# ABSTRACT

The more developed a country is, the higher the need for protein in the the community, which will affect the high level of livestock waste. The accumulation of livestock waste will have a negative impact if it is not managed correctly. One of the effective and efficient ways is to process the waste as a raw material in the gasification process. This process is the conversion of solid raw materials into gas raw materials. The syngas results from the gasification process can be used as an alternative gas fuel.

The problems faced in developing experimental methods can increase the risk of failure, which will increase the cost of making the gasification system. In this study, a simulation was carried out using the Computational Fluid Dynamics (CFD) method using the downdraft type gasification type to reduce this risk of failure. This study uses temperature variations at 680°C and 1000°C and variations in airflow velocity at 0.00827 m/s, 1 m/s, 2 m/s, and 4 m/s.

Downdraft gasification simulation produces various syngas. However, the syngas variations observed were only CO, $H_2$, $CH_4$ and $CO_2$ as new energy fuels. Using raw materials in the form of chicken manure can produce maximum output for syngas CO, $CH_4$ and $CO_2$ at variations inflow velocity of not more than 1 m/s. Then, using raw materials in the form of cow manure can produce maximum output for $H_2$ syngas at variations in airflow velocity of 0.00827 m/s. With this simulation, it can be seen that chicken manure and cow dung can be used as raw materials for the gasification process. The results of this study are expected to help further development in the downdraft gasification system.



**Keywords: Computational Fluid Dynamics (CFD), livestock waste, downdraft gasification system.**