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Title: Effects of biomass of caged Nile tilapia (*Oreochromis niloticus*) and aeration on the growth and yields in an integrated cage-cum-pond system

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Abstract: An experiment was conducted to determine the appropriate biomass of caged Nile tilapia (*Oreochromis niloticus*) supporting maximum production of small tilapia in open water and maintaining acceptable water quality, and to investigate effects of aeration on the growth of both caged and open-pond tilapia and water quality in an integrated cage-cum-pond system. One, two, three or four cages were suspended in unaerated ponds as experimental treatments with three replicates each. An additional treatment with four cages in aerated ponds was also tested. Large tilapia (91 ± 2.6–103 ± 2.8 g) were stocked in 4-m^3 net cages at 50 fish/m^3, while tilapia fingerlings (13 ± 0.2–16 ± 0.8 g) were stocked at 2 fish/m^3 in open water of all ponds. Caged tilapia were fed with floating pelleted feed twice daily at 3%, 2.5%, and 2% body weight/day during the first, second and third month, respectively. Important water quality parameters, such as dissolved oxygen, unionized ammonia nitrogen and chlorophyll *a*, were analyzed biweekly. The biomass of caged tilapia had significant ($P < 0.05$) effects on the growth of both caged and open-pond tilapia. Survival of caged tilapia decreased with increasing biomass of caged tilapia per pond, while survival of open-pond tilapia in the treatment with one cage was significantly ($P < 0.05$) lower than that in treatments with more cages. Final mean weight of caged tilapia decreased significantly ($P < 0.05$) from 478 ± 20.0 g in the treatment with one cage to 261 ± 10.0 g in the treatment with four cages. However, the growth of open-pond tilapia (0.74 ± 0.02–1.57 ± 0.10 g/fish/day) increased significantly ($P < 0.05$) with the increased biomass of caged tilapia per pond, in response to the increased feed inputs to cages. Total extrapolated net yield, including both caged and open-pond tilapia, was highest (6.20 ± 0.36 t/ha/crop) in the treatment with four cages; however, the treatments with one or two cages gave significantly ($P < 0.05$) better

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overall feed conversion ratio (0.82± 0.02 –0.98 ± 0.02). Nighttime aeration for 5 h enhanced the growth of tilapia in the treatment with 4 cages/pond, and increased the carrying capacity in the integrated cage-cum-pond system. Net yield of caged tilapia in aerated ponds averaged 6.92 ± 0.60 t/ha/crop, which was significantly ($P < 0.05$) higher than that (3.65 ± 0.22 t/ha/crop) in unaerated ponds with four cages each. However, the growth of open-pond tilapia in aerated ponds was significantly ($P < 0.05$) lower than that in unaerated ponds. Further study should focus on determining the appropriate stocking density of open-pond tilapia to optimize the harvested tilapia size both from cages and open ponds in order to develop an integrated cage-cum-pond system for tilapia rotation culture.

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