The Effect of CAFO Proximity on Water Quality of Inland Recreational Lakes in Southwest Michigan

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Based on USDA's 2017 Census of Agriculture data, 99% of farmed animals in the US are raised in Animal Feeding Operations (AFOs) or Concentrated Animal Feeding Operations (CAFOs). These AFOs and CAFOs produce a significant amount of gaseous, liquid, and solid waste, which poses a waste management challenge and has the potential to harm nearby recreational waters especially when handled poorly. This project aimed to determine the effect of CAFO proximity on recreational water bodies. Water quality indexes were repeatedly performed at a number of lakes (30) in Southwest Michigan, an area densely populated with CAFOs. Sampling sites ranged from a proximity of 0.4 miles to the nearest CAFO to sampling sites without CAFOs in a 10 mile radius. Lakes closest to CAFOs possessed the highest, and in some cases unsafe (per the EPA), E. coli concentrations, while lakes furthest from CAFOs consistently had only trace E. coli concentrations. An alarming 46% of the variability of E. coli concentrations could be attributed to a combination of CAFO proximity metrics and lake size. Microbial source tracking (via qPCR) confirmed the presence of bovine and pig specific bacteroides. There was little evidence to suggest CAFO proximity had bearings on water quality parameters apart from E. coli. Ultimately, there is a need for thorough water monitoring in environments where there are CAFOs within 3-4 miles of recreational waters, specifically testing for harmful E. coli toxin genes and harmful antibiotics or chemicals used in CAFO operations. Local communities may be overlooking the effects of CAFO operations.

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