DOWNLOAD PDF INDIGENOUS FERMENTED FOOD OF NON-WESTERN ORIGIN (MYCOLOGIA MEMOIR)

Chapter 1 : UCLA Center for Human Nutrition

Buy Indigenous Fermented Food of Non-Western Origin (MYCOLOGIA MEMOIR) on blog.quintoapp.com FREE SHIPPING on qualified orders.

On the other hand, in the placebo-treated group there was no significant difference between baseline and 8 weeks or baseline and 12 weeks. HDL cholesterol levels did not differ significantly within or between the groups at baseline, 8 weeks, or 12 weeks. There were no significant differences in dietary intake within or between groups at 8 weeks. Blood lipid differences between the red yeast rice-treated and placebo-treated groups were already evident at a time 8 weeks , when there were no differences in dietary intake. Differences in dietary intake cannot, therefore, account for the observed decrease in cholesterol. Furthermore, there were no differences in body weight between or within groups at any time. At 12 weeks, the treatment group reported reduced intake of total calories, saturated fat, monounsaturated fat, and fiber intake compared to baseline, but not when compared to the placebo-treated group. Reported total fat intake and polyunsaturated fat intake were lower than reported at baseline, as well as when compared to the placebo-treated group. There were no serious adverse effects in any of the 88 subjects randomized. In the placebo-treated group, three subjects reported minor adverse effects, including: There were no reported adverse events in the red yeast rice-treated group, except for one subject who reported an intercurrent hospitalization for musculoskeletal chest pain at his 12th week visit. He continued the dietary supplement while hospitalized and had a normal electrocardiogram stress treadmill performed by his outside doctor. His chest pain resolved and was not related to the dietary supplement. Liver function tests were measured at baseline and 12 weeks. There were no significant differences between the groups at baseline or 12 weeks. Both were lower at 12 weeks than at baseline. There were no abnormal liver function or renal function tests obtained at any time in any subject under study. In this double-blind randomized, placebo-controlled prospective study, red yeast rice significantly reduced cholesterol levels beyond effects that could be accounted for by diet alone, and without significant adverse effects. The content of Monacolin K is only 0. Therefore, 5 mg is the relevant comparison to 20 to 40 mg of lovastain. At this level, the mixture of monacolins and other substances present in the red yeast may have some effect on cholesterol biosynthesis not explained by the Monacolin K content. It is unlikely to be due solely to a single species of Monacolin, but rather to result from a combination of actions of monacolins and other substances in the red yeast rice. Studies in humans have been conducted in China with both greater and lesser concentrated extracts of the red yeast rice than in our red yeast rice-treated group. In hypercholesterolemic subjects treated with Xuezhikang 1. Two to four weeks before the initiation of this study, subjects were instructed to cease taking all medications and were provided dietary counseling. In a second study, an earlier version of the red yeast rice supplement containing 10 to 13 mg total monacolins was given to hypercholesterolemic subjects. Total cholesterol decreased by HDL cholesterol levels increased by These and other Chinese studies were similar to this study in showing a marked effect of the constituents of this traditional seasoning on cholesterol levels. However, there were differences in the ethnicity and serum lipid levels of the populations studied. Furthermore, a rice placebo was used in the present study conducted in a double-blind fashion, while the Chinese studies used different natural preparations in the comparison group rather than a matched placebo capsule. The benefits of statin drugs on the primary prevention of heart disease and in the secondary prevention of recurrent heart disease have been demonstrated in several large prospective clinical trials. These studies have increased interest in the use of statins for heart disease prevention, such as for individuals with hypercholesterolemia and modest cholesterol elevations. While it is acknowledged that side effects with statins are rare and are dose-related, there are data indicating that some statins may cause liver function abnormalites, and under certain circumstances rhabdomyolysis. A clinical trial in men and women with average cholesterol levels demonstrated that Lovastatin reduced the risk for a first acute major coronary event. The authors suggested a "need for reassessment of the national Cholesterol Education

Program guidelines regarding pharmacological intervention. When considering a population-based public health approach to lowering cholesterol and preventing coronary artery disease, the reduced costs of the red yeast rice dietary supplement compared to prescription drugs could provide a new and novel approach for the maintenance of healthier cholesterol levels. Cholesterol-lowering effects of a proprietary Chinese red yeast rice dietary supplement. Am J Clin Nutrition ; Pennsylvania State University Press. Ann Soc Nat Bot. Solid state fermentation of rice by Monascus Purpureus. Korean Society of Food Sciences. Biological activity of polyketide pigment production by fungus Monascus. Monacolin K, a new hypocholesterolemic agent produced by Monascus sp. Monascus purpureus fermented rice red yeast rice: Comparative pharmacokinetics of lovastatin, simvastatin, and pravastatin in humans. J Clin Pharmacol ; The physiological disposition of lovastatin. Drug Metabolism and Disposition ; A receptor-mediated pathway for cholesterol homeostasis. Preiss Academic Press, Orlando, Fla. Sterol regulation of acetyl coenzyme A carboxylase promoter requires two interdependent binding sites for sterol regulatory binding proteins. Edwards PA, Ericsson J. Signalling molecules derived from the cholesterol biosynthetic pathway: Current Opinions in Lipidology ;9: Signalling molecules derived from the cholesterol biosynthetic pathway. In Bittman R ed. Its functions and metabolism in biology and medicine. Variation in succeptibility to atherosclerosis among inbred strains of mice. Spontaneous hypercholesteolemia and arterial lesions in mice lacking apo E. Apolipoprotein E and the apoliporotein deficient mouse. Apo E deficient mice develop lesions of all phases of atherosclerosis throughout the arterial tree. Apolipoprotein E3-Leiden transgenic mice as a test model for hypolipidemic drugs. Monascus Purpureus red yeast: Nutrition Research, accepted for publication. Wang J, Su M. Clinical trial of extract of Monascus Purpureus red yeast in the treatment of hyperlipidemia. A prospective study on Zhitai capsule in the treatment of primary hyperlipidemia. Red yeast flavored duck. Guangxi, China, Guangxi National Press, ; Prevention of coronary heart disease with pravastatin in men with hypercholesterolemia. Randomized trial of cholesterol lowering in patients with coronary heart disease: The effect of pravastatin on coronary events after myocardial infarction in patients with average cholesterol levels. New Engl J Med. Two-efficacy and safety follow-up. American Journal of Cardiology ; Primary prevention of acute coronary events with Lovastatin in men and women with average cholesterol levels. Lipid-lowering therapy in low-risk patients. Multiple DNA elements for sterol regulatory element-binding protein and NF-Y are responsible for sterol- transcription of the genes for 3-hydroxymethylglutaryl coenzyme A synthase and squalene synthase. J Biochem Tokyo Jun; 6: Measurement of rates of lipogenesis with deuterated and tritiated water. In vivo measurement of fatty acids and cholesterol synthesis using D2O and mass isotopomer analysis. Pathology of atheromatous lesions in inbred and genetically engineered mice. Attenuation of plasma low density lipoprotein cholesterol by select 3-HMGCoA reductase inhibitors in mice devoid of low density lipoprotein receptors. Lipid Research ;

Chapter 2 : CiNii Books - Mycologia memoir

III "Mycologia Memoir No. ll~ '" Indigenous Fermented Food of Non-Western Origin"~ eds. C. W. Hesseltine and Hwa L. Wang Chapter 18 Glossary ofIndigenous Fermented Foods by H.L. Wang and C.W. Hesseltine.

Micro-organisms isolated during the processing include Bacillus, Corynebacterium, Staphylococcus, Micrococcus, Alcaligenes and Citrobacter. Bacil- lus spp was the only isolate, either separately or in combination, able to ferment the seeds into an acceptable product. The source of the organism was investigated. The steeping step, during which the cooked beans are soaked for h, and the leaves used for packaging were considered the major sources of the organism responsible for the fermentation. Introduction Ugba is a fermented legume product relished by most Nigerians, particularly those of Southern States origin. Based on its protein content and quality, it is be- lieved to be a good source of low cost palatable protein Achinewhu , It can be consumed directly after fermentation, or more commonly, mixed with other food ingredients to prepare local recipes. Ugba is prepared by the fermentation of the African oil bean seed Pentaclethra macrophylla Bentham. The methods of preparation vary slightly from place to place. Previous works have been mainly concerned with the nutritional and biochemical changes during fermentation Achinewhu , , , Njoku and Okemadu Apart from the work of Obeta , the microbiology of the fermentation has not been studied in any detail. For example, the source of the fermenting micro- organisms is not known, but it has been speculated that they may have origi- nated from several sources, such as the steeping water, wrapping leaves, and utensils used in processing. However, the issue can only be resolved by a proper study of the ecology of the organisms. Hesseltine and Wang have already highlighted the need for such a study in traditional fermentations. The objective of this study were to determine the nature and members of micro-organisms at various stages of pro- 0 Academic Press Limited 14 H. The effect of using pure isolates to initiate the fermentation was also examined. It is hoped that such information could be used to make recommendations for improved hygienic status at the pro- duction sites, and for the development of a defined starter which is believed to be essential for the upgrading of the pro- duction process. Materials and Methods A field study of the various steps involved in the processing of the African oil bean seed and the immediate environment of the production site were carried out to determine the micro- organisms associated with the processing. Sampling Samples were obtained from a local producer in Choba, Port Harcourt. The local production process is as previously described by Njoku and Okemadu and is shown in Fig. Briefly, it involves boiling of the seeds in water for h to remove the hard shells. The cotyledons are then sliced, boiled for l-2 h and soaked in water for lo h. The samples-were transported in sterile bottles to the laboratory for analysis within 1 h of collection. To ensure uniformity, all samples were collected from the same source. Microbiological studies The processing steps were grouped into four stages, as shown in Fig. The different steps within the stages were analyzed for bacteria, spore forming aerobic bacteria, moulds and yeast. Where appropriate, washings of the seeds prepared with 0. For microbiological analysis of stage D, Tryptone soya Agar was the isolation medium. Anaerobic counts were made under anaerobic conditions using the Gas Pak disposable anaerobic sys- tem. For the airborne organisms, the method of Adams was followed in isolating the organisms in the immediate en- vironment where production was carried out. All counts were done in triplicate and aver- age values are reported. The specific growth rates of the isolates were reported. The specific growth rates of the isolates were cal- culated using the equation described by Sta- nier et al. Controls From preliminary experiments, the second boiling was effective in eliminating the pre- ceeding microbial flora. Thus, controls were set up from this stage to determine the contri- butions of the subsequent processing steps to the microflora. Two control measures were used. Firstly a few slices 10 g of the seed were aseptically transferred into a bottle contain- ing sterile distilled water, and were trans- ported to the laboratory. The bottle was then kept at room temperature for 10 h: Thereafter, samples of the slices and soak water were examined for micro- organisms by standard microbiological tech- niques. A second control measure was set up to

determine the effect of leaves, used in wrap- ping the Ugba. Some quantity of the slices obtained from the first control were separately transferred into dry sterile bottles and sterile polythene bags pierced at intervals to enhance aerobic conditions. Characterization and identification of isolates Colonies were grouped according to their col- onial morphology and cell characteristics. The biochemical tests used to charac- terize the isolates are as described by Sker- man , Harrigan and McCance and Collins and Lyne The probable identities of the isolates were determined, as recommended by Buchanan and Gibbons and Cowan and Steel Laboratory preparation of Ugba using pure isolates as starter The procedure described below for the pro- cessing of the seed was developed after exten- sive preliminary tests designed to simulate the traditional production procedures. The cotyledons were then sliced into sizes of 4- 5 cm x 1. Control experiments showed that this concentration was effective in inhibiting microbial growth. After the desired period of soaking, the soak water was drained and the sliced cotyledons rinsed with sterile distilled water, and aseptically transfered into alu- miniurn foil. The processed seeds wrapped in aluminium foil were inoculated with 1 ml of the appropriate cell suspension of isolates ob- tained during the traditional fermentation. The inoculum comprised either single isolates or combinations of isolates in a ratio of 1: Processed seeds inoculated with sterile distilled water served as control. The progress of the fermentation was deter- mined by sensory and chemical analysis using parameters such as colour, odour, texture, slimyness, pH and amino nitrogen. Chemical analysis The moisture content, temperature, pH, and amino nitrogen were determined, as described in Njoku and Okemadu Texture was determined instrumentally using a portable penetrometer. Results Micro-organisms isolated during processing The total counts of bacteria and yeasts at the different processing steps within the stages are shown in Table 1. Bacteria were the dominant organisms during the processing. Yeasts were only isolated from the unboiled seed, but Gram positive rods and cocci were iso- lated at all stages of processing, Gram negative rods at stage B and spore- forming organisms at stage B, C and D. The highest number of spore-forming organisms were obtained from the leaves used for wrapping processed seeds in stages C. The results show that the re- spective boiling stages were effective in eliminating the proceeding microflora. No organism was isolated from the con- trol experiments carried out under asep- tic conditions. Under such conditions the substrate was not fermented. Fermen- tation was judged by the development of a characteristic aroma and brownish color- ation. Microflora of fermenting Ugba Stage D was considered to be the fermen- tation stage with only bacteria being iso- lated during this stage. The numbers and growth rate of the different isolates during the fermen- tation are shown in Table 3. At the begin- ning of the fermentation, five of the six different isolates were present: Citro- batter spp were first isolated at the 12th h of fermentation. The isolates appeared in high numbers at the beginning with their growth rate pattern being similar in all cases: However, Bacillus consistently had the highest growth rate value throughout the fermentation period. Population of different microbial groups and physical parameters during Ugba fermentation Higher aerobic counts were obtained dur- ing the fermentation Table 4 ;. This level was main- tained for the next 24 h of fermentation, and thereafter a decrease was observed. Anaerobic counts were lower, and ranged from 2. For the proteolytic and lipolytic counts, maxi- mum values of 8. The moisture content during the fer- mentation consistently increased from an initial value of The pH increased from 6. Laboratory preparation with isolates The results of some changes that occurred during the course of Ugba fer- mentation using single and mixed cul- tures of the isolates are shown in Tables 5 and 6, respectively. Single cultures of all isolates were able to bring about a change in colour, amino-nitrogen level and the degree of slimyness, but Bacillus and Corynebacterium spp were the only single cultures able to soften the sub- strate, as shown by the texture results. However, it was only Bacillus that was able to ferment the seed into the charac- teristic desirable odour. In the experi- ments with mixed cultures, it was only combinations comprising Bacillus that changed the sliced cotyledons into a slimy soft product, with the characteristic odour that is considered to be good Ugba. Discussion The results showed that a diveristy of bacterial groups were present during the processing of the African oil bean for Ugba production. Ugba fermentation was initiated through natural inocu- lation. The organisms involved were ob- served to be introduced into the process- ing line after the second boiling stage. Control experiments showed that the

boiling of the sliced cotyledons was effec- tive in eliminating the microflora of stage A; thereafter micro-organisms that enter the system were present during the fer- mentation. Aerobic, spore-forming micro-organisms reported to be the major organisms involved with the fermen- tation Obeta were first isolated during the steeping step in stage B. It may well be at the steeping step of stage B that the inoculation occurs. The detection of enzyme activity before the wrapping step in stage C Njoku and Okemadu is consistent with the view that fermentation begins during the steeping step, when beans are soaked for lo h, so that enzymes are already being pro- duced before the wrapping stage. A simi- lar report has been made by Banigo and Muller , they observed that it is during the steeping step that the desir- able micro-organisms for Ogi fermen- tation are selected. Leaves, as used in stage C, also made a major contribution to the numbers of the major organisms responsible for the fermentation. Wrap- ping materials have been extensively reported Steinkraus et al. Aerial contamination could probably be the primary source of the organisms, since spores were not isolated from the water when the supply source was sampled. The high bacterial counts recorded during the processing, although typical of bacterial food fermentations, where populations of the order of Ta ble 5. Therefore, it seems reasonable to suggest that the critical control points necessary to assume the microbiological safety from the point of the production process are: The use of sterile water or treated water would be useful in ensuring such control, and starter cultures and other packaging materials would further enhance the microbiological safety of the product. In- vestigations are in progress to assess the effect of the different parameters. In this study, the total aerobic counts were higher than that reported by Obeta The differences may be accounted for by the sanitary conditions at the sites of production. The values reported in this study are those of locally produced Ugba, while Obeta reported on labora- tory prepared Ugba. A similar obser- vation was reported by Soni et al. During preparation of fermented foods, there are different possible sources of contamination, while in the laboratory, in spite of attempts to simulate pro- duction conditions, there is an improved hygienic status during processing. Good manufacturing practice require8 effec- tive cleaning of equipment and pro- duction premises Toomey , and this should be adopted in the production pro- cess in order to improve the quality of product.

Chapter 3 : C.W. Hesseltine (Author of Indigenous Fermented Food Of Non Western Origin)

la "Mycologia Memoir No. 11, Indigenous Fermented Food of Non-Western Origin", eds. C. W. Hesseltine and Hwa L. Wang Chapter 16 Nutritional Quality ofFermentedFoods by HwaL. Wang.

A traditional oriental process for the production of a fermented soya sauce essentially comprises preparing koji in a first step, preparing and fermenting moromi in a second step and refining in a third step. The moromi is left to ferment for about 6 to 8 months and then refined by filtration and pasteurization. A major disadvantage of this traditional process is its duration which is necessary for ensuring that the sauce acquires all its aroma through the slow and progressive action, during fermentation of the moromi, of the enzymes produced during preparation of the koji, microorganisms which produce lactic acid and are resistant to the high salt content halophiles , particularly Pediococcus halophilus, and yeasts which produce aromatic substances and alcohol, particularly Saccharomyces rouxii. Accordingly, various processes have been proposed for shortening this duration. This process effectively enables the duration of the moromi fermentation step to be considerably shortened while, at the same time, ensuring that the proteins and carbohydrates are hydrolyzed to a degree comparable with that obtained in a traditional process such as described at the beginning. The fermentation time of the moromi can thus be reduced from about 6 to 8 months to about 4 to 8 weeks for example. Whole soya beans are preferably used for carrying out the process according to the invention. However, in one particular embodiment of the process according to the invention, where the liquor obtained after pressing, pasteurization and clarification is subsequently concentrated, dehydrated and ground, it is also possible to use defatted soya flour for example. The cooked soya may be prepared by soaking crushed soya beans, i. The cooked soya meal is then preferably mixed with crushed roasted grains of wheat, i. This suspension may have a pH of from about 6. The object of this optional addition of sodium chloride is to exert a plasmolysis effect and thus to contribute towards the release of the enzymes. Mixing and the hydrolysis step itself may be carried out, for example, in a double-jacketed tank equipped with a stirrer. The outcome of the hydrolysis step is essentially to provide from the outset all the nutrients required for the microorganisms which are involved in fermentation of the moromi whereas, in the traditional process described at the beginning, these nutrients are only gradually released on account of the high salt concentration. These hydrolysis conditions have to be strictly observed to obtain maximum benefit without any risk of contamination. The results obtained by this hydrolysis are remarkable because, for a total soluble nitrogen of approximately 0. The fermentation of the moromi is preferably induced by acidification of the moromi to a pH value favourable to the work of the yeasts of the soya sauce. This acidification may be carried out either chemically, for example by addition of lactic acid, or biologically by inoculation with a culture of halophilic lactic bacteria. The moromi may be inoculated with a pure culture of Pediococcus halophilus for example. After pasteurization, the liquor is preferably left standing for about 1 to 7 days to allow the insoluble particles which were not removed during pressing to sediment, and is then clarified, for example by passage through a filter paper. Accordingly, it is possible by the process according to the invention to obtain a fermented soya sauce comparable in taste and aroma with a fermented soya sauce obtained by a traditional process such as described at the beginning. In one particular embodiment of the process according to the invention, the clarified liquor is concentrated, dehydrated and ground so that fermented soya sauce is in the form of a powder which may be used as a seasoning or subsequently reconstituted with water in a ratio of 2 or 3 parts by weight water to 1 part by weight powder. Finally, the dehydrated liquor may be ground, for example in a hammer mill, to obtain a fermented soya sauce in the form of a powder in which most of the particles are between 0. In this particular embodiment of the process according to the invention, the koji may also be hydrolyzed in aqueous suspension, for example in admixture with non-fermented cooked soya. A dehydrated and ground fermented soya sauce of high quality is thus obtained from the hydrolysis of a mixture containing approximately 1 to 2 parts by weight non-fermented cooked soya solids to 2 parts by weight koji solids for example. The resulting mixture is

inoculated with a koji culture in a ratio of 1 part culture or spore powder to 10, parts mixture. The mixture is left to ferment on screens for 44 hours with stirring and aeration twice in all. Initially, the suspension is stirred slowly and, as the viscosity of the suspension progressively decreases during hydrolysis, the rotational speed of the stirrer is increased to approximately r. The pH of the suspension, which is 6. The koji suspension thus hydrolyzed has a total soluble nitrogen content of 1. A moromi is prepared by addition of 17 kg sodium chloride to this hydrolyzed koji suspension. The moromi is then pressed in a press. The pasteurized liquor is left standing for 6 days, the insolubles which have sedimented are removed and the liquor is clarified by passage through a filter paper. The fermented soya sauce obtained in this way is comparable in taste and aroma with a soya sauce obtained by a traditional process such as described at the beginning. EXAMPLE 2 The procedure is as in Example 1, except that the koji suspension is hydrolyzed for 8 hours instead of 5 hours and the moromi is left to ferment for 4 weeks instead of 8 weeks. The hydrolyzed koji suspension has a total soluble nitrogen content of 1. The fermented soya sauce obtained after fermentation of the moromi for only 4 weeks is comparable in taste and aroma with the fermented soya sauce obtained in Example 1. The resulting mixture is suspended in water by stirring with 57 kg water in a double-jacketed tank equipped with a stirrer. A moromi is prepared by addition of 17 kg sodium chloride to the hydrolyzed suspension. The procedure is then as described in Example 1 until the clarified liquor is obtained. The liquor is concentrated for about 2. The dehydrated liquor is then ground in a hammer mill equipped with a 1 mm square mesh sieve. The powder-form fermented soya sauce obtained may be used as a seasoning or may be reconstituted by dispersion in water in a ratio of 1 part powder to 2 parts water. The sauce thus reconstituted has a taste typical of a high-quality fermented soya sauce. A process for producing soya sauce comprising: A process according to claim 1 wherein the water is mixed with the koji in an amount of from 1 part to 3 parts by weight water to 1 part by weight koji. A process according to claim 1 further comprising adding sodium chloride to the koji suspension to exert a plasmolysis effect during the heating of the koji suspension. A process according to claim 1 further comprising acidifying the moromi to induce fermentation and wherein the acidified moromi is inoculated with a soya yeast for fermentation. A process according to claim 1 wherein the moromi is acidified with a culture of Pediococcus halophilus to induce fermentation. A process according to claim 1 wherein the moromi is fermented with a culture selected from the group of cultures consisting of a culture of Saccharomyces rouxii and a culture of Torulopsis etchelsii and combinations thereof. A process according to claim 1 further comprising concentrating the clarified liquor, dehydrating the concentrated liquor to obtain solids and then grinding the solids to obtain a powder. A process according to claim 1 further comprising preparing the koji from a mixture of from 50 parts to 90 parts by weight of crushed cooked soya and from 10 parts to 50 parts by weight of crushed roasted wheat. A process according to claim 11 further comprising preparing the koji with a culture of spores selected from the group of spores consisting of spores of Aspergillus oryzai and spores of Aspergillus sojae and combinations thereof.

Chapter 4 : Bioline International Official Site (site up-dated regularly)

 Received July 26th, ; revised August 26th, ; accepted September 4th, Keywords: However, no aflatoxin was detected after 24 hours of fermentation until the final product was obtained. Despite the losses in some nutritional compounds, the fermented product, doklu, was found to have appreciable nutritional quality. Introduction Traditional cereal foods play an important role in the diet of the people of Africa particularly in cereal producing zones. Flour from various cereals is one of the main raw materials used in the production of popular food products with high acceptability, good storage characteristics and affordable cost [1]. Indeed, Cereals have a relatively better mineral profile but the availability of these minerals to human system is low [3]. Phytic acid present in considerable amount in cereal grains [4] may be partly responsible for the low digestibility of starch [5], protein [6] and low bioavailability of minerals [7,8]. A majority of traditional cereal based foods consumed in Africa are processed by natural fermentation and are particularly important as weaning foods for infants and as dietary staples for adults [9,10]. Fermentation of food grains is known to be an effective method of improving the starch and protein digestibility [11] and bioavailability of minerals [4]. Fermentation also brings down the level of antinutrients like phytic acid and polyphenols [7,12]. Doklu is one of these traditional fermented foods produced mainly in the southern parts of country at household level and for family consumption only. It is a snack made from maize flour and eaten at any time of the day. The people often appreciate doklu for its sour taste due to fermentation. In the preparation of doklu, cleaned and washed whole maize grains are steeped in water for 1 or 2 days, milled, mixed into a dough and left to undergo a spontaneous fermentation for 2 - 3 days by desirable microbes in the environment. One portion of the fermented dough is firstly precooked andthen shaped into balls, wrapped in maize husks and boiled for about 3 h Figure 1. Besides improving the digestibility, bioavailability of minerals and reducing the level of antinutrients, fermentation may also change the level of nutrients in the food grains. Indeed, during manufacture of these fermented Figure 1. Flow diagram for production of doklu. This paper reports the effect of spontaneous fermentation as applied at household level on the nutrients composition and aflatoxins rate of maize during the processing into doklu. Materials and Methods 2. All collected samples were immediately transported in an icebox directly to the laboratory for analyses. The pH was determined on 50 ml of the supernatant using a pH-meter P Consort. Total titratable acidity was determined by titrating 30 ml of supernatant used for pH determination against 0. The total titratable acidity was calculated as percentage of lactic acid. Total sugars content were determined by the phenol sulphuric acid method according to Dubois et al. Total carbohydrates were determined according to the method of [16]. The contents of protein, fat, ash and moisture were determined according to the methods described in [17]. The determination of the energy value was done by calculation according to the method proposed by [18], with specific coefficients of starchy foods: Mineral Analyses The method described by the Association of Official Analytical Chemists [19] was used for mineral analysis. This was made up to the mark with deionized water. The minerals were determined from the resulting solution. Sodium [Na] and Potassium [K] were determined using the standard flame emission photometer. NaCl and KCl were used as the standards [19]. Twenty 20 g of maize samples collected throughout the doklu process were extracted with ml acetonitrile: The extract was filtered and the resultant filtrate further purified with a Sepak cleanup column Merck. The dried samples were dissolved in 1 ml acetonitrile: Separation was carried out isocratically using H3PO4 0. The flow rate was maintained at 0. Identification of aflatoxins B1, B2, G1, and G2 in each sample was achieved by comparison with retention times of standard peaks. A series of each aflatoxin standards were used to construct a calibration curve. The

equation obtained from the calibration curve was used to calculate the concentration of aflatoxins in each sample. Statistical Analysis The effect of processing steps on the concentration nutrient and aflatoxins in maize samples was analyzed using the analysis of variance ANOVA with the use of post hoc tests. Tests with P-values less than 0. Results and Discussion 3. Acid Production in Doklu Fermentation The types and amounts of the main acids produced during the process of doklu production are shown in Table 1. Two acids were produced in detectable amounts, namely, lactic and acetic acids. Lactic acid rate was already higher in the maize flour, due to the 2 days soaking stage underwent by maize grains. In fact, according to reference [21], lactic acid bacteria dominate during the soaking stage of the traditional process. And as a result, a significant increase of organic acids takes place. The concentrations of these organic acids increased continuously during the fermentation and reached a maximum total of about 1. After this period, a decrease was observed. The amounts of acids produced in this fermentation are comparable to amounts reported for many other traditional fermented foods. Reference [22] reported 0. The pH dropped significantly during the fermentation from 5. These are relatively quick variations if compared to similar fermentations, and indicates a relatively high fermentation rate. According to references [], the organic acids released e. The undissociated forms of the acetic and lactic acids at low pH exhibit inhibitory activities against a wide range of pathogens. This improves food safety by restricting the growth and survival, in fermented cereal beverages, of spoilage organisms and some pathogenic organisms such as Shigella, Salmonella and E. Fermented maize dough for doklu production with pH value below 3 could have undoubtedly inhibited the growth of such organisms if they were present. Macronutrient and Mineral Composition The macronutrient and mineral composition of samples collected during doklu fermentation are presented in Tables 2 and 3 respectively. The moisture content values of the samples ranged between Effect of fermentation stages on pH, total titratable acidity and organic acids of maize during its processing into doklu. Effect of fermentation stages on proximate composition of maize during its processing into doklu. Effect of fermentation stages on minerals composition of maize during its processing into doklu. This variation in the moisture content is due to the fact that an amount of water is added to the maize flour to make the dough. However, the value obtained for the final product is different of those stated by [28] for kenkey, a similar maize food from Ghana. Moreover, scientific investigation has reported that low moisture content in food samples increased the storage periods of the food products [29]; while high moisture content in foods encourage microbial growth; hence, food spoilage [30]. The proteins, fatty matters and total soluble sugars contents were respectively of 8. These values were significantly reduced during the process of doklu production. As a result of fermentation significant reducetion in crude protein and soluble sugars contents of the food may be attributed in one hand to an increase in protein catabolism by the fermenting microorganisms which leads to the escape of the by-product of metabolic deamination, i. The results are similar to those reported by [31] who observed a reduction in protein content of fermented cereal-legume food mixtures by the action of bacteria and yeasts. Reference [32] also noticed a significant reduction in the protein content of pearl millet when it was fermented with L. According to Reference [33], fermentation may slightly alter the proximate composition substrates. A slight increase in the percentage of protein can be noted. This increase reflects the decrease of other constituents which the microorganisms might have consumed for growth. The decrease of soluble sugars and fatty matters in maize dough during doklu fermentation suggested that the fermenting microorganisms had used them as an energy source. Reduction of fat content was previously mentioned by [34] in their study on the fermentation of pear millet. Ash content of maize seeds was 1. A similar trend was observed during the fermentation of cassava during fufu production by [35]. Data have not been published on changes in the caloric content of food as a result of fermentation processes. Generally only small changes would be expected. In processes such as tempeh production, which are aerobic, the fermentation period is too short to allow large decreases in the total lipids, carbohydrate, or protein components of the food [36]. Effect on Aflatoxins Rate Figure 2 shows the high-performance liquid chromatogram of aflatoxins B1, G1 and G2 extracted from maize grains samples. As it could be seen on the figure, aflatoxin B2 was not detected in maize grains and consequently during all the process of doklu

production. The total amount of aflatoxins detected in the grains was 4. Maize and maize products are known to be susceptible to contamination by fungi that produce secondary metabolites such as aflatoxins [37]. Aflatoxins have been described as extremely toxic and carcinogenic compounds, which appear to be ubiquitous in the environment [38]. The incidence and level of aflatoxin contamination in various food commodities have been monitored worldwide [19] and continues to be of great concern. Aflatoxins, particularly aflatoxin B1 AFB1 , are considered to be the most important of the mycotoxins due to their high toxicity and they are still of major concern to the feed industry and farmers as many raw materials which are used as components of animal feeds are prone to contamination [39]. Their adverse effects involves their mutagenic, carcinogenic especially to kidneys and liver , teratogenic and oestrogen immunosuppressive effects. However, during processing of maize into doklu, important decreases in aflatoxins rates were observed Table 4. After the 2 days soaking, the amount of aflatoxins was reduced to 1. At the fermentation steps no aflatoxin was detected, involving that all the mycotoxins degraded. This study has shown that natural fermentation of maize dough for doklu production can substantially reduce the amount of aflatoxins contamining the raw material. The toxicity of the product was significantly reduced after the soaking and the first time fermentation period with progressive decrease in the pH. This is in agreement with other studies, which clearly show that lactic acid bacteria Lactobacillus strains efficiently remove aflatoxin B1 from the culture solution [42,43]. It has been suggested that removal of toxins is through noncovalent binding of mutagens by fractions of the cell wall skeleton of lactic acid bacteria [44]. However, other alternative mechanism of aflatoxin B1 removal has been reported, in which LAB fermentation opens up the aflatoxin B1 lactone ring resulting in its complete detoxification [45].

Chapter 5 : Process for producing soya sauce - Nestec S.A.

Preface 7 Chapter 1 Food Fermentation Research and Development C.W. Hesseltine and H.L. Wang 9 Chapter 2 History of Chinese Fermented Foods H. L.

Thirty-eight isolates were Gram stained and the 20, which were Gram positive, were identified to genus level using morphological, physiological and biochemical tests. E2, D5, F6 , Streptococcus two isolates: G2 and G4 and Enterococcus three isolates: B3, B4 and G3. From these genera, eleven isolates five from the genus Lactobacillus, three from Lactococcus and three from Leuconostoc were selected for identification to species level using API 50 CH kits. The Lactobacillus strains were identified as follows: Two of the Lactococcus isolates were identified as Lc. The three Leuconostoc strains were Ln. Clear beer is a product of alcoholic fermentation of barley malt and maize adjuncts by a bottom fermenting yeast Saccharomyces carlsbergensis Casida, ; Varnam and Sutherland, Sorghum beer is a product of two fermentations of sorghum malt and straight run maize meal, an alcoholic fermentation by a top fermenting yeast Saccharomyces cerevisiae and a spontaneous lactic acid fermentation Novellie, ; Haggblade and Holzapfel, ; Steinkraus, The lactic acid fermentation in sorghum beer is effected by microorganisms inherent in the raw materials, containers and the surrounding environment Marshall, ; Tamime, ; Nout, ; Mpandi-Khosa, Spontaneous fermentations are difficult to control; are not predictable in terms of length of fermentation and quality of product; can produce unwanted products or products with a short shelf life and are sometimes not safe since they are liable to contamination by pathogens Novellie and De Schaeprijver, ; Tamime, ; Nout, To overcome this problem, the most predominant microorganisms found in an acceptable product are isolated and purified Marshall, ; Tamime, ; Marshall, By so doing, the fermentation can be manipulated in such a way that it is possible to predict the amount and quality of product formed, and the length of the fermentation period Tamime, ; Hesseltine, The most commonly sold sorghum beer in Zimbabwe is termed chibuku. Chibuku has inherent problems of poor and inconsistent quality. Although commercially prepared lactic acid is added during the preparation of wort for chibuku brewing, spontaneous lactic acid fermentation due mostly to mesophilic lactic acid bacteria inherent in the malt has been demonstrated during the later stages of chibuku brewing Mashanda, This spontaneous lactic acid fermentation might be one of the contributing factors to the inconsistent quality of chibuku Novellie and De Schaeprijver, ; Gadaga et al. Thus the main objective of this study was to purify and identify the most predominant LAB that had been isolated from chibuku for later assessment of their potential as lactic acid bacteria starter cultures. The identified genera and species were reportedly associated with sorghum grains and some were found to occur in South African sorghum beers. In Zimbabwe, no work of this nature has been carried out on either chibuku or any sorghum beer. Instead, the only related work was on the determination of shelf life of chibuku that was found to be five days Mashanda, The purity of the isolates had not been previously authenticated. Morphologically different colonies were picked from the plates and each streaked on a separate plate of MRS agar Biolab. The process was repeated until there were no mixed cultures on each plate. Thirtyeight morphologically different isolates were obtained for further investigations. Other tests were catalase test Harrigan and McCance, , oxidase test Collins and Lyne, , nitrate reductase test, oxidationfermentation test and growth in litmus milk Harrigan and McCance, The results obtained for morphological, physiological and biochemical tests were compared with those in standard texts for identification Sharpe, ; Teuber and Geis, ; Garvie, ; Kandler and Wiess, ; Mundt, ; Dellaglio et al. In cases of equivocal results, reference was made to standard texts for identification. All the 20 Gram positive bacteria were negative for the catalase, oxidase and nitrate reduction tests Table 1. The majority of the isolates were identified as belonging to the genus Lactobaccillus 7 with the rest belonging to the genera Lactococcus 5 , Leuconostoc 3 , Enterococcus 3 and Streptococcus 2 Table 1. Except for strain F1, all the other strains were fermentative with no gas production and produced acid in litmus milk Table 1. Strain E3 was the only one that could not grow at pH 4. Strains B1, E3 and F1 did not grow at 6. Strain E1 reacted differently from other

Lactococcus strains by growing in 6. Isolate G5 was the only strain which could grow at pH 4 while isolate G6 was the only strain which showed no growth at pH 5. Isolates E1 and F5 grew at pH 4. Only strains H1 and G6 could grow at pH 9. Strains E2 and F6 could grow at pH 4. Only strain E2 could grow in 6. Two Lactobacillus strains C4 and F4 were identified as Lb. Although strains C4 and F4 were identified as Lb. E6 was capable of metabolizing the highest number of sugars 26 out of 49 while the two Lb. Two Lactococcus strains H1 and G6 were identified as Lc. The third Lactococcus strain F5 was identified as Lc. However, their acid production from ten carbohydrates was variable Table 2. With the exception of the genus Enterococcus, the other genera have been previously reported in African sorghum beers Novellie and De Schaeprijver, ; Haggblade and Holzapfel, Similar to observations in South African beers, the most predominant LAB in chibuku were members of the genus Lactobacillus while leuconostocs were also present but in lower numbers Novellie and De Schaeprijver, ; Haggblade and Holzapfel, The lower numbers of leuconostocs is probably due to their inability to compete with other LAB in mixed cultures Teuber and Geis, The isolation of Lactococcus strains from chibuku is consistent with their previously reported presence in sorghum malt Teuber, The least number of isolates from chibuku belonged to the genus Streptococcus similar to previous observations in other sorghum beers. The source of the Enterococcus strains is not clear since they have not been previously reported in sorghum beer. However, members of this genus are commonly found in plant material Devriese and Pot , and therefore they could have been introduced by the sorghum malt or maize. When selected strains of the genus Lactobacillus were identified to species level as Lb. This was therefore designated Lactobacillus sp. However, ribosomal RNA analysis can be employed to differentiate the two. The two species of lactobacilli identified in chibuku have also been reported in other sorghum beers. Similar to observations made in this study, Lb. However, the occurrence of lower numbers of Lb. The strains belonging to the genus Lactococcus were identified as Lc. Lactococcus lactis has been reported in South African sorghum beers Haggblade and Holzapfel, while this is the first report of Lc. Reports of occurrence of Lc. Their role as spoilage organisms has however not been substantiated since sorghum beer is a live product and even the presence of desirable LAB sometimes results in an undesirable product due to over production of such organic acids and volatile compounds. The identified isolates will undergo tests for lactic acid production and selected for further tests production of desirable organic acids and volatile compounds to assess their potential as starter culture in the brewing of sorghum beer. The lactic acid starter culture will greatly contribute in solving the problem of inconsistent quality and short shelf life of sorghum beers in Zimbabwe as the fermentation process will be under full control. Blackie Academic Press and Professional, London, pp. A review of traditional fermented food beverages of Zimbabwe. International Journal of Food Microbiology 53, Williams and Wilkins, Baltimore, pp. Marcel Dekker, New York, pp. Laboratory Methods in Food and Dairy Microbiology. Applications of Biotechnology to Traditional Fermented Foods. National Academy Press, Washington, D. Regular, nonsporing Gram-positive Rods. CRC Press, Ohio, pp. Fermented milks and their future trends I: Journal of Dairy Research 54, Starter cultures for milk fermentation and their characteristics. Journal Society of Dairy Technology 46, Industrial use and production of lactic acid bacteria. Ethanol fermentation using fission yeast Schizosaccharomyces pombe isolated from Zimbabwe. Upgrading traditional biotechnological processes. Sorghum beer and related fermentation of Southern Africa. Cramer Publishers, Berlin, pp. Modern developments in traditional African beers. Progress in Industrial Microbiology 23, Handbook of Indigenous Fermented Foods. Marcel Dekker, New York. Microbiology of starter cultures. Ed , Dairy Microbiology, vol. The family Streptococaceae non-medical aspects. Technology, Chemistry, and Microbiology, vol. Chapman and Hall, London.

DOWNLOAD PDF INDIGENOUS FERMENTED FOOD OF NON-WESTERN ORIGIN (MYCOLOGIA MEMOIR)

Chapter 6 : MDS: | LibraryThing

Note: Citations are based on reference standards. However, formatting rules can vary widely between applications and fields of interest or study. The specific requirements or preferences of your reviewing publisher, classroom teacher, institution or organization should be applied.

A process for producing soya sauce comprising: A process according to claim 1 wherein the water is mixed with the koji in an amount of from 1 part to 3 parts by weight water to 1 part by weight koji. A process according to claim 1 further comprising adding sodium chloride to the koji suspension to exert a plasmolysis effect during the heating of the koji suspension. A process according to claim 1 further comprising acidifying the moromi to induce fermentation and wherein the acidified moromi is inoculated with a soya yeast for fermentation. A process according to claim 1 wherein the moromi is acidified with a culture of Pediococcus halophilus to induce fermentation. A process according to claim 1 wherein the moromi is fermented with a culture selected from the group of cultures consisting of a culture of Saccharomyces rouxii and a culture of Torulopsis etchelsii and combinations thereof. A process according to claim 1 further comprising concentrating the clarified liquor, dehydrating the concentrated liquor to obtain solids and then grinding the solids to obtain a powder. A process according to claim 1 further comprising preparing the koji from a mixture of from 50 parts to 90 parts by weight of crushed cooked soya and from 10 parts to 50 parts by weight of crushed roasted wheat. A process according to claim 11 further comprising preparing the koji with a culture of spores selected from the group of spores consisting of spores of Aspergillus oryzai and spores of Aspergillus sojae and combinations thereof. A traditional oriental process for the production of a fermented soya sauce essentially comprises preparing koji in a first step, preparing and fermenting moromi in a second step and refining in a third step. The moromi is left to ferment for about 6 to 8 months and then refined by filtration and pasteurization. A major disadvantage of this traditional process is its duration which is necessary for ensuring that the sauce acquires all its aroma through the slow and progressive action, during fermentation of the moromi, of the enzymes produced during preparation of the koji, microorganisms which produce lactic acid and are resistant to the high salt content halophiles , particularly Pediococcus halophilus, and yeasts which produce aromatic substances and alcohol, particularly Saccharomyces rouxii. Accordingly, various processes have been proposed for shortening this duration. This process effectively enables the duration of the moromi fermentation step to be considerably shortened while, at the same time, ensuring that the proteins and carbohydrates are hydrolyzed to a degree comparable with that obtained in a traditional process such as described at the beginning. The fermentation time of the moromi can thus be reduced from about 6 to 8 months to about 4 to 8 weeks for example. Whole soya beans are preferably used for carrying out the process according to the invention. However, in one particular embodiment of the process according to the invention, where the liquor obtained after pressing, pasteurization and clarification is subsequently concentrated, dehydrated and ground, it is also possible to use defatted soya flour for example. The cooked soya may be prepared by soaking crushed soya beans, i. The cooked soya meal is then preferably mixed with crushed roasted grains of wheat, i. This suspension may have a pH of from about 6. The object of this optional addition of sodium chloride is to exert a plasmolysis effect and thus to contribute towards the release of the enzymes. Mixing and the hydrolysis step itself may be carried out, for example, in a double-jacketed tank equipped with a stirrer. The outcome of the hydrolysis step is essentially to provide from the outset all the nutrients required for the microorganisms which are involved in fermentation of the moromi whereas, in the traditional process described at the beginning, these nutrients are only gradually released on account of the high salt concentration. These hydrolysis conditions have to be strictly observed to obtain maximum benefit without any risk of contamination. The results obtained by this hydrolysis are remarkable because, for a total soluble nitrogen of approximately 0. The fermentation of the moromi is preferably induced by acidification of the moromi to a pH value favourable to the work of the yeasts of the soya sauce. This acidification may be carried

out either chemically, for example by addition of lactic acid, or biologically by inoculation with a culture of halophilic lactic bacteria. The moromi may be inoculated with a pure culture of Pediococcus halophilus for example. After pasteurization, the liquor is preferably left standing for about 1 to 7 days to allow the insoluble particles which were not removed during pressing to sediment, and is then clarified, for example by passage through a filter paper. Accordingly, it is possible by the process according to the invention to obtain a fermented soya sauce comparable in taste and aroma with a fermented soya sauce obtained by a traditional process such as described at the beginning. In one particular embodiment of the process according to the invention, the clarified liquor is concentrated, dehydrated and ground so that fermented soya sauce is in the form of a powder which may be used as a seasoning or subsequently reconstituted with water in a ratio of 2 or 3 parts by weight water to 1 part by weight powder. Finally, the dehydrated liquor may be ground, for example in a hammer mill, to obtain a fermented soya sauce in the form of a powder in which most of the particles are between 0. In this particular embodiment of the process according to the invention, the koji may also be hydrolyzed in aqueous suspension, for example in admixture with non-fermented cooked soya. A dehydrated and ground fermented soya sauce of high quality is thus obtained from the hydrolysis of a mixture containing approximately 1 to 2 parts by weight non-fermented cooked soya solids to 2 parts by weight koji solids for example. The resulting mixture is inoculated with a koji culture in a ratio of 1 part culture or spore powder to 10, parts mixture. The mixture is left to ferment on screens for 44 hours with stirring and aeration twice in all. Initially, the suspension is stirred slowly and, as the viscosity of the suspension progressively decreases during hydrolysis, the rotational speed of the stirrer is increased to approximately r. The pH of the suspension, which is 6. The koji suspension thus hydrolyzed has a total soluble nitrogen content of 1. A moromi is prepared by addition of 17 kg sodium chloride to this hydrolyzed koji suspension. The moromi is then pressed in a press. The pasteurized liquor is left standing for 6 days, the insolubles which have sedimented are removed and the liquor is clarified by passage through a filter paper. The fermented soya sauce obtained in this way is comparable in taste and aroma with a soya sauce obtained by a traditional process such as described at the beginning. EXAMPLE 2 The procedure is as in Example 1, except that the koji suspension is hydrolyzed for 8 hours instead of 5 hours and the moromi is left to ferment for 4 weeks instead of 8 weeks. The hydrolyzed koji suspension has a total soluble nitrogen content of 1. The fermented soya sauce obtained after fermentation of the moromi for only 4 weeks is comparable in taste and aroma with the fermented soya sauce obtained in Example 1. The resulting mixture is suspended in water by stirring with 57 kg water in a double-jacketed tank equipped with a stirrer. A moromi is prepared by addition of 17 kg sodium chloride to the hydrolyzed suspension. The procedure is then as described in Example 1 until the clarified liquor is obtained. The liquor is concentrated for about 2. The dehydrated liquor is then ground in a hammer mill equipped with a 1 mm square mesh sieve. The powder-form fermented soya sauce obtained may be used as a seasoning or may be reconstituted by dispersion in water in a ratio of 1 part powder to 2 parts water. The sauce thus reconstituted has a taste typical of a high-quality fermented soya sauce.

Chapter 7 : Indigenous fermented food of non-western origin â€” Schweizerbart science publishers

A variety of fermented foods can be found widespread over the world. Some of them are described in this chapter, mainly to illustrate the complexity of biochemical, nutritional, and sensorial changes that result from an array of microbial activities in a range of raw materials.

Chapter 8 : USA - Process for producing soya sauce - Google Patents

*In "Mycologia Memoir No. 11, Indigenous Fermented Food of Non-Western Origin". eds. C. W. Hesseltine and Hwa L. Wang Chapter 1 * FoodFermentation Research and Development by.*