USING A NON-VENTURI AIR INJECTION SYSTEM TO RAISE *Litopenaeus vannamei* IN A HIGH DENSITY BIO-FLOC SYSTEM

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ABSTRACT:
The aquaculture industry battles countless issues to produce high quality animals. One of the most important issues in the shrimp industry is dissolved oxygen levels. Stocking at high densities creates stress on the system. To ensure high dissolved oxygen levels, Advanced Industrial Aeration (AIA) and Shrimp improvement Systems (SIS) worked together to raise *Litopenaeus vannamei* using non-venturi air injection technology, called Taeration®. AIA's Taeration® transfers oxygen at a high rate and does so using up to 70% less energy than more common methods. This aeration technology is capable of high air/water ratios (up to 10 to 1) without the use of blowers or compressors while maintaining a fine micro bubble. This system increases the air/water ratio by splaying the motive flow three times the original diameter. This enables the entrainment of ambient air throughout the motive flow. The entrainment is gorged with oxygen transferring at a rate ~~of 200% saturation~~ without regard for temperature or depth. These high rates of oxygen allow for simultaneous aeration and degassing of carbon dioxide while creating a circular current without using any additional equipment. SIS observed *Litopenaeus vannamei* at a density not exceeding 1.7 kg/m^2 in a bio-floc system in a large, outdoor concrete pond employing AIA's Taeration® technology. Water temperature ranged from 23.8°C to 29.9°C over a 6 month period. Dissolved oxygen levels were recorded no lower than 6.2 mg/L and no higher than 8.1mg/L (Table 1). Growth rates averaged 2.15g/week with a survival rate of over 90%.

Comment [BA1]: Re-word – This needs to express that in a clean water test the system reaches maximum saturation after re-circulation only half the containment and not infer that 200% saturation can be reached using ambient air.

Table 1: Parameters observed using the AIA system to raise *L. vannamei*.

Dates	DO(mg/L)	Temp (°C)	Ave. Wt (g)	Growth/wk (g)	Population	Density (kg/m2)
7/19-7/28	6.9	29.8	10.41	2.03	15000	0.5
7/29-8/7	7.1	29.9	14.36	2.34	15000	0.7
8/8-8/17	6.6	29.5	16.72	2.29	15000	0.7
8/18-8/27	7.1	29.3	21.82	2.38	15000	1
8/28-9/6	6.6	29.6	27.2	2.42	15000	1.2
9/7-9/16	6.2	28.5	29	2.14	15000	1.3
9/17-9/26	6.7	28.4	30.42	2.07	15000	1.3
9/27-10/6	6.7	27.8	31.42	2.02	15000	1.4
10/7-10/16	7.2	28.7		2.02	15000	1.6
10/17-10/26	6.3	26.5	37.59	2.02	15000	1.7
10/27-11/5	7.2	23.8	40.48	1.91	15000	1.7
11/6-11/15	8.1	25.4	41.62	1.88	9000	1.2