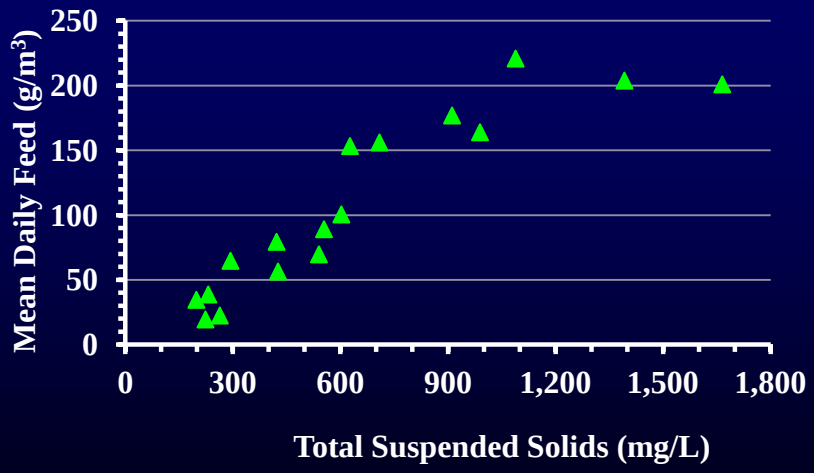




TSS - Feed

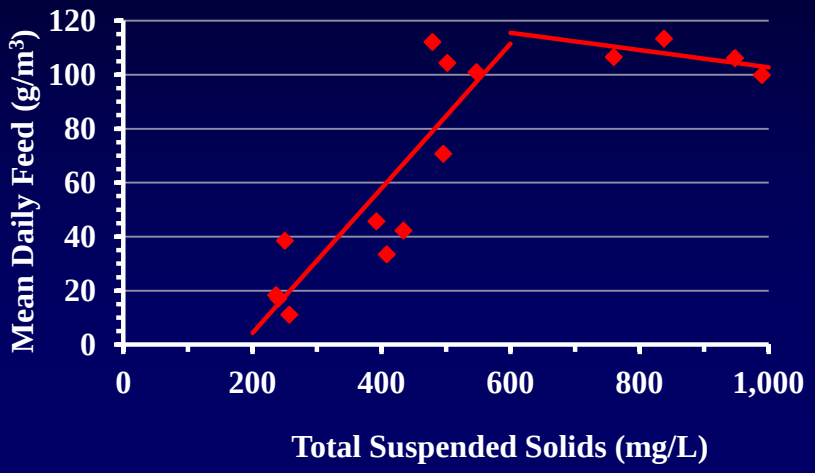


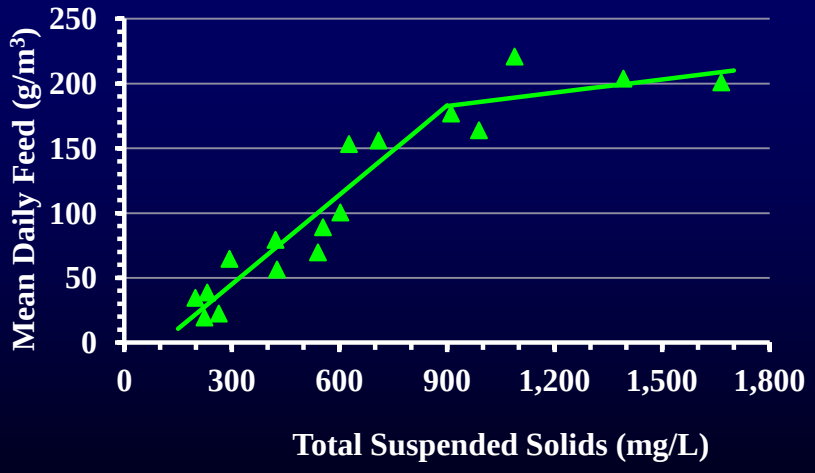




1.4 kg/m^3 Initial Biomass
1.8 kg/m^3 Initial Biomass
2.3 kg/m^3 Initial Biomass

TSS - Feed





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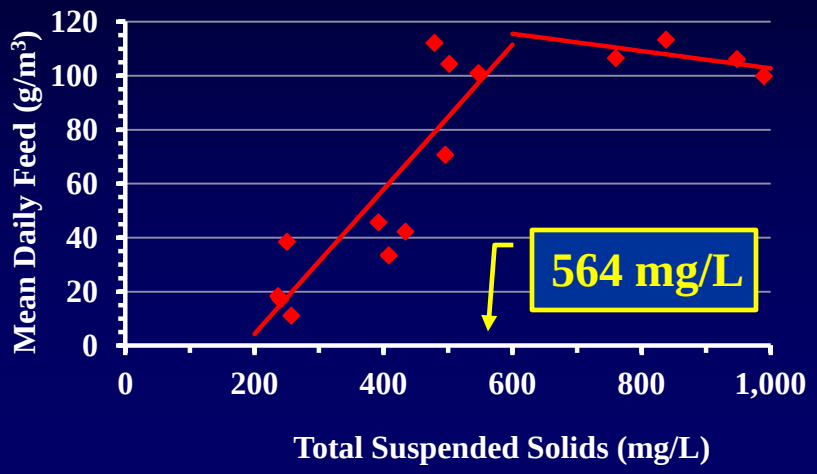

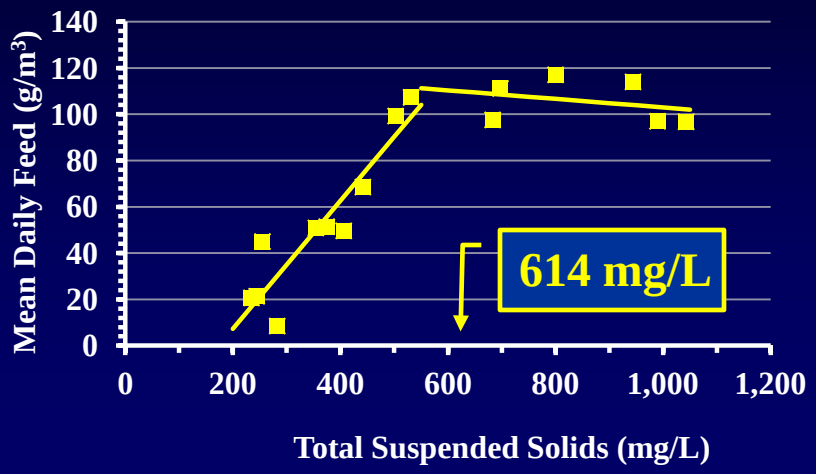

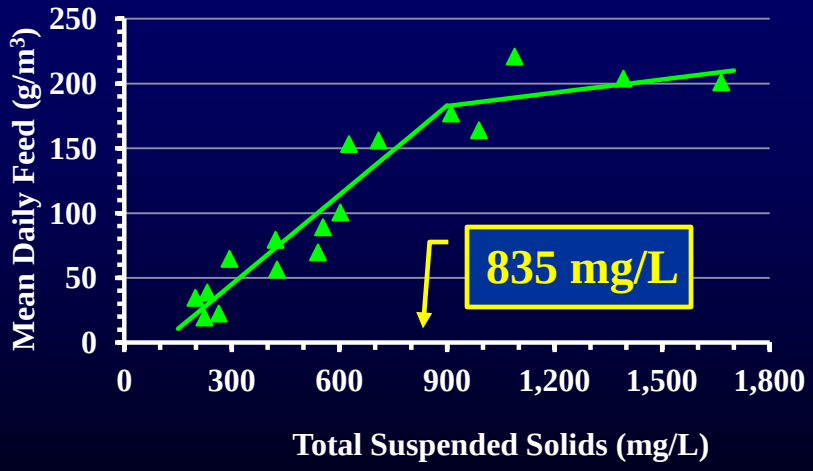

1.4 kg/m³ Initial Biomass
1.8 kg/m³ Initial Biomass
2.3 kg/m³ Initial Biomass

Summary

- Stocker size channel catfish produced at all stocking rates
- Net yield, final size, and FCR independent of stocking rates tested
- TSS ca. 2,000 mg/L appeared to cause respiratory distress
- Daily feed consumption affected by TSS
  - Breakpoint regression showed feed consumption did not increase once TSS > 550-835 mg/L
- Recommend TSS < 500 mg/L

Acknowledgement

- **Thanks to Greg O'Neal and SNARC co-workers for their assistance.**
- **Mention of trade names or commercial products is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the U. S. Department of Agriculture. USDA is an equal opportunity provider and employer.**