Amending Freshwater for Production of *Litopenaeus vannamei* in Earthen Ponds

Bartholomew Green

USDA-ARS Aquaculture Systems Research Unit

Pine Bluff, AR

Channel Catfish Prices

Introduction

- Inland, low-salinity culture of Pacific white shrimp in US.
  - Low salinity: < 10 ppt salinity
  - Freshwater: < 1 ppt salinity
- Potential ionic deficiencies.
  - Brine solutions
  - Mineral salts
- May – September growing season in US.

Objectives

- **To determine if Pacific white shrimp (*L. vannamei*) can be grown successfully in freshwater amended with key ions.**
- **To determine if two crops per season were possible by stocking PL_{25} shrimp.**

Materials and Methods - 1

- Six 0.1-ha earthen ponds.
- Filled from freshwater well.
- Ponds fertilized and salted:
  - 3,100 kg/ha K-Mag (0-0-22, 11% Mg, 22% S)
  - 5,600 kg/ha stock salt
  - 225 kg/ha cottonseed meal
  - 30 kg/ha 19-19-19
- 0.8 ppt final salinity

Materials and Methods – 2

- PL_{15} shrimp stocked at 39/m^2 for 125 d.
- PL_{25} shrimp stocked at:
  - 23/m^2 for 55 d (30 May – 24 Jul);
  - 28/m^2 for 63 d (1Aug – 3 Oct).
- 35% protein sinking, extruded feed.
- Weekly samples.

Water Composition (mg/L)

Ion	Seawater 0.8 ppt	Pre-fertilization	Post-fertilization
Cl^-	442	34	239
Na^+	246	57	161
SO_4^{2-}	62	37	136
Mg^{2+}	29	18	33
Ca^{2+}	9	27	39
K^+	9	4	28
$Ca^{2+}:Mg^{2+}$	1 : 3.2	1.5 : 1	1.2 : 1
$K^+:Na^+$	1 : 27.3	1 : 14.3	1 : 5.7

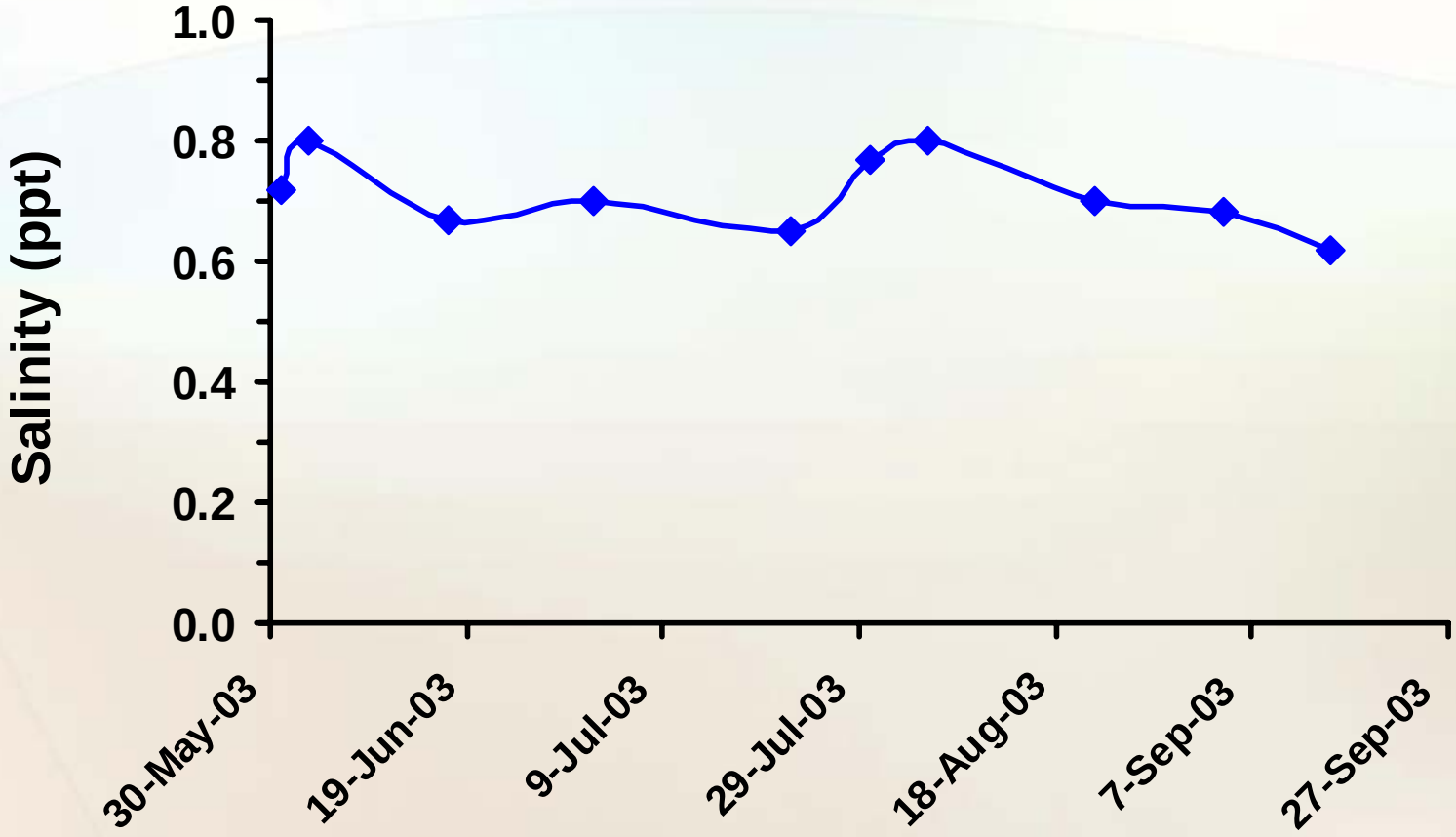
Ionic Concentrations (mg/L)

Ion	Day 0	Day 1	Day 125
Cl^-	34	239	183
Na^+	57	161	197
SO_4^{2-}	37	136	72
Mg^{2+}	18	33	46
Ca^{2+}	27	39	55
K^+	4	28	29
$Ca^{2+}:Mg^{2+}$	1.5 : 1	1.2 : 1	1.2 : 1
$K^+:Na^+$	1 : 14.3	1 : 5.7	1 : 6.8

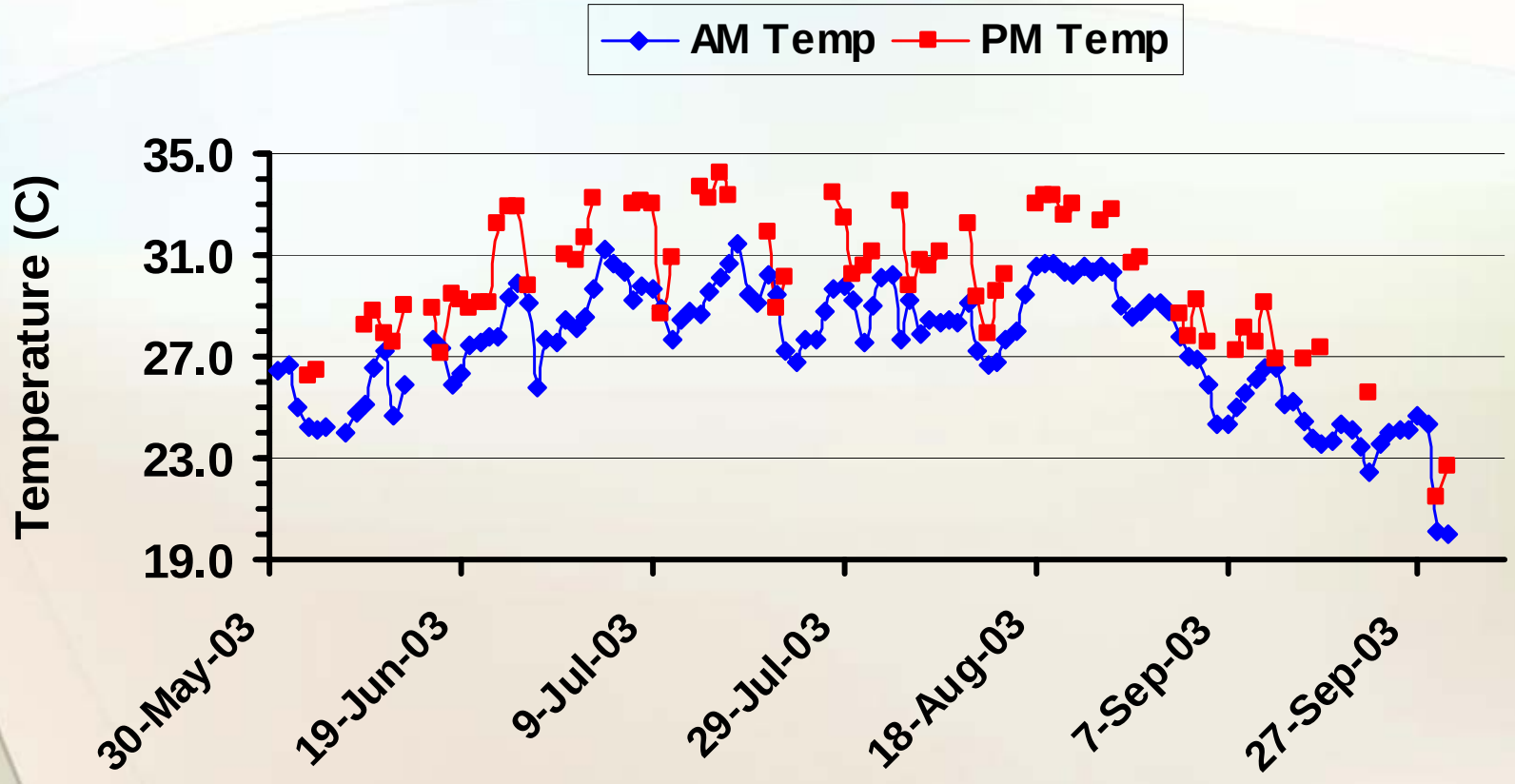
Ionic Proportions

Ion	Seawater 0.8 ppt (mg/L)	Day 1	Day 125
Cl^-	442	0.5	0.5
Na^+	246	0.7	0.9
SO_4^{2-}	62	2.2	1.3
Mg^{2+}	29	1.1	1.8
Ca^{2+}	9	4.3	6.9
K^+	9	3.1	3.6

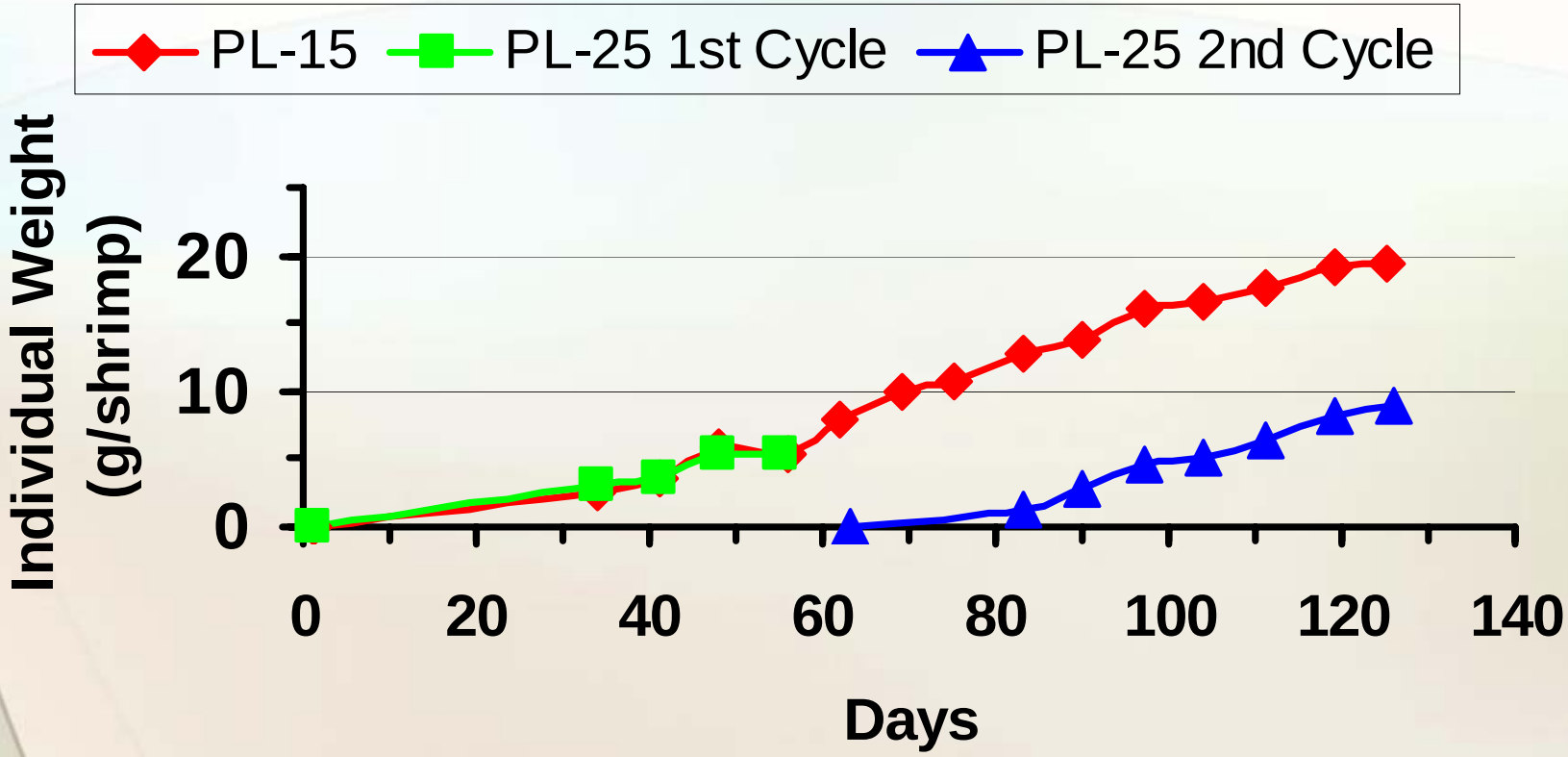
Pond Salinity



Water Temperature



Shrimp Growth



Production

Treatment	Growth (g/week)	Mean Weight (g/shrimp)
PL_{15}	1.3	19.3
PL_{25} – 1st Cycle	1.1	5.5
PL_{25} – 2nd Cycle	1.3	9.0

Production

Treatment	Survival (%)	Gross Yield (kg/ha)	FCR
PL_{15}	47	3,449	3.0
PL_{25} - 1st Cycle	75	976	1.9
PL_{25} - 2nd Cycle	98	2,463	1.2

Summary

- *L. vannamei* can be cultured successfully in amended freshwater.
- Excess SO_4^{2-}, Mg^{2+}, Ca^{2+}, K^+ and deficient Cl^- and Na^+ do not appear to have impact.
- Stocking PL_{25} does not appear commercially feasible.

Acknowledgements

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