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Effect Of Different Techniques Of Acidification By Sauerkraut Extracts To Physical Performance Of Acidified Fish Meal

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ABSTRACT

Research to observe effect of different techniques of acidification by sauerkraut extracts to physic-organoleptically performance of acidified fish meal has been conducted in the Laboratory of Feed Technology Faculty of Animal Science Diponegoro University. Extract of Sauerkraut is made by fermenting wastes of vegetable market (LPS) for 6 days, which is starting by molasses. Acidification of fish by extract solution of LPS was conduct by dipping for 0, 4 and 8 hours, and dipping followed by ensiling for 10 days. Changes in pH, odor, color, texture and moisture content of acidified fish meal is parameters observed. Results of research indicate that the extract LPS can be used in the acidification of "Ikan rucah" by providing the value of pH 3,4-4,9. Value of pH decreased with the soaking time, pH of fish in the form of post-acidification for 0, 4 and 8 hours, and soaking followed ensiling is 3.8; 4.0; 4.0 and 9.8. Acidified fish meal product of soaking 0 and 4 hours are characterized by typical smell of extract LPS, with a rather bright reddish color. While soaking in 8 hours of extract of LPS provide typical smell of extract a bit fishy, with garnet color, and the Fish that was soaked followed by fermentation for 10 days the smell is fleshy fish with the color dark brown. The texture of the fish soaked intact and slightly chewy, while the texture of fish that fermented to be soggy such as porridge. After drying the fish meal is made with techniques of dipping smelly of fish meal and slightly sour smell, with light brown to brown color, while fish meal made with fermentation smell a bit rotten with black brown color. Content of Moisture of fish meal decreased in line with the time of soaking. It can be concluded that physical- organoleptically performance of fish meal made with the dipping technique is better than that was made with ensiling.
Keywords: acidified fish meal, dipping, ensiling, extracts Sauerkraut

ABSTRAK

Penelitian untuk mengkaji pengaruh perbedaan teknik pengasaman menggunakan ekstrak sauerkraut yang berbeda terhadap peformans fisik organoleptik tepung ikan asam telah dilakukan di Laboratorium Teknologi Makanan Ternak Fakultas Peternakan UNDIP. Ekstrak sauerkraut dibuat dengan pemeraman limbah pasar sayur(LPS) selama 6 hari, dengan starter molasses. Selanjutnya larutan LPS digunakan untuk mengasamkan ikan rucah dengan cara perendaman (dipping) selama 0, 4 dan 8 jam, serta perendaman dilanjutkan dengan pemeraman selama 10 hari dalam ekstrak LPS. Perubahan pH, bau, warna, tekstur dan kadar air tepung ikan asam adalah parameter yang diobservasi. Hasil penelitian menunjukkan bahwa larutan ekstrak LPS dapat digunakan dalam pengasaman ikan rucah dengan pH 3,4-4,9. Keasaman campuran menurun dengan lama perendaman, pH ikan asam dalam bentuk pasca lama perendaman 0,4 dan 8 jam, serta perendaman yang dilanjutkan dengan pemeraman 10 hari adalah 3,9; 4,1; 4,3 dan 6,8. Ikan asam pada perendaman 0 dan 4 jam berbau khas ekstrak LPS, dengan warna cerah agak kemerahan. Sementara pada perendaman 8 jam berbau khas ekstrak LPS dan agak amis dengan warna merah tua, Ikan yang direndam dan diperam 48 jam berbau busuk menyengat dengan warna kehitaman. Tekstur ikan yang direndam utuh dan kenyal sementara ikan yang diperam tektur menjadi lembek seperti bubur. Setelah pengeringan dengan sinar matahari tepung ikan yang dibuat dengan teknik perendaman berbau khas tepung ikan dan sedikit bau asam, dengan warna coklat terang sampai coklat, sementara tepung ikan yang dibuat dengan pemeraman bau agak busuk dengan warna hitam kecoklatan. Kadar air tepun ikan menurun sejalan dengan lama pemeraman. Disimpulkan bahwa performance fisik-organoleptik tepung ikan asam dengan teknik perendaman lebih baik dibanding dengan pemeraman.
Kata kunci: tepung ikan asam, perendaman, pemeraman, ekstrak sauerkraut

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BACKGROUND

Indonesia ocean is able to produce fish as much as ± 6.4 million tons per annum. Total capacity of fishing of all potential resources recommended is 5.12 million tons per annum or ± 80% of the sustainable potency. While the potency is used ± 40% (Ilyas et al., 1988) and 10-25% of the catching has been proven out as wastes of fishing (including "ikan rucah"). "Rucah" fish as a source of protein feed materials has been recognized by farmers, especially for a feed of ducks. However, that fish have been characterized by problem of perishable materials (i.e.: easy to decay). The factors related to that problems are autolysis process, bacteriological process, and rancidity. The conventional method of producing fish meal in farmer scale has been weakened by technology and its quality. Acidified fish meal has advantages in terms of application technology and quality in compared to conventional fish meal. Yunizal (1986) recommend a technology of fish processing by ensiling. Fish silage is a form of hydrolytic protein with other components of the fish in the acid condition, therefore decomposing bacteria can not survive because of pH range is 4. This, made a form of fish silage is Souris pasty porridge likely (Jatmiko, 2002). The principle of making fish silage is pH should be low that may stopped growth and development of contaminant decomposing bacteria at the fish (Afrianto and Liviawaty, 2005). Ensiling process of fish is purely biological, means is not using chemicals and the method is called fermentation. Fermentation process usually used a number of bacillus species, temperature is set to the optimum condition of bacteria (room temperature) at anaerobic atmosphere. Fermentation takes place within relatively long 10 days, is that marked by the destruction of meat and bone, so that the final form of a pasty porridge like and do not stink (Jatmiko, 2002). Acidification is one of techniques preservation of making the fish silage. In term, soaking technique (dipping) is an alternative technique in the preservation. Amin and Leksono (2001) reported that soaking of fish of "Jambal Siam" in solution extract of fermentation of cabbage waste for 3 hours and 60 days storage prevented the growth of bacteria in the smoked products of "Jambal Siam" fish. Vegetables market waste is organic waste of traditional markets, usually consists of part of cabbage and Chinese cabbage. Regard to the Central Statistics Agency of Kabupaten Semarang (2005), production of cabbage and Chinese cabbage of Kabupaten Semarang are 969.06 tons and 789.11 tons per annum. Previous survey noted percentage of organic waste of vegetables market (LPS) reach 5-10% of gross weight of the vegetables. It was reported that fermentation of waste vegetable market by adding 2% of salt and 6.7% of molasses provide product which is richly organic acid, especially lactic acid and pH solution reached 3.74.

This research is aimed to study influence of differences technique of acidification by using extracts solution of Sauerkraut to physic-organoleptically performance of acidified fish meal. Dipping mechanism of organic acid based on the consideration, the sauerkraut extract has a highly acidity and contain lactic acid microorganisms. The process of soaking is

expected to provide acid atmosphere so that impedes autocatalytic process in the fish meat and prevent activity of decomposing microorganisms, while the process of soaking and incubation is expected given acid condition followed by fermentation process, so it will produce of acidified fish meal with a good performancet

MATERIALS AND METHOD

Extract solution of Sauerkraut is made of Chinese radish and cabbage wastes, mixed with 2% of salt (w/w) and 6.7% of molasses (w/w), that is incubated for 6 days. Extraction is done mechanically, it was press by 10kg/cm2 for 5 minutes, then extract solution of sauerkraut used to acidify "ikan rucah". "ikan rucah" is taken from "TPI-Tambak Lorok", it was chopped to 3-4 cm, then soaked with extract of Sauerkraut by ratio 1:1 (w/v) with soaking time 0, 4, 8, then that was drained and dried in the sun. To the treatment of soaking and incubation, once soaked with extract that was followed incubation in anaerobic atmosphere for 10 days, then dried in the sun. The dried acidified fish were ground, moisture content, odor, color and texture of acidified fish meal product are parameter observed. Descriptive quantitative analysis is conducted to test the influence of treatment of score of smell, color and texture. Statistical analysis conducted by the GLM-SAS (SAS-Institute, 1982)..

RESULTS AND DISCUSSION

Results of research indicate that after 2 days conditioning, the solvent extracts of LPS have pH 3.48, with the fresh sour smell, so it is feasible to be used as a acidify solution of fish. Table 1 provide completely performance of fish meal after soaking and drying. It appears that the acidity of fish decreased with the soaking time, the average pH in fresh form of fish post-soaking 0, 4 and 8 hours, and soaking followed by incubation are 3.8, 4.0, 4.0 and 9.2. The dipping up to 8 hours did not significantly ($p > 0.05$) reduce acidity solution, but incubation for 10 days significantly decreased the acidity ($p < 0.05$). Soaking time does not significantly affect the odor, color or texture of fish post-dripping. These can be understood considering the fluid of intra- and extra-cellular of tissues is neutral, so that in line with time of soaking number of liquid acid may neutralize extracts solution of LPS and becomes a bit fishy smell. Significantly differences shown by product of incubation, texture of fish become soft like pasty porridge, blackish brown color and stink sting odor ($p < 0.05$). These is incompatible with the Kompiang and Ilyas (1983), Grace and Trinity (1993) and Jatmiko (2002) that describe fish silage have been characterized texture so soft, smooth, reddish brown color and odorize by typically organic acid. It is clear here that the organic acid and the acid bacteria that exists in the extract solution of LPS has not been able to control the activity of growing decomposing bacteria during incubation, is that marked by from the stench and the pH became alkali.

Physic-organoleptically performance of acidified fish meal produced from the two techniques of acidifications provided different results ($P < 0.05$). Moisture content decreased with time of soaking and incubation. Score of odor, color and texture also lower and it is

characterized with a bit rotten smell, colored black brownies and textured a little sticky. These require further study related to the actual nutrition of fish meal produced. The decline in moisture level indicates the amount of free water that is easily evaporated increased and it is reinforce situation where at the time of fresh the texture became soggy and pasty porridge like. Exemption of bound water to be free water may indicated as a corrupt. Increasing of free water is possibly due to releasing water from protein by decomposing bacteria or groups of lactic acid bacteria in the extracts Sauerkraut

Acid production of Lactic acid bacteria running quickly, so that the growth of other unwanted microorganisms can be obstructed (Fardiaz, 1989). However, bacterial acid groups are also proteolytic optionally (Butt, 1999), so that degradation of protein will cause excessive exemptions compound that caused a stench and increasing pH to be alkali. According Desrosier (1988) and Hudaya and Daradjat, (1980), the effectiveness of organic acid for the preservation influenced the amount and type of organic acid used. Evidenced in the case of dipping, organic acids in the extract solution of LPS provide enough acidity to maintain the atmospher e, so it does not expressing damage of preserved product in the form of fresh or dried fish

Table 1. Performance of acidified fish by different techniques of acidification

Treatments	Fresh				Dried			
	pH*	Odor	Color	Texture	Moisture**	Odor	Color	Texture
Dipping								
0 hours	3,75±0,15[a]	typically odor of extract -LPS	slightly reddish	bright, springy	9,8±2,2[a]	a fresh smell, typical fish meal	Light brown	crumbly
4 hours	3,78±0,21[a]	typically odor of extract -LPS	slightly reddish	bright, springy	7,7±2,3[b]	a fresh smell, typical fish meal	Light brown	crumbly
8 hours	3,80±0,20[a]	typically odor of extract -LPS, slightly fishy	Bright reddish	bright, little springy	7,6±2,3[b]	a fresh smell, typical fish meal, slightly fishy	brown	crumbly
Soaking & Incubation								
10 days	8,85±0,3[b]	Decay sting	Brown nigre-scence	Soggy and Pasty porridge like	7,5± 3,3[c]	fishy smell and bit a rotten	Black brownies	a little sticky

Notify : * pH measurements made only on the fresh condition
** Drying is done indirectly with the sun, 8 hours per day for 3 days.

Bacteria used for fermentation of vegetables generally lactic acid type such as Streptococcus, Leuconostoc, Lactobacillus, and Pediococcus. These organisms are capable used sugar to make acid especially lactic acid that may restrict growth of other organisms (Volk and Wheeler, 1992 and Daulay and Rahman 1992). Lactic acid bacteria is a group of bacterial species with the ability to form lactic acid as the results of carbohydrate metabolism and able to grow in low range of pH (Rahayu, 1989).

CONCLUSION

That was conclude that physic-organoleptically performance of acidified fish meal is influenced by the techniques acidification and acidification method by dipping in the extracts LPS performed higher than ensiling method.

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REFERENCES

Afrianto, E. dan E. Liviawaty, 2005. Pengawetan dan Pengolahan Ikan. Cetakan Pertama. Penerbit Kanisius, Yogyakarta

Amin, W. dan T. Leksono. 2001. Analisis pertumbuhan mikroba ikan jambal siam (*Pangasius sutchi*) asap yang telah diawetkan secara ensiling. J. Natur Indonesia. 14 (1). (http: //www.unri.ac.id/jurnal/junal.natur/vol 14(1)/wazna-tjipto.pdf).

BPS Semarang .2005 Badan Pusat Statistik Kabupaten Semarang dalam Angka 2005. Biro Pusat Statistik Kerjasama dengan Pemerintah Kabupaten Semarang, Ungaran

Buckle, K. A., R. A. Edward, G. H. Fleet dan M. Wootton. 1987. Ilmu Pangan. UI-Press, Jakarta. (Diterjemahkan oleh H. Purnomo dan Adiono)

Butt, H. 1999. Exploring Management Protocols For Chronic Fatique Syndrome: A Case For Pro And Prebiotics. Probiotica 8:2-6

Daulay, D dan A. Rahman. 1992. Teknologi Fermentasi Sayuran dan Buah-Buahan. Pusat Antar Universitas Pangan dan Gizi IPB, Bogor. (Tidak Diterbitkan Desrosier, N. W. 1988. Teknologi Pengawetan Pangan. Penerbit Universitas Indonesia, Jakarta. (Diterjemahkan oleh Muljohardjo)

Fardiaz, S. 1989. Fisiologi Fermentasi. Pusat Antar Universitas Institut Pertanian Bogor, Bogor (Tidak Diterbitkan)

Hudaya, S. Dan S. Daradjat, 1980. Dasar-dasar Pengawetan I. Departemen Pendidikan dan Kebudayaan , Jakarta.

Ilyas, S.,F.Cholik, R.Afrifudin, N.Naamin,S.T.Soekarto, Siswoputranto, Soedjarwo dan K.C.Chong. 1988. Prospek Pengusahaan Tepung Ikan Indonesia. Proceeding Lokakarya Tepung Ikan. Pusat Penelitian dan Pengembangan Perikanan,Balitbang Pertanian, Deptan. Jakarta. hal.41-56.

Jatmiko, B. 2002. Teknologi dan Aplikasi Tepung Silase Ikan. Makalah Falsafah Sains. Program Pasca Sarjana (S3). Institut Pertanian Bogor. http://tumoutou.net/702_05123/budhi_jatmiko.htm).

Kompiang, I. P. Dan S. Ilyas. 1983. Pembuatan Silase Ikan dengan Penggunaan Asam Formiat. J. Penelitian Teknologi Hasil Perikanan. 60 : 12-20

Rahayu, K. 1989. Mikrobiologi Pangan. Pusat Antar Universitas Pangan dan Gizi. Universitas Gadjah Mada, Yogyakarta.

Rahmat,A dan J.Trimurti . 1993. Silase Ikan:Kumpulan Hasil-hasil penelitian pasca penen perikanan. Pusat Penelitian dan Pengembangan Perikanan. Jakarta. hal.8-10.

SAS-Institute, 1982. SAS User Guide:Statistics. SAS Institute, Raleigh.

Volk, W. A dan M. F. Wheeler. 1993. Mikrobiologi Dasar. Jilid 2. Edisi Kelima. Erlangga, Jakarta.

Yunizal. 1986. Teknologi Pengawetan Ikan Dengan Proses Silase. Sub-Balai Penelitian Laut Slipi, Jakarta.