

ABSTRACT

Catfish (*Clarias gariepinus*), which has the local name “*lele dumbo*”, is the most widely cultivated species in Indonesia. Because of the current high production, in addition to an increasing value, it is necessary to diversify fishery products made from *lele dumbo*. One of them is using *lele dumbo* as an alternative raw material for surimi production. Surimi gel characteristics are highly dependent on the fish species and are influenced by the chemical composition of fish species, setting time and temperature, and indigenous enzyme activity. The aim of this research was to investigate the role of indigenous transglutaminase in the gel formation of *lele dumbo* surimi. This research consists of 3 stages that were (1) characterization of physicochemical properties of *lele dumbo* muscle and surimi, (2) application of setting in the surimi gel-making process, and (3) indigenous TGase and protease profiles in *lele dumbo* and its role in the gel formation of surimi. The results showed that *lele dumbo* was a lean fish. *Lele dumbo* muscle has glutamine and lysine residues that can support TGase activity. Concentration of myofibrillar protein of *lele dumbo* surimi increased from 69.24% to 85.41% of total protein compared to fish muscle, while the sarcoplasmic protein concentration decreased from 18.30% to 10.60% of total protein. The whiteness of *lele dumbo* surimi was 66.03%, higher than that of commercial surimi and meets the international surimi standard of >53%. The optimum gel strength was achieved at 50°C for 90 min (1060.70 g.cm). The decreased of gel strength at 60 and 70°C for 90 min from 861.23 g.cm to 467.06 g.cm was accompanied by the increased of expressible moisture content from 3.40% to 8.71% and degradation of MHC with molecular weight of 126 and 141 kDa. TGase from *lele dumbo* showed optimum activity at 50°C, pH 8.5 and CaCl₂ concentration of 60 mM. The addition of TGase inhibitor (IAA and EDTA) at 5 mM could decreased TGase activity by 51.03 and 40.05%, respectively. The addition of IAA and EDTA were caused a decrease in surimi gel strength by 12-45% and 9-38%, respectively. Based on the SDS-PAGE, the addition of TGase inhibitors of IAA and EDTA may inhibited myosin heavy chain polymerization, whereas the addition of CaCl₂ at 60 mM resulted in cross-linking of myosin heavy chain with molecular weight >646 kDa. Protease activity was higher in surimi gel with setting temperature of 60 and 70°C compared with 50°C. The increased of surimi gel protease activity at setting temperature of 60 and 70°C indicated a “modori” phenomenon at 60-70°C. Therefore, it can be concluded that *lele dumbo* can be used as an alternative raw material for surimi and indigenous transglutaminase plays a role in the gel formation of surimi, especially at 50°C setting temperature.

Keywords: *lele dumbo* surimi, gel forming ability, setting, indigenous transglutaminase.

INTISARI

Lele dumbo (*Clarias gariepinus*) merupakan salah satu spesies ikan yang banyak dibudidayakan di Indonesia. Mengingat ketersediaan bahan baku cukup besar dan untuk meningkatkan nilai tambah, perlu dilakukan upaya diversifikasi produk perikanan berbahan dasar lele dumbo. Salah satunya adalah memanfaatkan lele dumbo sebagai bahan baku alternatif untuk surimi. Karakteristik gel surimi tergantung pada spesies ikan dan dipengaruhi oleh komposisi kimia spesies ikan, suhu dan waktu *setting*, serta aktivitas enzim indigenous. Penelitian ini bertujuan untuk mengetahui peran transglutaminase indigenous dalam pembentukan gel surimi lele dumbo. Penelitian ini terdiri dari 3 tahap, yaitu (1) karakterisasi sifat fisikokimia daging dan surimi lele dumbo, (2) aplikasi *setting* dalam pembuatan gel surimi lele dumbo, dan (3) profil enzim TGase dan protease indigenous pada lele dumbo dan perannya dalam pembentukan gel surimi. Hasil penelitian menunjukkan bahwa lele dumbo termasuk ikan berlemak rendah. Daging lele dumbo mengandung asam amino glutamin dan lisin yang dapat mendukung aktivitas TGase. Konsentrasi protein miofibril surimi mengalami kenaikan dibandingkan daging ikan yaitu dari 69,24% menjadi 85,41% dari protein total, sedangkan konsentrasi protein sarkoplasma surimi mengalami penurunan dibandingkan daging ikan yaitu dari 18,30% menjadi 10,60% dari protein total. Derajat putih surimi lele dumbo sebesar 66,03% lebih tinggi daripada surimi komersial dan memenuhi standar mutu surimi internasional yaitu >53%. Kekuatan gel optimum surimi dicapai pada suhu *setting* 50°C selama 90 menit yaitu 1060,70 g.cm. Penurunan kekuatan gel surimi lele dumbo pada suhu *setting* 60 dan 70°C selama 90 menit yaitu dari 861,23 g.cm menjadi 467,06 g.cm disertai dengan peningkatan *expressible moisture content* yaitu dari 3,40% menjadi 8,71% dan degradasi MHC dengan berat molekul sekitar 126 dan 141 kDa. TGase lele dumbo menunjukkan aktivitas optimum pada suhu 50°C, pH 8,5 dan konsentrasi CaCl₂ sebesar 60 mM. Penambahan inhibitor TGase berupa IAA dan EDTA sebesar 5 mM dapat menurunkan aktivitas TGase masing-masing sebesar 51,03 dan 40,05%. Penambahan IAA dan EDTA menyebabkan penurunan kekuatan gel surimi berturut-turut sebesar 12-45% dan 9-38%. Berdasarkan hasil SDS-PAGE, penambahan inhibitor TGase berupa IAA dan EDTA dapat menghambat polimerisasi *myosin heavy chain*, sedangkan penambahan kofaktor TGase berupa CaCl₂ sebesar 60 mM menghasilkan *cross-linking myosin heavy chain* dengan berat molekul >646 kDa. Aktivitas protease pada gel surimi dengan suhu *setting* 60 dan 70°C lebih tinggi dibandingkan dengan suhu *setting* 50°C. Peningkatan aktivitas protease gel surimi lele dumbo pada suhu *setting* 60 dan 70°C mengindikasikan terjadi fenomena “modori” pada suhu *setting* 60-70°C. Oleh karena itu, dapat disimpulkan bahwa lele dumbo dapat digunakan sebagai bahan baku alternatif surimi dan transglutaminase indigenous berperan dalam pembentukan gel surimi lele dumbo terutama pada suhu *setting* 50°C.

Kata kunci: surimi lele dumbo, kemampuan pembentukan gel, *setting*, transglutaminase indigenous.