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Asian Journal of Poultry Science 8 (1): 1-8, 2014 ISSN 1819-3609 I DOI: 10.3923/ajpsaj.2014.1.8 © 2014 Academic Journals Inc. Utilization of Ash in the Salting Process on Mineral Content Raw Salted Eggs Deni Novia, Sri Melia and Indri Juliyarsi Faculty of Animal Husbandry, Andalas University, Limau Manis, Padang, West Sumatera, Indonesia Corresponding Author: Deni Novia, Faculty of Animal Husbandry, Andalas University, Limau Manis, Padang, West Sumatera, Indonesia ABSTRACT Salted eggs in the manufacturing process can be fortified mineral content by utilizing the salting medium containing essential minerals, especially from wood ash and rice husk ash synthetically by a diffusion process. The purpose of this research was different and amounts ash in the process of salting effect on the mineral raw salted egg. This study used a randomized block design with a 2x3 factorial with 3 replications, where the factor A was a type of ash: Husk and wood ash while the B factor was the addition of different amounts of ash that was 1 part, 2 parts and 3 parts. Observations were made on raw salted eggs to albumen (white) pH, ash content, NaCI, P, Ca, Mg and K. Based on the results of the study there was an interaction ash type and ash amount differently to albumen pH, ash content and NaCI, an effect on the type of ash to Ca, Mg and K, affects the ash amount on the Mg content and no real influence on the P content. Utilization of wood ash in salting solution the produce raw salted eggs with a much higher mineral content from of husk ash. The best treatment was the use of wood ash as much as 1 part has been effective in maintaining the albumen pH, salted egg was sintered and minerals that have been optimal. Key words: Salted egg, ash, minerals, albumen (white) pH, NaCI content INTRODUCTION Salted egg can be made by brining eggs in saturated saline or by coating the egg with soil paste mixed with salt. Paste coating method produces were more pronounced dehydration and release of lipids In yolk increased with mcreasmg salting time (Kaewmanee et al., 2009). Mahayana and Hidayati (2011), salting process which produces eggs in accordance with the criteria salted foods taste salty (day 12 and 16) and consumers preferred in a row used media red brick, sawdust, sand and clay. The salted egg Sicincin, West Sumatra, Indonesia is made by a combination of immersion in a saturated solution with the addition of wood ash, producing salted egg with a distinctive taste which favored. Salted eggs are generally made from duck eggs. According to Arunlertaree et al. (2007) removal efficiency of duck egg shell was higher than that of hen egg shell duck egg shells because had more pores per square centimeter than hen egg-shells. This will facilitate the process of diffusion of salts into the egg.

Salts can be derived from NaCI salt used in salting process and can also come from salts contained by the media salting. Husk ash as a result of burning of agricultural waste from rice husk potentially were used alternatively salting media because it contains 86% Si02, 3.6% CaO, MgO 0.27% (Rao et al., 2012). According to Alma'arif et al. (2012) wood ash contains elements of strong bases such as Ca and K are the greatest levels of rice husk ash. The compounds contained in wood ash was 3.56% Ca, 0.97% Mg, 0.52% Na, 4.77% K and 7.77% Si, while rice husk ash containing 0.14% Ca, 0.13% Mg, 1.16% Na, 1.69% K and 43.25% Si. The study from Handayani (2012) was wood ash containing 0.96% P205, 815 ppm Fe, 420 ppm Mn 18 ppm Cu and 86 ppm Zn which contains more wood ash P205, K, Ca and Mg and micro nutrients, Fe, Mn, Cu and Zn over a lot of manure. Purawisastra (2011) research resulted wood ash has the highest alkalinity then market ash and bamboo ash, but husk ash contains no alkalinity at all. These properties will affect the absorption of minerals from the ash into a duck egg during salting process. In principle of making salted eggs is diffusion process of salt particles from high concentration of into the duck egg with a low concentration through the pores of the egg shell. Particles that diffuse into the salted egg comes from marinating solution (NaCl salt and salt from the ashes). According to Peck et al. (2008) passive diffusion process is the usual method to cross the cell membrane, from high concentration to low concentration and does not require energy and is dependent on pH. MATERIALS AND METHODS Materials research: This study uses Tegal duck eggs (Anas javanica) with bluish-green eggshell, age maximum 48 h as many as 180 pieces weighing 65-70 g were obtained from duck farmers in Piai, Banana Village, Pauh subdistrict, Padang City. Then, husk ash, salt were purchased at Pasar Raya Padang and wood ash from the plant out in the Sungai Sapih Village, Kuranji District, Padang City and aquadest. The equipment was used analytical scales, stainless steel spoon, p H meter, AAS (Atomic Absorption Spectrophotometer), furnace, electric oven, desiccators, porcelain bowls, mortar and pestle, clamp the cup, funnel, pumpkin drinks, distiller tools and glass trophies. Research methods: The method was used an experimental method using a randomized block design with a 2x3 factorial with 3 replications, where the factor A was a type of ash: Ash and husk ash wood while the B factor was the addition of different amounts of ash that was 1 part, 2 parts and 3 parts. Linear model of the design that was used: Yijk = m+Si+Ej++Kk+I,ijk SEij Description: i = Many of factors level S (1 and 2) J = Many offactor level E (1, 2 and 3) k = Group (1, 2 and 3) Yijk = Observation value of the S factor in the extent to i, E factor in the extent to j, the group to k f..L = Mean general Si = Level effect to i from factor S (1 and 2) Ej = Level effect to j from factor E (1, 2 and 3) SEij = Interaction effect from level to I from S factor, level to j, E factor Kk = Group effect K at the level to k I,ijk = Error If the resulted of the influence of variance Duncan's test further. Parameters was observed in the raw salted egg was egg albumen p H (using a p H meter), ash content (Furness method), NaCl content (titration method), the levels of P, Ca, Mg and K using AAS (Atomic Absorption Spectrophotometer) . The process of making salted eggs for the working groups as follows: (a) Raw duck eggs as many as 60 points, washed clean. (b) Meanwhile, prepare a solution of salting the water, salt and ash. Where the factor A was kind of ash: Husk and wood while the B factor was the addition of different amounts of ash that was 1, 2 and 3 parts. (c) Eggs were inserted into the media salting each of 10 items. Then, do the marinating for 8 days. (d) After the salting process were observed ash content, albumen pH, ash content and minerals (NaCl, P, Ca, Mg and K). Place of research: Research has been carried out in the Laboratory of Animal Products Technology, Faculty of Animal Husbandry Andalas University. RESULTS AND DISCUSSION p H of albumen (white): Mean pH of raw salted egg whites with the type and number of different ash resulted shown in Table 1. Table 1 it could be seen that the average of albumen pH of raw salted eggs ranged from 8.57 to 9.52. Based on the variance analysis were found significant interaction between the type and the amount of differently ash to pH of raw salted egg albumen. Results Duncan's further test were obtained treatment A2B1 (1 p art of ash wood) of the lowest real other treatments. While pH of raw salted egg albumen highest in treatment A2B3 and not different significantly with treatment A2B2, A1B1. Along with the increase in the number of wood ashes will raise the pH of raw salted egg albumen while increase amount of husk ash the relative in the number of statistically similar. Increase in p H was also due to the CO2 content in egg. The results Wulandari (2004) pH value of albumen immersion results with a lower pressure than the pH of the albumen without pressure immersion salted egg. Reduced CO2 contained in the egg caused an increase in p H, The high albumen p H of raw salted egg in treatment A2B3 and A2B2 along with the high ash content. According to Peck et al. (2008) pH-dependent passive diffusion process. The increase in pH was quite high on this treatment were caused the albumen of raw salted egg with treatment salting process in the solution as much as 3 parts wood ashes were alkaline. The higher the amount of wood ash was added then the solution would be more alkaline, it was in line with the increase in the albumen pH of raw salted egg. Purawisastra (2011) research results the higher the concentration of ash, the higher the alkalinity of the water but husk ash does not contain alkalinity at all. So, no alkalinity to husk ash solution caused albumen salted pH using husk ash as salting medium of the same relative. Table 1: Mean values of albumen pH raw salted eggs results FactorB Factor A BI B2 B3 Mean AI 9.34ab 9.11b 9.02b 9.16 A2 8.57' 9.34ab 9.52a 9.14 Mean 8.96 9.22 9.27 9.15 Mean with different superscript letters indicate significantly different effect (p<0.05), AI: Husk ash, A2: Wood ash, BI: Addition of ash 1 part, B2: 2 parts and B3: 3 parts Table 2: Mean values of ash content raw salted eggs results (%) Factor B Factor A BI B2 BI Mean Ai 2.28b I.56' 2.30b 2.05 A2 I.82' 2. 52ab 2.77a 2.37 Mean 2.05 2.04 2.54 2.21 Mean with different superscript letters indicate significantly different effect (p<0.05), AI.: Husk ash, A2: Wood ash, BI: Addition of ash 1 part, B2: 2 parts and B3: 3 parts The low ash content of the A2B 1 treatment of the other treatments was caused by amount of wood ash was added to 1 part not affect albumen pH. During storage albumen would increase alkalinity. The salting process with 1 part wood ash capable of maintaining the salted eggs pH to minimize the damage. Thin albumen p H of duck research results Adamski et al. (2005) ranged from 8.65-8.84. Ash content: Mean ash content of raw salted egg with the type and number of different ash resulted shown in Table 2. Based on Table 2, it could be seen that the average lowest ash content in treatment AIB2 (Salting in a solution of 2 parts husk ash) was 1.56% and ash content of the highest in treatment A2B3 (Salting in wood ash solution of 3 parts) was 2.77%. Based on the results of variance analysis there was significant interaction between the type and the amount of ash on the ash content of different raw salted eggs. Duncan's test results further treatment did not differ significantly with AIB2, A2BI treatments and significantly different from other treatments. Along with the increasing amount of ash that was used in the salting process would increase ash content. The high ash content A2B3 treatment and did not differ significantly with treated A2B2 were caused by high inorganic compounds in raw salted egg research. The ash content of raw salted eggs sourced from inorganic compounds and inorganic compounds duck eggs salting solution that diffuses into the egg. This was consistent with the analysis of raw salted egg study results using the salting solution of wood ash was much higher content of NaCl, Ca, Mg and K. While mean lowest ash content contained on AIB2 treatment was salting in solution of 2 part husk ash. Low ash levels in AIB2 treatment was caused husk ash by the chemical composition more silica. The lowest in addition, husk ash contains more silica and not affect the mineral content of raw salted eggs. According Alma'arif et al. (2012) husk ash contains 43.25% silica, 1.69% potassium while wood ash contains silica 7.77 and 4.77% potassium. The increase in ash content due to the addition of salt to the salting process that causes the ions Na+(sodium) and Cl-ions (chlorine) into the egg and increase the amount of minerals in the eggs also contained other minerals from the ash. According to Peck et al. (2008) passive diffusion process can exist in either the unionized or ionized form, depending on the pH. According to Forson et al. (2011) duck eggs contain minerals, such as Ca, Cl, K, Na. NaCI content: Mean NaCl content raw salted raw eggs results of the study ranged from 1.80 to 6.28% as shown in Table 3. Based on the variance analysis, there was a significant interaction between the type and the amount of different ash to NaCl content on raw salted egg. Lowest NaCllevel contained in A2B2 treatment and significantly different from other treatments. Highest NaCl content A2BI treatment Table 3: Mean values of NaCl content raw salted eggs results (%) Factor B Factor A B1 B2 B3 Mean A1 3.09b' 4.79ab 2.69' 10.57 A2 5.63a I.47' 4.90' 12.00 Mean 8.72 6.27 7.58 22.57 Mean with different superscript letters indicate significantly different effect (p<0.05), A1: Husk ash, A2: Wood ash, B1: Addition of ash 1 part, B2: 2 parts and B3: 3 parts and significantly different with A1B1, A1B3 and A2B2. According to Kaewmanee et al. (2009) the coating and immersing methods at different times would salting decreases in moisture content with coincidental increases in salt content in both egg white and yolk. In line with the study results Kaewmanee et al. (2011) as the salting time increased, salt content decreased for both cooked salted egg white and yolk. NaCllevels on treatment A2B2 (2 parts wood ash) was 1.47%. NaCI content was almost equal to the results of research, Budiman et al. (2012) salinity eggs salted boiled that have been roasted 10 minutes had higher NaCI content 1.99% albumen and yolk 0.91% (mean 1.45%). Low NaCI content in the treatment of other treatments was influenced the decline of N aCI diffusion process into the egg caused by pH. According to Peck et al. (2008) process of passive diffusion can exist in either the unionized or ionized form, depending on the pH. High NaCI content in treatment A2B1 (a part wood ash) 5.63% was caused by albumen pH the lowest and most optimal NaCI diffusion on the treatment that was sourced from salt solution and wood ash. Laboratory analysis results the Na content of 0.81% from wood ash. Mahayana and Hidayati (2011) salting medium fastest consecutive NaCI absorption was sand (highest porosity), sawdust, red brick and clay with curing time 8 days resulted in NaCIlevels below 2%. NaCI content of 2-4% (according to the criteria of salty taste food) was obtained from the long curing time to 12 and 16 days. Added by Lukito et al. (2012) quail eggs were marinated for 5 days with a saturated salt solution had a higher NaCI content from coating salt dough with husk ash. P content: Mean levels of P salted raw results with the type and amount of different ash shown in Fig. 1. Based on the variance analysis, the type and amount of ash different effect on P content not significant raw salted eggs. P levels salted egg ranged from 0.53 to 2.91%. Ash of Husk and wood containing P in low numbers so that the phosphor content of the salted eggs of different unreal. Ca content: Mean calcium levels raw salted egg results shown in Fig. 2, ranged from 1.00 to 1.40%. Based on the variance analysis types of ash very significant effect on calcium levels. Salting process duck eggs in a solution of wood ash contains calcium was significantly higher (1.39%) of husk ash (1.09%). The high calcium content of raw salted egg salting results utilizing wood ash along with the high calcium content of ash wood. Results of laboratory analysis of wood ash used in this study contains calcium 1.22%, while husk ash contains only 0.93%. Higher calcium content raw salted eggs from ash caused by the existing calcium content in duck eggs. Calcium content of raw salted eggs was higher than ash content's were caused calcium content had in duck eggs. According to Forson et al. (2011) duck eggs were containing 0.27% calcium in albumen and 0.55% in yolk egg. Fig. 1: Mean P content raw salted egg results (%), AI: Husk ash, A2: Wood ash, BI: Addition of ash 1 part, B2: 2 parts and B3: 3 parts Fig. 2: Mean Ca content raw salted egg results (%), AI: Husk ash, A2: Wood ash, BI: Addition of ash 1 part, B2: 2 parts and B3: 3 parts Fig. 3: Mean Mg content raw salted egg results (%), AI: Husk ash, A2: Wood ash, BI: Addition of ash 1 part, B2: 2 parts and B3: 3 parts Mg content: Based on Fig. 3 shown the average Mg content of raw salted egg research. Based on the variance analyses were marked influence the type and amount of ash that was used but there was no interaction on Mg levels. Duncan's test results real wood ashes highest Mg content than husk ash and the addition of 3 parts of the highest real magnesium content was compared to the addition of 2 and 1 part ash. Along with the increasing used of ash will increase the Mg content of raw salted eggs, but the use of 2 parts decreased. Higher mean Mg content salted eggs salting in a wood ashes solution (1.56%) was compared to husk ash (1.47%) due to higher Mg content of wood ash. Laboratory analysis results was Fig. 4: Mean potassium content raw salted egg results (%), AI: Husk ash, A2: Wood ash, B1: Addition of ash 1 part, B2: 2 parts and B3: 3 parts obtained from the Mg content of wood ash 1.54% while husk ash 1.41%. Mg levels decreased upon the 2 parts addition of ash was caused by a more rapid diffusion of Mg in the dilute solution (1 part ash) of the salting process. Potassium content: Based on Fig. 4 looks raw salted eggs potassium levels results. Mean potassium levels ranged from 0.92 to 1.10%. Along with the more addition of ash would increase the potassium levels of raw salted eggs research. Based on the variance analysis were the real effect of the ash type that was used potassium levels. Salted egg results salting in a wood ash solution had significantly higher potassium content (1.054%)from husk ash solution (0.96%). Higher mean levels of potassium raw salted egg research results using wood ash contains potassium were caused higher wood ash from husk ash. Laboratory analysis research of wood ash was potassium 1.26% and 1.08% husk ash. In accordance with the results of the study Alma'arif et al. (2012) potassium content wood ash (4.77%) and husk ash (1.69%). It was added Forson et al. (2011) potassium content of 0.24% in the albumen and the yolk 0.28%. So, that an increase in potassium during the salting process, where wood ash higher diffused into eggs. CONCLUSION Based on the results of the study there was an interaction ash type and ash amount differently to albumen pH, ash content and NaCI, an effect on the type of ash to Ca, Mg and K, affects the ash amount on the Mg content and no real influence on the P content. Utilization of wood ash in salting solution the produce raw salted eggs with a much higher mineral content from of husk ash. The best treatment was the use of wood ash as much as 1 part has been effective in maintaining the albumen pH 8.57, salted egg was sintered with NaCI content 5.63%, minerals that have been optimal (P, C, Mg and Kcontent; 1.05, 1.40, 1.58 and 1.01%) and ash content 1.82%. ACKNOWLEDGMENTS Awards and acknowledgments were addressed to those who have supported the implementation of the competitive research grants, especially to DP2M Education as funding through DIPA Andalas University contracts No: Dipa-023.04.2. 415061 /2013, dated December 5, 2012, then Rector Andalas University, Chairman of LPPM Unand, Dean of Animal Husbandry Faculty, Chairman of Departments Animal Husbandry. REFERENCES Adamski, M., Z. Bernacki and J. Kuzniacka, 2005. Changes in the biological value of duck eggs defined by egg quality. Folia Biol., 53: 107-114. Alma'arif, A.L., A. Wijaya and R.P.D. Murwono, 2012. Removal of acid poison cyanide (HCN) in gadung bulbs using absorbent materials ash. J. Teknol. Kimia Ind., 1: 14-20. Arunlertaree, C., W. Kaewsomboon, A. Kumsopa, P. Pokethitiyook and P. Panyawathanakit, 2007. Removal oflead from battery manufacturing wastewater by egg shell. Songklanakarin J. Sci. Technol., 29: 857-868. Budiman, A., A. Hintono and Kusrahayu, 2012. 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