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DAFTAR ISI

CHEMICAL CHANGES IN PEDAH DURING THE FIRST FERMENTATION

(Perubahan-perubahan Kimia Pada Pedah Selama Proses Fermentasi Pertama)

By Hari Eko Irianto *)

Abstract

Pedah adalah salah satu produk permentasi ikan tradisional Indonesia. Pedah dalam pengolahannya memerlukan dua tahap fermentasi (penggaraman), yaitu fermentasi pertama dan fermentasi kedua.

Penelitian terhadap perubahan-perubahan kimia selama fermentasi pertama telah dilaksanan. Hasil penelitian mengungkapkan bahwa kadar air, nilai a_w dan pH dari ikan menurun. Sedangkan kadar garam dari ikan meningkat selama fermentasi pertama.

Nilai pada a_w akhir fermentasi adalah 0.764 dan pada nilai a tersebut bakteri yang memungkinkan untuk tumbuh adalah bakteri halophilik (tahan garam tinggi) yang bertanggung jawab pada perubahan-perubahan yang terjadi selama fermentasi kedua.

Introduction

Pedah is popular product in java island, especially in East Java. This product is quite different from other fermented fish products and even from other traditional fish products such as dried salted fish (ikan asin), boiled salted fish (pindang) atau softened bone fish (presto), especially the flavour and texture.

Basic method of pedah processing is a salting process with two steps. The first salting is normally carried out for several days and known as the first fermentation. On the other hand, the second salting takes several weeks to develop flavour and texture, and this step is called the second fermentation, or maturation phase. However Hanfiah (1987) noted that there is no prescribed period for the processing, the length of which varies from processor to processor.

Unfortunately, published scientific studies on pedah are quite rare in relation to both provcessing and product it self. This study was aimed to reveal the of changes of pedah during processing, especially chemical changes during the first fermentation.

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Materials and Methods

1. Materials

Yelloweye mullet (*Aldrichetta forsteri*) caught from New Zealand waters was used as raw material in this study. The fish had total length of 27.4 ±1.1 cm, thickness of 3.2 ±0.2 cm and weight of 182.64 ±21.55 g. Proximate analyses indicated that the fish had 78.02% moisture, 15.53% protein, 4.47% fat and 1.05% ash.

Salt used for salting process in the first fermentation was commercial salt having 94.9% purity level. The label printed on the packaging of salt mentioned that the salt contains not moore than 1% calcium silicate and free flowing agent.

2. Methods

2.1. Fish Preparation and First Fermentation Method

Frozen fish taken out from the freezer of -25°C were thawed at room temperature before using them. During thawing, the water was run continously until the fish were separated and texture was normal.

The first fermentation was carried out by salting the fish using a 1:3 salt to fish ratio. Fish and salt were placed in layers alternately in a plastic vat, in which thick layers of salt were added at the bottom and on the top layers to keep the saturated condition of brine, especially when the fish start releasing water. The fermentation process was carried out in an incubator at 28-31 . Samples were taken after 12 hours, 24 hours, 36 hours, 48 hours, 3 days, 4 days, 5 days, 6 days and 7 days.

2.2. Analysis

Samples were were analyzed for moisture content, salt content, a_w and pH. The moisture content was determined by drying 2g chopped sample in an air oven at 100 ±2°C for around 16 hours. The salt contents of fish and salt were measured by the AOAC method (AOAC section 18.035, 1984). Decagon CX-1 a_w-meter was used to define water activity (a_w) value of fish. pH was determined by mixing fish flesh and water at ratio of 1:2 and then measured with pH meter.

Results and discussions

Moisture content decreased during the first fermentation as shown in Figure 1. The sharp reduction of moisture content occurred during the first two days fermentation and this reductions was from 78.02% to 57.87%. Extention of fermentation period still resulted in further decrease in the moisture content, but at a lower rate.

on the other hand, the salt content of fish increased due to salting treatmen in the first fermentation and this occurrence was shown by both wet and dry basis salt content

data as displayed in figure 2. The fastets increase was registered during the first two days fermentation and the fast increase was stilll detected until the fifth day. Further fermentation would give a slow increase of salt content. The salt content of fish at the end of fermentation was 18.66% (w.b) and 40.36% (d.b.).

Moisture content decrease and salt content increase are the common phenomenon in salting process as have been reviewed by Stansby (1963), Burgess *et al* (1965), Voskresensky (1965) and Van Klaveren and Legendre (1965). In the first fermentation, the salt penetrates into the fish flesh because of the osmotic pressure differences in the fish and the salt surrounding the fish and at the same time the water is pushed out to be released from the fish. The water dilutes the coarse salt and from pickled brine which cover the fish at the end of the first fermentation.

An interesting change was encountered after 36 hour fermentation in which the salt content decreased according to dry base calculation. A quick penetration of salt into the fish might induce desalting process of brine surrounding the fish due to the slow dilution rate of coarse salt. This occurrence would cause the release of salt from the fish into the brine until the salt diluted into the brine was enough to overcome the pressure differrences between the fish and the brine. After that salt penetration into the fish occurred again as exhibited by the salt content increase.

Figure 3 exhibites that water activity (A_w) values of fish decreased during the first fermentation. The sharp decrease was noted on the fifth day and further fermentation period until the seventh day resulted in aslight changes in the a_w value the a_w values of the fish on the fifth and seventh days were 0.772 and 0.764 respectively. Microorganisme whice are able to grow at these pH level are halophilic bacteria (Anonymous,1990). THis indication was supported by Winarno *et al* (1973) and Hanafiah (1987) that fermentation in pedah is carried out by halophilic bacteria predominated by gram positive cocci indentified as lactic acid bacteria.

The pH values of the fish tented to decrease during the fermentation, eventhough in the fact the fluctuation of the values were noted. The pH values of the fish at the beginning and the end of fermentation were 6.73 and 6.46 respectively.

CONCLUSIONS

In general, the rapid chemical changes during pedah production occurred during the first two days fermentation and the significant changes continued until the fifth day fermentation. Further fermentation period tended to give insignificant changes.

Aw achieved at the end of fermentation facilitated for halophilic bacteria growth.

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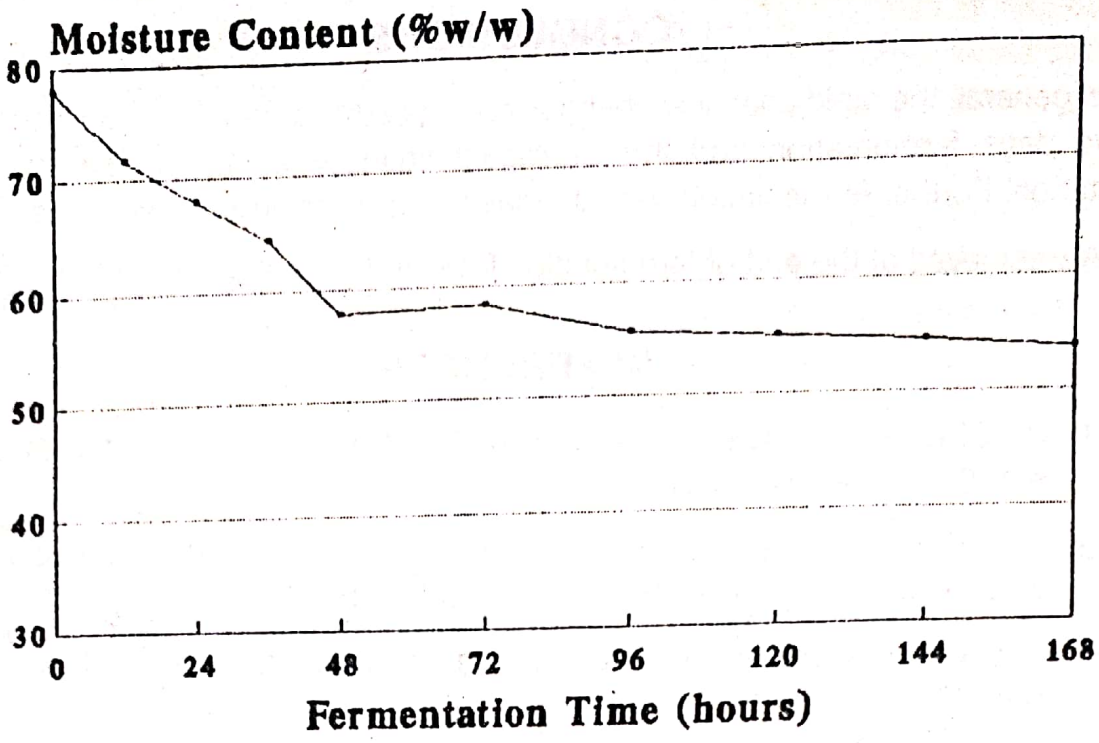

Figure 1. Moisture content changes in pedah during the first fermentation

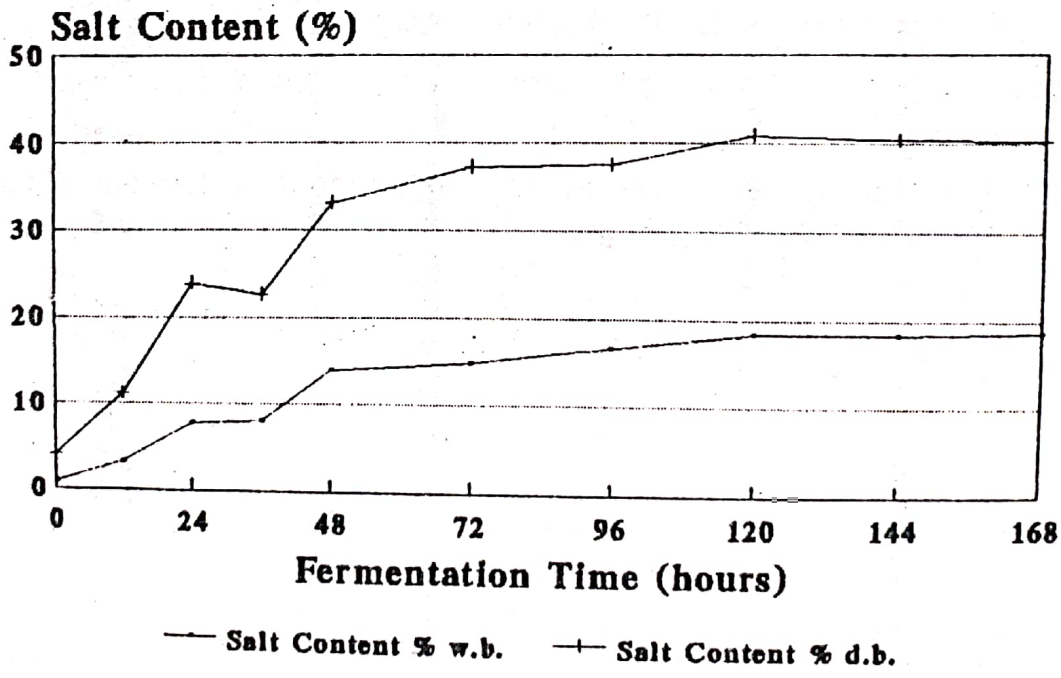

Figure 2. Salt content changes in pedah during the first fermentation

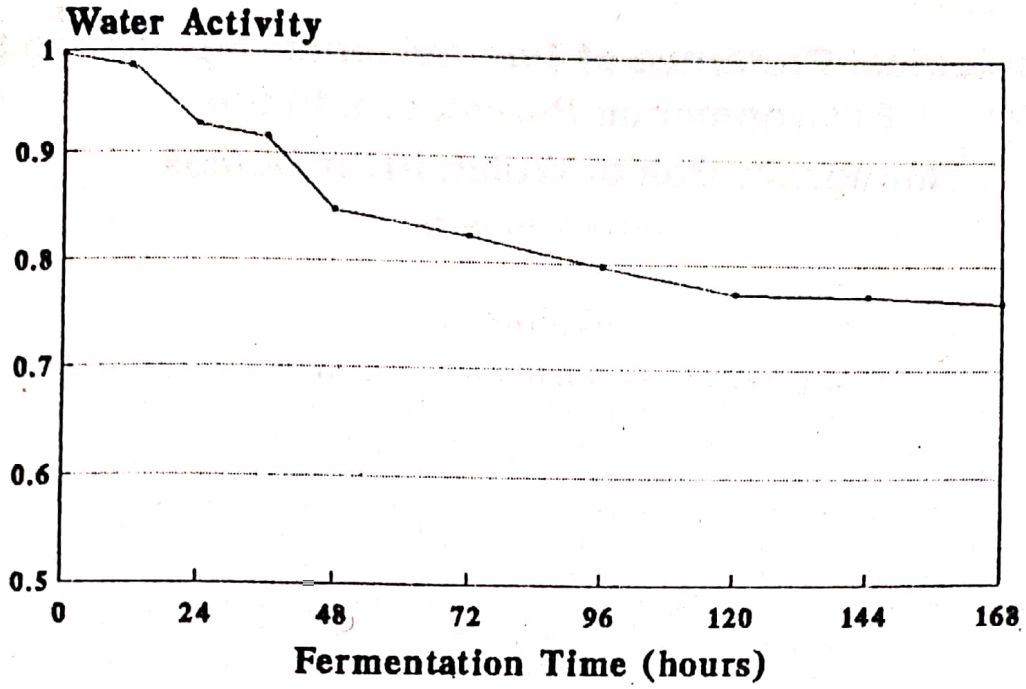

Figure 3. Water activity changes in pedah during the first fermentation

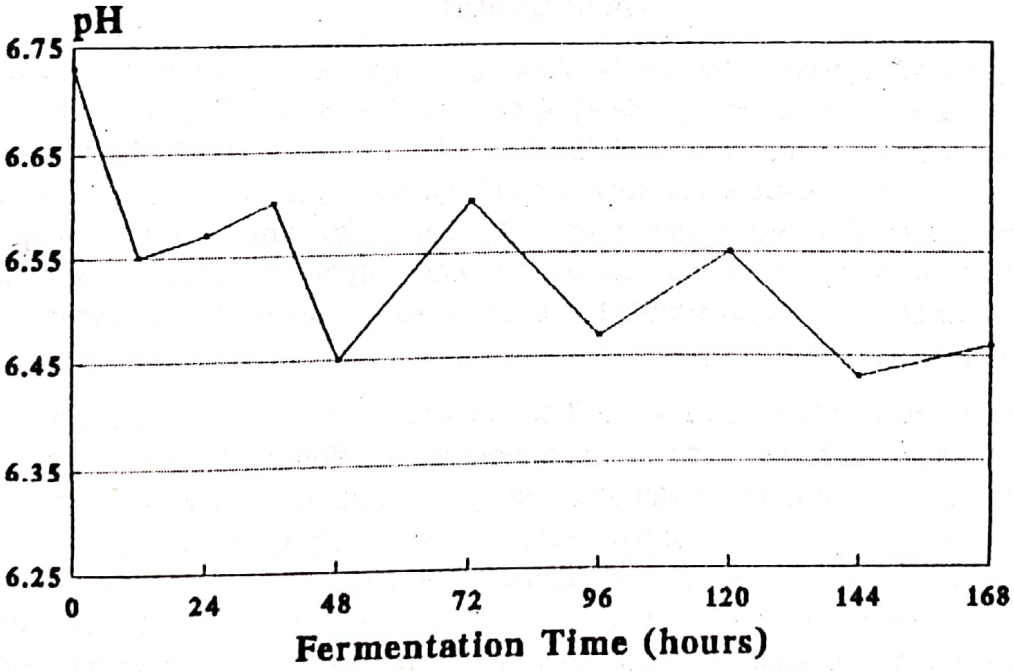

Figure 4. pH changes in pedah during the first fermentation.