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Substitusi NaCl dengan KCl untuk Meningkatkan Kekuatan Gel Surimi Lele
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INTISARI

SUBSTITUSI NaCl DENGAN KCl UNTUK MENINGKATKAN KEKUATAN GEL SURIMI LELE

Surimi membentuk gel setelah dipanaskan dan memerlukan NaCl 1–3% untuk melarutkan protein miofibril, sedangkan NaCl juga sumber natrium. Substitusi parsial dengan KCl, garam monovalen tanpa natrium, perlu dikaji pada surimi lele (*Clarias* sp.). Penelitian bertujuan mengetahui pengaruh substitusi NaCl dengan KCl terhadap kekuatan gel surimi lele dan menentukan tingkat substitusi yang menghasilkan kekuatan gel tertinggi dibandingkan kontrol. Penelitian menggunakan Rancangan Acak Lengkap satu faktor dengan empat perlakuan: P_0 (NaCl:KCl = 2,0:0 g), P_1 (1,8:0,2 g), P_2 (1,5:0,5 g), dan P_3 (1,0:1,0 g) per 100 g surimi, setara substitusi KCl 0, 10, 25, dan 50% pada total garam 2% (b/b), dengan tiga ulangan. Gel dibuat dengan transglutaminase 0,2 g per 100 g surimi, *setting* 40 °C selama 30 menit, dan pemanasan 90 °C selama 20 menit. Kekuatan gel diukur dengan *Universal Testing Machine* (g·cm), didukung pengukuran natrium total, daya ikat air (WHC), derajat putih, proksimat, dan sensoris. Data dianalisis dengan ANOVA dan *Duncan's Multiple Range Test* serta *Kruskal–Wallis* dan *Mann–Whitney* (taraf 5%). Substitusi KCl berpengaruh nyata terhadap kekuatan gel ($p < 0,001$) dengan pola tidak monoton: menurun pada P_1 (626,53 g·cm) dan P_2 (520,52 g·cm) dibandingkan P_0 (767,08 g·cm), lalu meningkat pada P_3 (1.110,88 g·cm), atau 44,82% di atas kontrol dan setara *grade* SA (SNI 2694:2021; indikatif). P_3 memiliki WHC tertinggi (63,29%) dan natrium total terendah (394,00 mg/100 g; turun 51,95%), tetapi derajat putih lebih rendah (65,57% dibandingkan 68,44%). Substitusi KCl 50% (P_3) menghasilkan kekuatan gel tertinggi, sedangkan titik balik di antara 25 dan 50% serta taraf optimum belum dapat ditentukan.

Kata kunci: daya ikat air, KCl, kekuatan gel, lele, NaCl, substitusi, surimi

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ABSTRACT

NaCl SUBSTITUTION WITH KCl TO INCREASE GEL STRENGTH OF CATFISH SURIMI

Surimi forms a gel upon heating and requires 1–3% NaCl to solubilize myofibrillar proteins, while NaCl is also a source of sodium. Partial substitution with KCl, a sodium-free monovalent salt, needs to be evaluated in catfish (*Clarias* sp.) surimi. This study aimed to determine the effect of NaCl substitution with KCl on the gel strength of catfish surimi and to determine the substitution level that produced the highest gel strength compared with the control. The study used a single-factor Completely Randomized Design with four treatments: P_0 (NaCl:KCl = 2.0:0 g), P_1 (1.8:0.2 g), P_2 (1.5:0.5 g), and P_3 (1.0:1.0 g) per 100 g surimi, equivalent to 0, 10, 25, and 50% KCl substitution at 2% total salt (w/w), with three replications. Gels were prepared with transglutaminase at 0.2 g per 100 g surimi, setting at 40 °C for 30 minutes, and heating at 90 °C for 20 minutes. Gel strength was measured with a Universal Testing Machine (g·cm), supported by measurements of total sodium, water holding capacity (WHC), whiteness, proximate composition, and sensory attributes. Data were analyzed with ANOVA and Duncan's Multiple Range Test as well as Kruskal–Wallis and Mann–Whitney (5% level). KCl substitution had a significant effect on gel strength ($p < 0.001$) with a non-monotonic pattern: it decreased in P_1 (626.53 g·cm) and P_2 (520.52 g·cm) compared with P_0 (767.08 g·cm), then increased in P_3 (1,110.88 g·cm), or 44.82% above the control and equivalent to grade SA (SNI 2694:2021; indicative). P_3 had the highest WHC (63.29%) and the lowest total sodium (394.00 mg/100 g; 51.95% lower), but lower whiteness (65.57% compared with 68.44%). The 50% KCl substitution (P_3) produced the highest gel strength, whereas the turning point between 25 and 50% and the optimum level could not yet be determined.

Keywords: catfish, gel strength, KCl, NaCl, substitution, surimi, water holding capacity