

PENGGUNAAN EKSTRAK KASAR ENZIM RAGI TEMPE DAN PROBIOTIK
LOKAL UNTUK MENINGKATKAN KUALITAS TEPUNG *MAGGOT* (*Hermetia
illucens*)

RINGKASAN

Amanda Hasanah
D2A022001

Penelitian ini bertujuan untuk meningkatkan kualitas kimia, mikrobiologi dan fisik tepung *maggot Black Soldier Fly* (BSF) *Hermetia illucens* melalui proses hidrolisis enzimatis oleh ragi tempe (RT) dan probiotik lokal (PL). Penelitian dilaksanakan pada bulan Juli - November 2023, bertempat di Laboratorium Ilmu Nutrisi Makanan Ternak Fakultas Peternakan dan Laboratorium Riset Universitas Jenderal Soedirman. Penelitian dilaksanakan dalam dua tahapan.

Penelitian tahap pertama bertujuan untuk mengkaji interaksi taraf starter dan waktu inkubasi terhadap kadar protein dan aktivitas enzim hidrolitik RT dan PL. Bahan yang digunakan adalah RT Raprime (PT Aneka Fermentasi Indonesia), PL Mix-C (PT Banyumas Raya Indonesia) dan *maggot* BSF umur 15 hari (PT Green Prosa). Digunakan metode penelitian rancangan acak lengkap (RAL) pola faktorial 3 x 5 dengan 3 ulangan dan uji lanjut ortogonal polinomial. Faktor pertama adalah taraf starter; A1 = 0% RT, A2 = 0,1% RT, A3 = 0,2% RT dan B1 = 0% PL, B2 = 0,1% PL dan B3 = 0,2% PL. Faktor kedua adalah waktu inkubasi, C1 = 1 hari, C2 = 2 hari, C3 = 3 hari, C4 = 4 hari dan C5 = 5 hari. Peubah yang diukur adalah kadar protein serta aktivitas enzim RT dan PL. Terdapat interaksi antara taraf starter dan waktu inkubasi terhadap aktivitas lipase dan kitinasi RT, serta kadar protein dan aktivitas lipase PL. Kadar protein dan aktivitas enzim RT optimum pada taraf starter 0,10 s.d 0,13% dengan waktu inkubasi 2,00 s.d 3,47 hari. Kadar protein dan aktivitas enzim PL optimum pada taraf starter 0,13 s.d 0,20% dengan waktu inkubasi 2,61 s.d 5,00 hari.

Penelitian tahap kedua bertujuan untuk mengkaji taraf enzim dan waktu hidrolisis terhadap kualitas tepung *maggot* BSF. Bahan yang digunakan *maggot* BSF umur 12 hari serta ekstrak kasar enzim asal RT dan PL pada penelitian tahap pertama. Metode penelitian yang digunakan adalah RAL pola faktorial 4 x 3 dengan 3 ulangan dan uji lanjut ortogonal polinomial. Faktor pertama adalah taraf enzim; A1 = 0% enzim RT, A2 = 1% enzim RT, A3 = 2% enzim RT, A4 = 3% enzim RT dan B1 = 0% enzim PL, B2 = 1% enzim PL, B3 = 2% enzim PL dan B4 = 3% enzim PL. Faktor kedua adalah waktu hidrolisis, C1 = 0 jam, C2 = 24 jam, dan C3 = 48 jam. Peubah yang diukur adalah daya hambat terhadap *Escherichia coli*, aktivitas antioksidan, kelarutan dalam pepsin, berat jenis, kerapatan tumpukan, kerapatan pepadatan tumpukan dan sudut tumpukan. Terdapat interaksi antara taraf enzim dan waktu hidrolisis terhadap daya hambat, aktivitas antioksidan dan kelarutan protein dalam pepsin *maggot* BSF yang dihidrolisis enzim RT maupun PL. Disamping itu, uji fisik menunjukkan *maggot* hidrolisis memiliki kualitas fisik lebih baik daripada *maggot* non hidrolisis. Kualitas terbaik *maggot* BSF yang dihidrolisis enzim RT adalah taraf enzim 1,43 s.d 1,60% dengan waktu hidrolisis 23,87 s.d 27,14 jam. Kualitas terbaik *maggot* BSF yang dihidrolisis enzim PL adalah taraf enzim 1,54 s.d 1,76% dengan waktu hidrolisis 21,57 s.d 29,70 jam.

Kata kunci : Aktivitas, Enzim, Hidrolitik, *Maggot*, Probiotik, Tempe

THE USE OF TEMPEH STARTER AND LOCAL PROBIOTICS CRUDE ENZYMES TO IMPROVE THE QUALITY OF MAGGOT FLOUR (*Hermetia illucens*)

SUMMARY

Amanda Hasanah
D2A022001

This research aims to improve the chemical, microbiological and physical quality of *Hermetia illucens* Black Soldier Fly (BSF) maggot flour through an enzymatic hydrolysis process by tempeh starter (RT) and local probiotics (PL). The research was carried out in July – November 2023, at the Laboratory of Animal Nutrition Science, Faculty of Animal Science and the Laboratory of Research at Jenderal Soedirman University. The research was carried out in two steps.

The first step of research aims to evaluate the interaction of starter level and incubation time on protein levels and hydrolytic enzyme activity of RT and PL. The materials used were RT Raprima, PL Mix-C and 15 day old BSF maggots. The research method used was a completely randomized design (CRD) with a 3 x 5 factorial, 3 replications and an orthogonal polynomial further test. The first factor was the starter levels; A1 = 0% RT, A2 = 0.1% RT, A3 = 0.2% RT and B1 = 0% PL, B2 = 0.1% PL and B3 = 0.2% PL. The second factor was incubation time, C1 = 1 day, C2 = 2 days, C3 = 3 days, C4 = 4 days and C5 = 5 days. The variables measured were protein levels and enzyme activities of RT and PL. There was an interaction between starter level and incubation time on RT lipase and chitination activity, as well as protein levels and PL lipase activity. Protein levels and enzyme activity of RT were optimum at the starter level of 0.10 to 0.13% with an incubation time of 2.00 to 3.47 days. Meanwhile, the protein levels and enzyme activity of PL were optimum at the starter level was 0.13 to 0.20% with an incubation time of 2.61 to 5.00 days.

The second step of research aims to evaluate the interaction of enzyme level and hydrolysis time on the quality of BSF maggot flour. The materials used were 12 day old BSF maggots and crude extracts of enzymes from RT and PL in the first stage of research. The research method used was CRD with a 4 x 3 factorial, 3 replications and an orthogonal polynomial further test. The first factor was enzyme level; A1 = 0% RT enzyme, A2 = 1% RT enzyme, A3 = 2% RT enzyme, A4 = 3% RT enzyme and B1 = 0% PL enzyme, B2 = 1% PL enzyme, B3 = 2% PL enzyme and B4 = 3% PL enzyme. The second factor was hydrolysis time, C1 = 0 hours, C2 = 24 hours, and C3 = 48 hours. The variables measured were inhibitory activity against *Escherichia coli*, antioxidant activity, protein solubility in pepsin, specific gravity, stack density, stack compaction density and stack angle. There was an interaction between enzyme level and hydrolysis time on inhibitory activity, antioxidant activity and protein solubility in pepsin of hydrolyzed maggot by RT and PL enzymes. Besides, hydrolyzed maggots have better physical qualities than non-hydrolyzed maggots. The best quality of hydrolyzed BSF maggots by RT enzymes was an enzyme level of 1.43 to 1.60% with a hydrolysis time of 23.87 to 27.14 hours. Meanwhile, the best quality of hydrolyzed BSF maggots by PL enzymes was an enzyme level of 1.54 to 1.76% with a hydrolysis time of 21.57 to 29.70 hours.

Keywords : Activity, Enzymes, Hydrolytic, Maggot, Probiotic, Tempe