

***Phosphorus and Calcium Bioavailability of
special bone meal Alkaline Hydrolysis Product of
Skipjack Bone (*Katsuwonus pelamis L*) on Broiler***

**By
Betty Bagau**

Under Supervision of :

***Prof. Dr. Hj. Tjitjah Aisjah, M.S
Dr. Ir. Rachmat Wiradimadja, M.S
Dr. Denny Rusmana, S.Pt., M.Si***

ABSTRACT

Fish bone is an industrial waste of fishery product processing which as a potential source of calcium and phosphorus for livestock. The general principle to process the fish bones into bone meal is an effort to hydrolyze non-ash components contained in the bones, especially collagen. Hydrolysis of collagen can be performed using an alkali or alkaline solution. Types of alkali can be sourced from chemical alkaline (NaOH) and natural alkaline as filtrate form of rice husk ash (FASP). Effectiveness of both types of alkaline hydrolysis is influenced by the concentration and length of processing time and specific to each material processed.

*Research has been conducted in the Laboratory of Poultry Nutrition Non-Ruminant Livestock and Feed Industry, and Experimental cage of Laboratory of Poultry Production, Faculty of Animal Husbandry, Padjadjaran University. The experiment was conducted in two stages: first stage, solid waste processing of Cikalang fish bone (*Katsuwonus pelamis L.*) using the alkaline NaOH and FASP to produce bone meal as a source of calcium and phosphorus. The second phase, testing the bioavailability of special bone meal processed product of first phase selection of mineral supplements in broiler rations. The first phase of the experiment conducted two separate experiments using an experimental method in the laboratory with nested completely randomized block design: 1) the concentration level of NaOH (2.3 and 4%) with hydrolysis time 12, 24, 36 and 48 hours, and 2) FASP concentrations (10, 20 and 30%) with hydrolysis time 12, 24, 36 and 48 hours. Influence of between treatments were tested with a variety of analysis and continued by Duncan's multiple range tests. The best product of NaOH processed products compared with the best product of processed FASP using t-test. The second phase of the experiment using a completely randomized design with three treatments as a source of calcium (Dicalcium Phosphate/DCP, commercial bone meal/bovine bone and bone meal processed by the best stage I). Each treatment was six replications.*

The results obtained that the use of NaOH alkali was more effective in improving of hydrolyzed fish bone, calcium and phosphorus levels of special bone meal produced compared to the FASP. Fish bone hydrolyzed by NaOH 4% with 48-hour hydrolysis time of 16.98%, levels of calcium and phosphorus special bone meal produced respectively 20.69% and 10.29%, while fish bones hydrolyzed by FASP 10% with hydrolysis time of 48 hours for 11.12%, levels of calcium and phosphorus special bone meal produced respectively 19.28% and 9.50%. The use of special bone meal by NaOH hydrolysis results in broiler had the same effects with dicalcium phosphate and commercial bone meal with commercial average ration consumption 2916.51 g, body weight gain of 1818.20 g, feed conversion 1.60, carcass bone weight 221.88 g, tibia bone calcium content of 15.43%, tibia bone phosphorus content 7.06%, retention of calcium and phosphorus respectively 62.68% and 58.75%.

Keyword: skipjack bone fish, NaOH, dusk rice husk filtrate,alkaline hydrolysis bioavailability

BIOAVAILABILITAS KALSIUM DAN FOSFOR
***special bone meal* PRODUK HIDROLISIS ALKALI**
TULANG IKAN CAKALANG (*Katsuwonus pelamis* L)
PADA AYAM BROILER

Oleh,
Betty Bagau

Tim Promotor
Prof. Dr. Hj. Tjitjah Aisjah, M.S
Dr. Ir. Rachmat Wiradimadja, M.S
Dr. Denny Rusmana, S.Pt., M.Si

ABSTRAK

Tulang ikan merupakan limbah industri pengolahan hasil perikanan yang potensial sebagai bahan sumber kalsium dan fosfor bagi ternak. Prinsip umum mengolah tulang ikan menjadi tepung tulang adalah upaya menghidrolisis komponen *non ash* yang terdapat pada tulang terutama kolagen. Hidrolisis kolagen dapat dilakukan dengan menggunakan alkali atau larutan basa. Jenis alkali dapat bersumber dari alkali kimiawi (NaOH) dan alkali alami (Filtrat Abu Sekam Padi). Efektifitas hidrolisis kedua jenis alkali dipengaruhi oleh konsentrasi dan lama pengolahan dan spesifik untuk setiap bahan yang diolah.

Penelitian ini telah dilakukan di laboratorium Nutrisi Ternak Unggas, Non Ruminansia dan Industri Makanan Ternak Fakultas Peternakan Universitas Padjadjaran Jatinangor–Sumedang. Penelitian dilaksanakan dalam dua tahap, yaitu : Tahap pertama, pengolahan tulang ikan cakalang (*Katsuwonus pelamis* L) menggunakan alkali NaOH dan FASP untuk menghasilkan $SBM^{(TC)}$ sebagai sumber kalsium dan fosfor. Tahap kedua, pengujian bioavabilitas $SBM^{(TC)}$ produk olahan pilihan penelitian tahap pertama sebagai suplemen mineral dalam ransum broiler. Penelitian tahap pertama dilakukan dua percobaan terpisah menggunakan metode eksperimen di laboratorium dengan rancangan acak lengkap tersarang masing–masing: 1) tingkat konsentrasi NaOH (2,3 dan 4%) dengan lama hidrolisis 12, 24, 36 dan 48 jam, dan 2) tingkat konsentrasi FASP (10, 20 dan 30%) dengan lama hidrolisis 12, 24, 36 dan 48 jam. Pengaruh antar perlakuan diuji dengan analisis ragam dan dilanjutkan uji jarak berganda Duncan. Produk terbaik hasil olahan NaOH dibandingkan dengan produk terbaik hasil olahan FASP menggunakan uji–t. Penelitian tahap kedua menggunakan rancangan acak lengkap tiga perlakuan sumber kalsium (*Dicalcium phosphate*/DCP, tepung tulang komersial/tulang sapi dan $SBM^{(TC)}$ hasil olahan terbaik tahap I. Masing–masing diulang sebanyak enam kali. Hasil penelitian diperoleh bahwa penggunaan alkali NaOH lebih efektif meningkatkan tulang ikan cakalang yang dihidrolisis, kadar kalsium dan fosfor $SBM^{(TC)}$ yang dihasilkan dibandingkan dengan FASP.

Tulang ikan yang dihidrolisis oleh NaOH 4% dengan lama hidrolisis 48 jam sebesar 16,98%, kadar kalsium dan fosfor $SBM^{(TC)}$ yang dihasilkan masing-masing 20,69% dan 10,29%, sedangkan tulang ikan yang dihidrolisis oleh FASP 10% dengan lama hidrolisis 48 jam sebesar 11,12%, kadar kalsium dan fosfor $SBM^{(TC)}$ yang dihasilkan masing-masing 19,28% dan 9,50%.

Penggunaan $SBM^{(TC)}$ hasil hidrolisis oleh NaOH pada ternak ayam broiler berpengaruh sama dengan *dicalcium phosphate* dan tepung tulang komersial yaitu menghasilkan rataan konsumsi ransum 2916,51 g/ekor, penambahan berat badan 1818,20 g/ekor, Konversi ransum 1,60, berat tulang karkas 221,88 g, kadar kalsium tulang tibia 15,43%, kadar fosfor tulang tibia 7,06%, retensi kalsium dan fosfor masing-masing 62,68% dan 58,75%.

Kata kunci : tulang ikan cakalang, NaOH, FASP, hidrolisis alkali, bioavailibilitas