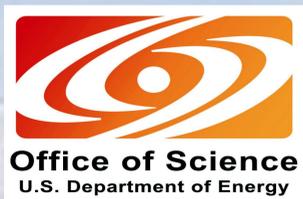


# Developing a Method for Reducing Pathogen Influx into a Watershed

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## ABSTRACT

Application of animal manure as a fertilizer on farms is a widely used technique. However, application of this fertilizer is a major source for pathogens to be introduced into farms, watersheds, and rivers. This research is intended to reduce pathogens in manure applied to the farmland.

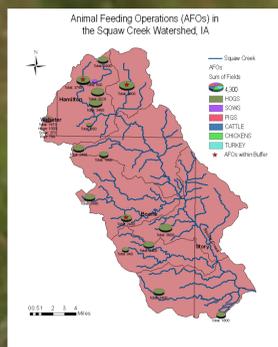


## PURPOSE

Our research is developing aerobic and anaerobic digesters that can be used to reduce the pathogens introduced on farms using animal manure as fertilizer. Using these digesters, farmers would be able to reduce the pathogens which have been reason for disease outbreak. Our results can help in developing manure application guidelines.

## Target watershed

This research is focused on remedying Squaw Creek Watershed. As shown in figure below, this watershed has several livestock feeding operations. The developed method can be used to treat the manure generated from these operations.



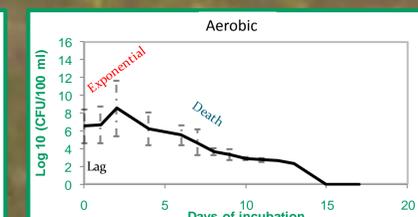
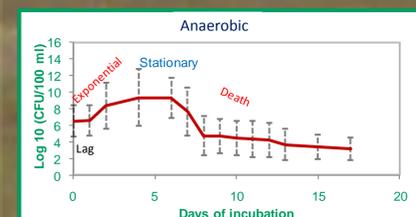
## METHODS

1. Manure preparation
  - a. Weight 0.498g of manure
  - b. Add 1500 ml of de-ionized water
  - c. Mix thoroughly
  - d. Use 850mm sieve to filter out fiber
2. Prepare six samples each, aerobic & anaerobic
3. Place samples in shaking water bath at 150 rpm 37 C
4. Daily remove three samples each randomly from three different reactors
5. Perform serial dilution of each sample
6. Prepare three plates for each sample after membrane filtration
7. Place plates in incubator for 24 hrs. at 44.2 C
8. Count bacteria colonies grown after 24 hrs.



## RESULTS AND DISCUSSION

Figure below shows the *E. coli* growth and destruction under aerobic and anaerobic conditions. While *E. coli* reduction is faster in aerobic conditions than the anaerobic. However, anaerobic process produces methane, a valuable source of energy.



Based on our findings, we suggest to the farmers that it is necessary to treat the manure before applying it as fertilizer by using either aerobic or anaerobic treatment process for protecting our land and waters.

## CONCLUSION

Manure is a major source of *E. coli*. Our research shows that using anaerobic and aerobic digester process, we can reduce 90-95% pathogens in manure that are introduced to farms and the watershed. Along with achieving the goal of reducing pathogens, we can produce methane (alternative source of energy) by using anaerobic process for manure treatment.

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