

J-GRILL : Self-fanning Charcoal Grill

Utilizing Chimney Effect and Heat Current by Convection

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1. Introduction

Satay, which is meat cut into small pieces, skewered and grilled on charcoal fire is one of the most famous Indonesian culinary. Satay vendors usually give airflow to the charcoal either with hand movement or electrical fan which uses so much energy. This is the main problem of this research. To solve it, a design called J-Grill is proposed to provide airflow using chimney effect and heat current by convection.

This research is conducted to know the effectiveness of chimney stove system, which is the comparison of burning rate between J-Grill and a regular charcoal grill, also to know important factors that influence airflow.

2. Research Method

The apparatus used is a charcoal container that has been fitted with chimney. There is an air duct / opening that allows the air to flow downwards through the charcoal, enter the chimney, and flows upwards (Fig.1). The air inside the grill is heated by the charcoal so that the chimney effect could start, and creates a letter 'J' shaped-like airflow.

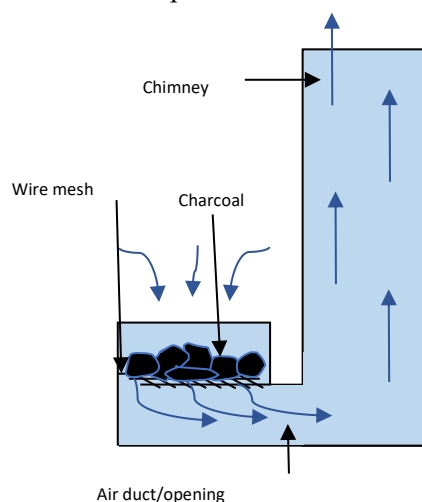


Figure 1. Concept of J-Grill

The experiment was done by measuring mass of the whole system and temperature at the bottom and upper part of the chimney over a fixed time interval while the combustion process is ongoing to obtain the burning rate. There were different variations of experiments: opened chimney (normal condition), closed chimney (control experiment), closed chimney and hand-fanned, also taller opened chimney.

3. Result and Analysis

The results of the experiments (Table 1) show that J-Grill has comparable effectiveness to a regular and fanned charcoal grill. This makes J-Grill potentially capable in replacing an ordinary grill.

Table 1. The Effectiveness of J-Grill in Various Experiments

Model	Effectiveness
Opened chimney (H=24 cm) (normal condition)	1,77
Closed chimney and fanned	1,65
Opened chimney (H=48 cm)	2,18

4. Conclusion

A self fanning charcoal grill named J-Grill has been made and tested with chimney effect and heat current by convection concept and compared to a regular charcoal grill. From the experiments, it is known that height of the chimney is a significant factor that influences airflow. In the end, J-Grill is potentially capable in replacing a regular and fanned charcoal grill.

For advance research, the size and capacity of J-Grill could be improved.

References

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