

Work Sheet

**Development of Anaerobic Digestion Technology for Processing Livestock
Manure: Demonstration at Lester's Dairy Farm, St. John's**

Contribution Agreement: Contribution Agreement - CAP2122-0710

Agriculture Growth and Innovation Program: Agriculture Research

The Canadian Agricultural Partnership

Department of Fisheries, Frosted, and Agriculture of Newfoundland and Labrador

Work Sheet

1. On-farm biogas production was demonstrated in a field study using small-scale portable digesters (45 liters: the digester = 32 liters, and the gasholder is 13 liters). Figure 1 shows the portable biogas digester.



Figure 1. The portable biogas digester model

2. Four portable biogas digesters have been set up on the farm, as shown in Figure 2.

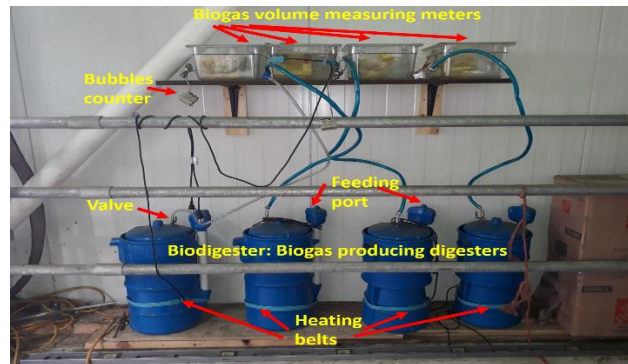


Figure 2. The on-farm experimental portable biogas digesters setup.



Figure 3. Location of the biogas digesters in the barn

3. The biogas composition was analyzed using a portable biogas analyzer (Figure 4)



Figure 4. The portable biogas analyzer

4. The digesters have been fed dairy manure at organic loading rates 1, 3, and 5 kg VS/m³.day.
5. The total solids in the digesters have been marinated at 5, 7.5, and 10%.
6. The organic loading rate of 1 kg VS/m³.day has been applied at totals solids of 5%, the organic loading rate of 3 kg VS/m³.day has been applied at total solids of 7.5%, and the organic loading rate of 5 kg VS/m³.day has been applied at total solids of 10%.
7. The operation was stable with no observed inhibition.
8. The methane yield ranged between 165 and 191 liters of methane per kg of volatile solids fed to the digester (NL CH₄/kg VS) in 21 days cycle.
9. Feeding 3 kg volatile solids per cubic meter of active microbial culture and operating the digester at 5 – 7.5% total solids appears a reasonable operation option.
10. These results have been obtained in digesters without mixing. Mixing the digesters' content would increase the yield further.
11. The digesters require heating to maintain constant and uniform temperature which is necessary for the operation. A slight decrease in the volume of methane produced was observed when the solid organic quantity (mass) fed to the digesters was applied at organic loading of 5 kg/m³.day with 10% total solids.