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## Determining the Effective Method for One-Sun-Dried Squid Drying

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### ABSTRACT

The research aimed to determine the effect of different drying methods including heat pump drying, hot air drying, combined infrared and heat pump drying, and combined infrared and hot air drying on the quality of one-sun-dried squid. With each method, squids are dried at three temperature degree of 40, 45 and 50°C. The quality of the product is assessed by protein content, organoleptic quality and drying rate. The research results showed that combined infrared and heat pump drying at temperature of 45°C is the most appropriate method of drying one-sun-dried squid. After drying, the protein content reaches 22/100 gram-squid; drying time is 180 minutes, the average drying rate is 3.33 %H<sub>2</sub>O/h and the squids color is best retained.

*Keywords:* one-sun-dried squid, drying rate, drying time, heat pump drying

### 1. INTRODUCTION

Squid is the seafood preferred due to the soft flesh structure, delicious taste, as well as high protein and nutrient content. However, fresh squid has high moisture - more than 80% [1],[2]. Therefore, it needs to be processed and stored for prolonged use.

One-sun-dried squid is produced to retain the flavor of fresh squid and prolong using time. Currently, more than 90% of one-sun-dried squids are produced manually, like sun-dried or coal-dried. However, these methods have drawbacks such as stretching time, depending on weather, reducing product quality, and easily being contaminated... The reality of food production demands a research to develop a drying method in order to overcome the disadvantages of the current methods and improving product quality.

Infrared radiation drying is known as an optimal drying method attracting many scientists to study and develop. The combination of infrared and other drying methods shows that the products have good organoleptic quality; drying time is reduced; and energy consumption is low. This method has been using to dry many agricultural products such as longan

[4], banana [5], potato, shrimp, anchovy, and squid. The results have been good. Meanwhile, lots of researches on drying squids [6], [7], [8] also found that the product's organoleptic quality was good when the combined infrared method was used.

Therefore, this research aimed to determine the appropriate method for one-sun-dried squid drying by comparing the effect of different drying methods at the different drying temperature. During drying process, the quality of squid is maintained and controlled based on the control parameters.

### 2. MATERIALS AND METHODS

Squids are split lengthways, removed organs, flayed and washed. Each squid is about 300 g to 350 g in weight, 210 ± 10 mm in length, 130 ± 10 mm in width, and 6 mm to 10 mm thickness. The initial moisture is 84%.

#### 2.1 Analysis method

##### a) Moisture content

The moisture content of squid was determined by the moisture analysis equipment A&D - MX 50; the accuracy of balance is 0.001%; and analysis temperature is 50 - 200°C.

During drying, the mass to be dried was measured using a digital balance at regular intervals (i.e., 30 min) and the current moisture content was calculated using the following equation.

$$M_t = 100 - \frac{W_0}{W_t} (100 - M_0)$$

M<sub>t</sub>: moisture at time *t*

M<sub>0</sub>: initial moisture

W<sub>t</sub>: the volume at time *t*

W<sub>0</sub>: initial volume

##### b) Drying rate

The drying rate is calculated by the equation:

$$dM = \frac{M_t - M_{t-\Delta t}}{\Delta t}$$

dM: drying rate (kg=kg (d.b)\*min.)

M<sub>t</sub>, M<sub>t+Δt</sub>: moisture content at time *t* and *t* + Δ*t*

Δ*t*: period of drying time