USE OF EARTHERN LINED PONDS IN SHRIMP CULTURE WITH BFT SYSTEM IN SOUTHERN BRAZIL

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BRAZIL

Fifth largest country in area,

8.5 million square km,

200 million people,

8,000 kilometers of coastline

Brazil is an important producer of shrimps in South America; in 2012 the production was 80,000 tons in 20,000 ha.

The production system is based in semi-intensive farms with ponds larger than 1.0 ha and stocking density from 10 to 25 shrimp/m².

Major producing region is located in latitudes between 0 and 15 °S.

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between 0 and 15 °S.

Brazil is known as tropical country, with wonderful beaches,

but…

BUT,
Rio Grande, Brazil…

32°12'15" S, 51°10'41" W


Brazil
International boundary
State boundary
National capital
State capital
Railroad
Road
0 200 400 Kilometers
0 200 400 Miles
Azimuthal Equal-Area Projection
Boundary representation is not necessarily authoritative.
The islands of Trindade, Martin Vaz, Arquipelago de Fernando de Noronha, Atol das Rocas, and Penedos de São Pedro e São Paulo are not shown.
Trindade and Martin Vaz are administered by Espírito Santo; Arquipelago de Fernando de Noronha by Pernambuco.
NORTH ATLANTIC OCEAN
SOUTH ATLANTIC OCEAN
SOUTH PACIFIC OCEAN
VENEZUELA
COLOMBIA
GUYANA
SURINAME
French Guiana (FRANCE)
TRINIDAD AND TOBAGO
PERU
BOLIVIA
PARAGUAY
CHILE
ARGENTINA
URUGUAY
AMAZONAS
RORAIMA
AMAPÁ
PARÁ
ACRE
RONDONIA
MATO GROSSO
MATO GROSSO DO SUL
GOIÁS
TOCANTINS
MARANHÃO
PIAUÍ
CEARÁ
RIO GRANDE DO NORTE
PARAÍBA
PERNAMBUCO
ALAGOAS
SERGIPE
BAHIA
MINAS GERAIS
ESPÍRITO SANTO
RIO DE JANEIRO
SÃO PAULO
PARANA
SANTA CATARINA
RIO GRANDE DO SUL
DISTRITO FEDERAL
Caracas
Port-of-Spain
Georgetown
Paramaribo
Cayenne
Bogotá
Manaus
Belém
Santarém
Altamira
Macapá
São Luís
Parnaíba
Fortaleza
Natal
João Pessoa
Recife
Maceió
Aracaju
Salvador
Ilhéus
Vitória da Conquista
Teresina
Picos
Barreiras
Palmas
Araguaína
Marabá
Carajás
Cachimbo
Humaitá
Porto Velho
Boca do Acre
Cruzeiro do Sul
Iquitos
Leticia
Benjamin Constant
Careiro
Tefé
Tabatinga
Guajará-Mirim
Rio Branco
Assis Brasil
Iñapari
Guayaramerín
Cobija
Quillabamba
Cusco
Arequipa
La Paz
Cochabamba
Santa Cruz
Oruro
Sucre
Potosí
Puerto Suárez
Corumbá
Cáceres
Cuiabá
Rondonópolis
Goiânia
Brasília
Campo Grande
Santa Fé do Sul
Uberlândia
Belo Horizonte
Vitória
Rio de Janeiro
São Paulo
Santos
Curitiba
São Francisco do Sul
Florianópolis
Porto Alegre
Rio Grande
Pelotas
Panorama
Pedro Juán Caballero
Ponta Porã
Ciudad del Este
Foz do Iguaçu
Asunción
Salta
San Miguel de Tucumán
Resistencia
Córdoba
Santa Fe
Rosario
Mendoza
Valparaíso
Santiago
Buenos Aires
La Plata
Colonia
Montevideo
Concepción
Mar del Plata
Bahía Blanca
Iquique
Antofagasta
Tacna
Arica
Matarani
Ilo
Puerto Carreño
Cúcuta
San Cristóbal
Bucaramanga
Barquisimeto
Maracaibo
Valencia
Barcelona
Maturín
Ciudad Bolívar
Santa Elena de Uairén
Boa Vista
Oiapoque
Macapá
Rio Negro
Amazon
Rio Madeira
Rio Purus
Rio Juruena
Rio Tapajós
Rio Xingu
Rio Tocantins
Rio Araguaia
Rio São Francisco
Rio Paraguay
Rio Paraná
Rio Grande
Lago Titicaca
Rio Beni
Rio Mamoré
Rio Orinoco
Equator
PARAGUAY
ARGENTINA
URUGUAY
Asunción
Pedro Juán Caballero
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Rosario
Mendoza
Buenos Aires
La Plata
Colonia
Montevideo
Rio Grande
Pelotas
Santa Maria
Porto Alegre
Paraná
Rio Grande
32° S

Fonte: GK Fóes

Fonte: IBAMA

Fonte: Dr. Afsharnasab

Fonte: D Krummenauer


Laguna
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Recently, Brazilian producers have turned to intensive systems, however, there are few studies an facilities using intensive growout in lined ponds.

Torres, south of Brazil

Uruguaiana, south of Brazil , 700 km far from the coast.

São José do Norte City, south of Brazil.

Studies initiated in

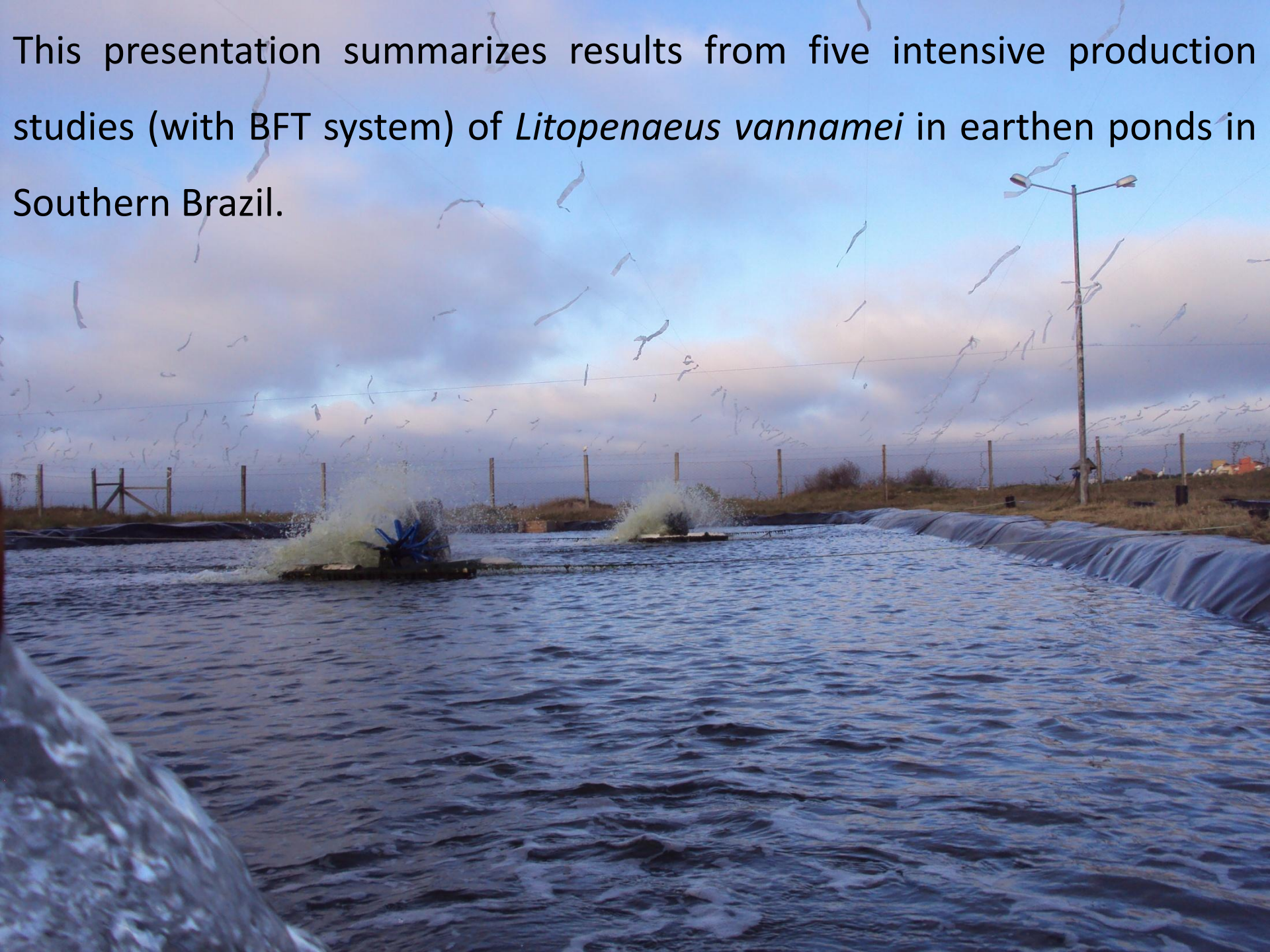
Universidade Federal do Rio Grande - FURG
Instituto de Oceanografia
Estação Marinha de Aquacultura "Prof. Marcos A. Marchiori"
Cassino Beach, Rio Grande City

Fonte: Paulo Iribarrem

The Federal University of Rio Grande has vast experience in research with native species of penaeid shrimps (*Farfantepenaeus paulensis* and *F. brasiliensis*).

Has also experience in BFT system in raceways and ponds.

This presentation summarizes results from five intensive production studies (with BFT system) of *Litopenaeus vannamei* in earthen ponds in Southern Brazil.



Usually,

Use of nurseries and transfer to growout ponds.

Several studies were performed:

(1) Compare the application strategies of molasses and water exchange to reduce concentrations of nitrogen compounds in the ponds, the stocking density used was 85 shrimps m^{-2} and the trial lasted 117 days;

(2) Feasibility of using partial harvests at density of 75 shrimp m^{-2}. The study lasted 117 days;

(3) Analyze two stocking densities (120 and 180 shrimp m^{-2}) reared in BFT system in 105 days;

(4) Shrimp performance of culture of *L. vannamei* (± 1.0 g) at two management strategies: in two consecutive short crops (70 days) or in one longer crop (150 days). The density employed was 50 shrimp m^{-2};

(5) Use of different aeration types and positioning. The density was 100 shrimp m^{-2} and the study latest 110 days.

Raceway

Mixed system

Control

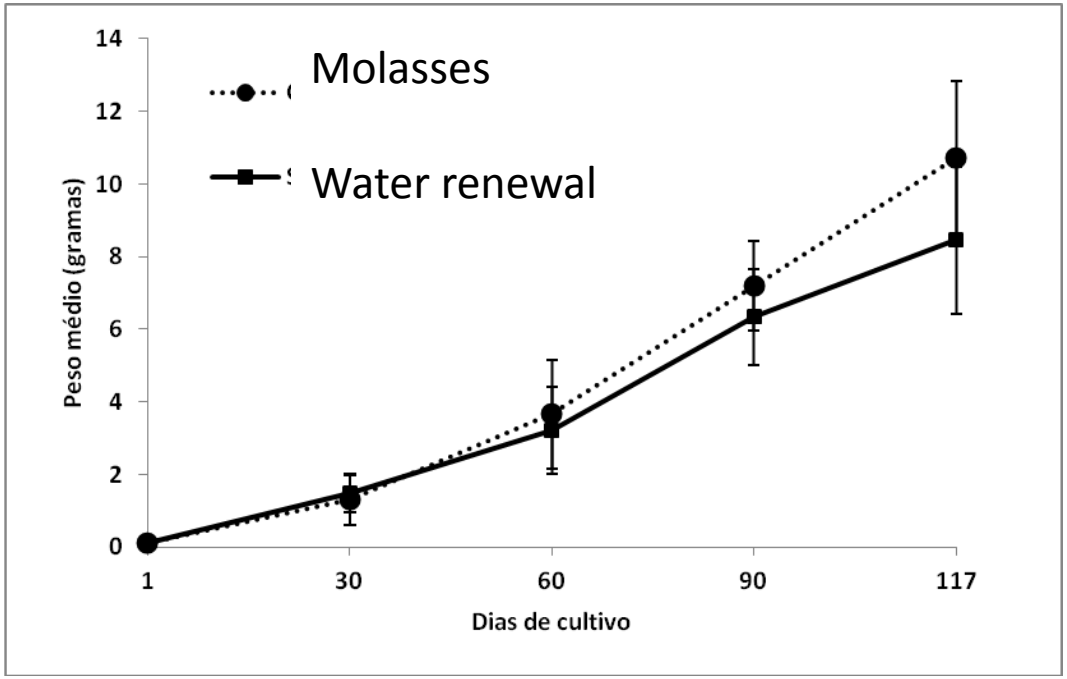
All experiments are chapters of masters and doctoral theses.

In all experiments, three ponds were used for each treatment.

The results of the first experiment demonstrated differences between treatments. The final weight was 10.7 g for the treatment molasses and 8.4 g on treatment with water renewal. (Average survival 95 %) and productivity was higher in the treatment molasses (8,772 kg ha-^{1})

Table 1. Zootechnical performance of *L. vannamei* in ponds with molasses fertilization or limited water exchange

Treatment	Final weight (g)	Survival (%)	F.C.R.	Productivity (kg ha^{-1})
Molasses	10.71 ± 2.1[a]	96.2 ±4,3	1.01 ± 0,1	8,772 ± 26
Water echange	8.46± 2.0[b]	94.2 ± 3,0	1.22 ± 0,1	6,759 ± 41



The results of the second experiment not demonstrated differences between treatments. The final weights ranged between 14.3 and 14.5g. (Survival 90 %) and maximal productivity was 9,241 kg ha-^{1}.

Table 2. Zootechnical performance of *Litopenaeus vannamei* in experiment about partial harvest in earthen ponds with BFT systems.

Treatment	Final weight (g)	Survival (%)	F.C.R.	Productivity (kg ha^{-1})
1 Harvest	14.29 ± 2.44	86.3 ± 2.4	1.21: 1	9,241
3 Harvests	14.35 ± 2.14	88.9 ± 9.1	1.13: 1	8,713
6 Harvests	14.55 ± 2.20	95.3 ± 3.5	1.05: 1	8,595

In the third experiment the average weights were 10.1g in both treatments (survival 98 % and 80 % respectively) and the productivity was 14,550 kg ha- in the treatment that we use 180 shrimp/m^{-2}).

Table 3. Zootechnical performance in comparation between densitys of *L. vannamei* in ponds with BFT system.

Treatment	Final weight (g)	Survival (%)	F.C.R.	Productivity (kg ha^{-1})
120 m^{-2}	10.10 ± 0.36	98.3 ± 2.8	1.11 ± 0.18	12,665
180 m^{-2}	10.14 ± 1.40	79.7 ± 0.21	1.45 ± 0.38	14,554

In the fourth experiment, the final weight in longer crop was 23.3 g and productivity of 8,300 kg/ha (survival 61 %), while the two crops was 11.26 g and productivity of 9,600 kg/ha (survival 75 %).

Table 4. Desempenho zootécnico de juvenis de *L. vannamei*, em viveiros utilizando uma safra longa (140 dias) ou duas safras menores (70 dias cada).

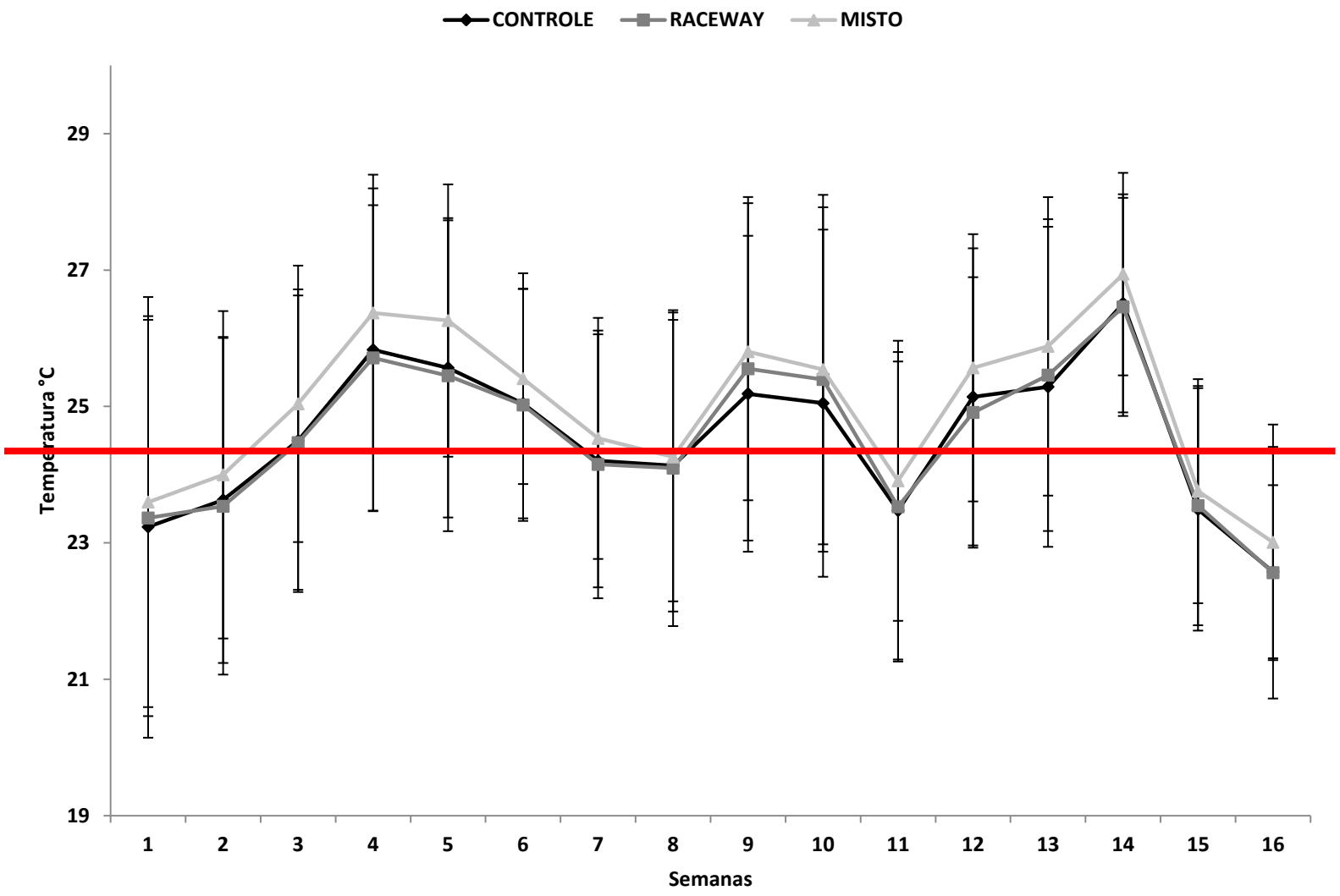
Tratamentos	Peso fin. (g)	Sobrev. (%)	C.A.A.	Cresc. Sem.(g)	Prod.(kg ha^{-1})
01 Ciclo	10,34 ± 1,65	66,3 ± 3,5	1,39 ± 0,18	1,13	3700 ± 1000
02 Ciclo	12,19 ± 0,94	95,5 ± 5,2	0,98 ± 0,04	1,25	5900 ± 0300
Safra longa	23,39 ± 2,09	74,0 ± 7,7	1,42 ± 0,01	1,25	8300 ± 0033

1 safra: melhor preço e mercado diferenciado (safra da Lagoa dos Patos)

2 safras: safra precoce (pagamento de custeio)
maior produtividade

In the fifth experiment, the raceway treatment results the highest final weight (15.14 g), however the survival and productivity were similar among treatments (85 % and 12,500 kg/ha).

Treatment	Initial weight (g)	Final weight (g)	F.C.R.	Weekly growth (g)	Productivity (kg $ha^{-1)}$	Survival (%)
Paddle Wheell	1.15	14.25±2.83	1.51±0.11	0.82±0.31	12,473±832	88 ± 8
Raceway	1.15	15.14±2.75	1.52±0.05	0.87±0.30	12,425±377	82 ± 4
Mixed	1.15	14.23±2.54	1.49±0.11	0.82±0.30	12,713±994	90 ±10


CONTROLE
RACEWAY
MISTO
Temperatura °C
29
27
25
23
21
19
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Semanas

The results demonstrate the viability of using lined ponds for intensive growout of *L. vannamei* in subtropical latitudes. We also demonstrate the feasibility of using microbial flocs system in lined ponds.

Acknowledgments