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Andalasian Livestock

Research Article

Innovative Raw Material for Crackers: Unhairing Durable Dry Salt-Cured Skin with Elephant Grass IMO

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ABSTRACT

Dry salt-cured skin is an alternative material for standard shrimp crisp skin, but it is difficult to discard to discard hair. The alternative is to use indigenous microorganisms (IMO) of elephants grass (*Pennisetum purpureum*), which contain protease enzymes that help the waste process hair. This research aims to determine the effect of using grass elephant IMO in unhairing on dry salt-cured skin with various soaking times cow skin to physicochemical and sensory tests. This research uses the method experiment with a completely randomized design, which consists of five treatments and four repetitions. The treatments were soaking the cow skin in a solution of grass elephant IMO for 12-60 hours. The parameters observed are rate water, rate proteins, texture, lightness (L*), and sensory test (cleanliness of hair, cleanliness of skin, and skin color). The results of the study showed that the length of soaking the skin using IMO elephant grass in the unhairing process had no significant effect (P>0.05) on moisture content, protein content, texture, and lightness (L*) but had a significant effect (P<0.05) on the sensory test; fur cleanliness, skin cleanliness, and color. Results best on study This is on immersion during 24 O'clock with an average rate of water 64.76%, rate proteins 31.51%, texture 56.88h, lightness (L*) 45.81 and sensory test; cleanliness hair 3.97 (clean), cleanliness skin 3.94 (clean), and color 4.63 (sand).

Keywords: Elephant grass, indigenous microorganism, protease, skin cow long-lasting salt, unhairing

INTRODUCTION

Shrimp crisp skin is a snack famous for being crisp, especially in West Sumatra Province standard skin buffalo or skin cow. Skin is generally used and originates from raw skin, which can be obtained from animal slaughterhouses (RPH) or traditional cutting. The largest slaughter of animals occurs during the Hajj Eid, producing large amounts of by-products in the form of skin. However, the skin obtained must be processed immediately because it is easily damaged. Limitations include power work, tools, and place because not all skin can quickly process and become shrimp crisp.

Skin crackers are a popular snack and one of West Sumatra's best products (Juliyarsi *et al.*, 2021). Various skin types can be used as a standard material for alternative shrimp crisp skin. Shrimp crisp skin from skin cow crude protein content is highest compared to shrimp crisp from skin buffalo and fish, and it is lowest on crackers skin chicken (Susanti *et al.*, 2022). Several cracker industries' skin experience constraints on material standards, good availability, and price, one of them shrimp crisp skin. Aulia complained about the high skin price; high raw also becomes_an obstacle to production (Juliyarsi *et al.*, 2019). Limitations in getting skin raw cause several business people to shrimp crisp skin forced roll mat.

DOI: 10.25077/alive.v1.n1.p1-8.2024

Arsyla skin crackers are one of the small and medium industries that process leather crackers and collect leather in large quantities during Eid Hajj. The skin is preserved and becomes skin dry salt preservation so that it can be durable for a long time. It can even stand until a year as a standard shrimp crisp skin. Shrimp's crisp skin from skin dry salt preservation is weak, especially in the complicated unhairing process, needs a long time ago, and remains fur on the skin (Novia *et al*., 2018).

Research using Na_2S 2.4%, NaHS 1.2%, and adding a protease enzyme, centrobate 1000 LVU of 0.25%, can obliterate hair, reduce swelling, and produce pickle skin with the same quality. The production waste produced experienced a significant reduction in COD of 18%, while BOD was less significant, namely 1.4% (Jannah *et al*., 2022). The protease enzyme *Aspergillus sp*., as much as 2.5-3%, can degrade hair on the skin, making the skin surface smooth (Syafie, 2014). Using protease from *Aspergillus oryzae* as much as 15-20% by spraying effectively removes hair from sheep and cattle for 24-48 hours, pH 9.5 (Zekeya *et al*., 2019). The skin unhairing process in rabbits using 4% lime gives a more sensory assessment of the crackers' skin than the boiling process (Amertaningtyas *et al.*, 2010).

One of the ways to overcome unhairing problems is to use a compound-friendly environment. These proteolytic enzymes are obtained using indigenous microorganisms (IMO) at the unhairing *stage* in processing skin crackers—grass elephant IMO, containing protease 18.62 U/ml (laboratory analysis) after fermentation for eight days. This research aims to determine the effect of elephant grass IMO in the dry salt-cured skin detailing process on dry salt-cured skin physicochemical and sensory quality.

MATERIAL AND METHODS

Material Study

The materials used in this research were 20 pieces of dry salt preserved skin, size 10 cm x 10 cm, obtained from factory shrimp crisp range Arsyila, whose address is at Jl. Wind Door No. 38, Kampung Baru Nan XX Village, Lubuk Begalung, Padang City, West Sumatra, Indonesia. The IMO is made from material grass elephant (*Pennisetum purpureum*), with coconut water and sugar. The materials used for protein testing are distilled water, concentrated sulfuric acid, NaOH, MM indicator, and selenium. The equipment used is analytical scales, stainless steel knives, basins, glass measuring, a ruler, scissors stainless steel, a base to throw away meat and fur, a blender, a 1500 ml bottle, Erlenmeyer, Kjeldahl flask, measuring flask, distillation tube, flask, measuring cup, dropper pipette, filter paper, Bunsen, texture analyzer, oven, cup clamp, measuring pipette.

Design Study

The research method used in this study was an experimental method with a complete randomized design with five treatments and four replications. Immersion of dry salt-preserved skin use solution IMO elephant grass with each treatment with a long soaking time: A (12 hours), B (24 hours), C (36 hours), D (48 hours), and E (60 hours). Data obtained continues to test analysis fingerprint variance (ANOVA) using the SPSS (Statistical Program for Social Science) application.

Observed Variables

Observed variables were moisture content using the oven method, protein levels with method Kjedahl (AOAC, 2012), testing the texture using a texture analyzer (Faridah *et al.,* 2006), color lightness test (L*) using Hunterlab colorFlex EZ spectrophotometer (Sede *et al.*, 2015) and sensory test. A sensory test was carried out on the raw material for skin crackers, including the

 DOI: 10.25077/alive.v1.n1.p1-8.2024

skin's physical appearance on a scale of 1 to 5, for fur cleanliness (1 = very not clean, 2 = no clean, 3 = somewhat clean, 4 = clean, 5 = very clean), skin cleanness (1 = very not clean, 2 = no clean, 3 = somewhat clean, 4 = clean and 5 = very clean), and color (1 = tawny, 2 = peanut, 3 = tortilla, 4 = sand, and 5 = egg nog). This sensory test uses untrained panelists who are students and lecturers at the Faculty of Animal Science, Universitas Andalas, as many as 100 people. Each panelist was asked to fill out the questionnaire that had been given.

Implementation Study

The working procedure for making IMO was 160 grams of elephant grass and 80 grams of molasses, blended with 800 ml of coconut water, then put into a 1500 ml bottle and closed tightly so air did not enter it. It was next fermented for eight days. The working procedure for unhairing dried salt-cured skin was 1) The dry salt-cured skin was soaked with a solution of elephant grass IMO: 150% water was put into a container, 50% IMO and 6% lime was added in a mixer in a washing machine for 30 minutes 3) then given a long soaking treatment; A (12 hours), B (24 hours), C (36 hours), D (48 hours), and E (60 hours). 4) then, the sharing process was carried out. 5) Next, observations and tests are carried out for moisture content, protein content, texture, color, and sensory tests.

Time And Research Place

This research was done in the Laboratory Instrument Faculty of Agriculture and the Animal Biotechnology Laboratory, Faculty of Animal Science, Universitas Andalas. The research was carried out from 12 September to 6 November 2022.

RESULTS AND DISCUSSION

Based on Table 1, the analysis of the diversity of dry salt-preserved skin resulting from unhairing using IMO solution had no significant effect on moisture content, protein content, texture, and lightness.

Table 1. Average moisture content, protein content, skin texture, and lightness cow dry salt preservation results study

Treatments	Moisture content (%)	Proteins content (%)	Texture (joules)	*Lightness* (L*)
A	62.33±1.08	34.00±0.90	58.60±6.33	46.58±1.89
B	64.76±2.56	31.51±2.23	56.88±4.50	45.81±6.16
C	62.97±3.50	32.69±3.71	56.75±5.15	47.15±2.89
D	62.66±2.26	33.10±2.40	55.40±4.58	46.39±5.01
E	61.97±0.98	33.59±1.72	58.02±5.84	48.32±1.86

Moisture Content

Dry salt-preserved skin soaking in elephant grass IMO solution had no significant effect on the moisture content of dry salt-cured skin. The longer the skin was soaked in the IMO solution, the less it could affect the moisture content of the unhairing skin. This was caused by Not-yet-optimal proteases in hydrolyzed protein fiber (collagen) on the skin. The opinion of Yuliatmo and Udkhiyati (2020) states that every protease can remove hair efficiently, but not every protease can have the ability to hydrolyze collagen. The study obtained an average mark rate of water on skin cows from 61.97 to 64.76%. Ratan mark rate water produced almost the same with skin fresh beef before soaking. Judoamidjojo (2009) stated that the average chemical composition of fresh skin is 64% water. This shows that giving elephant grass IMO to cow skin did not cause changes in the moisture content contained in the skin.

Proteins Content

There is no significant difference in the protein content (Table 1) of the skin resulting from IMO unhairing grass elephant IMOs because immersion enzyme proteases, which were on elephant grass IMO, could not digest or hydrolyze the proteins in the skin. Skin is not experiencing depolymerization or opening of skin collagen fibers. Consequently, there was not enough enzyme content produced from IMO elephant grass. The longer the cow skin was soaked in the IMO solution, the less collagen structure changed. In this opinion, Gutierres *et al.* (2009) added that in tanning skin in an enzymatic process, soaking or immersion skin happens, opening fiber, solvent, and the disappearance of proteins. In this study, the average protein content value was around 31.51- 34.00%. Irfan (2012) stated that fresh skin removed from an animal's body has 30-32% collagen or proteins.

Texture

Giving grass elephant IMOs on long immersion skin cows had no significant effect on dry salt-cured skin texture (Table 1). There was no real change of any kind treatment caused by the process, which happens from proteases from elephant grass IMO, work on the outermost surface layer of the skin (epidermis layer), work to release hair/feathers on cow skin, and does not work on the layer in structure skin that was part corium skin (collagen). After becoming shrimp, the crisp skin mark texture increases to 132.84 N/cm^2 (Juliyarsi *et al.,* 2020).

Lightness (L*)

It had no natural effect on the lightness value of the skin because it was deep immersion enzyme proteases, which there were in the IMO, does not change the lightness of the skin and is affected by the unhairing process of the skin with elephant grass IMO, as well as deep. This process carries out the same actions for each treatment to produce the same value. The skin in this study had almost the same color as sand matter. This caused enzyme protease moment. Unhairing occurs when the cow's skin is not entirely hydrolyzed, resulting in slightly darker skin due to the remaining hair/feathers still attached. In the section, the skin and the roots of the skin keratin were not obliterated. This was influenced by the enzyme content that was lacking in elephant grass. IMO, sufficient enzyme levels will produce good release on the cow's skin, thus affecting the appearance of the cow’s skin. Syafie (2014) explains. Enzyme levels affect enzyme activity; increasing enzyme concentration makes the enzyme work more optimally for hydrolyzing proteins.

Sensory Test

The diversity analysis results showed that the length of soaking in dry salt-preserved skin using elephant grass IMO had a significant effect (P<0.05) on the sensory value of fur cleanliness and cleanliness of skin and color of skin after the unhairing process. The average mark sensory cleanliness of fur, cleanliness of skin, and color of skin after unhairing can be seen in Table 2.

 DOI: 10.25077/alive.v1.n1.p1-8.2024

Table 2. Average mark sensory cleanliness hair, cleanliness skin, and color

Treatment	Cleanliness Hair	Cleanliness Skin	Color
A	3.36 ± 0.74^{c}	3.29 ± 0.76^{c}	3.96± 0.86^{b}
B	3.97± 0.85^{a}	3.94 ± 0.91^{a}	4.63± 0.83^{a}
C	3.18 ± 0.77^{c}	3.22 ± 0.77^{c}	4.2 1 ± 0.98^{b}
D	3.63± 0.72^{b}	3.62± 0.89^{b}	4.20 ± 0.96^{b}
E	3.60 ± 0.76^{b}	3.61 ± 0.81^{b}	3.38 ± 0.89^{c}

Information: Superscripts with different letters show different significance (P<0.05)

Cleanliness Hair

Results Table 2 shows the average mark of sensory clean fur on skin unhairing using the IMO solution. It ranges between 3.18 (relatively clean) and 3.97 (clean). The average mark sensory cleanliness of the fur on unhairing skin with elephant grass IMO was highest in treatment B with the soaking time IMO for 24 hours, and the lowest average sensory value of cleanliness of fur on detailed skin was found in treatment C with long soaking 36 Hours. The analysis of variance shows that the difference between long immersion skin cows in the process of skin unhairing was influential (P<0.05) in marking the sensory cleanliness of hair on the skin.

Duncan's further test showed that treatment A significantly differed from treatments B, D, and E but not with C treatment on sensory hygiene hair. The length of soaking the skin in a solution of elephant grass IMO was different; in fact, the cleanliness of the cow's fur because what affects the cleanliness of fur is the process of soaking and unhairing, which in this process. The process was the same for all treatments.

The long process of soaking and removing the feathers affects the results of each feather's cleanliness on the skin (Yuliatmo and Udkhiyati, 2020). Immersion plays a role in opening fiber collagen, hydrolyzing globular proteins, and throwing away hair roles in hydrolyzing keratin protein in feathers/hair.

The high-value test sensory cleanliness hair on treatment B due to immersion skin, which contained enzyme protease and was produced from elephant grass IMO, was in optimal condition. This is characterized by the cleanliness of most of the cow's hair and the roots of the hair being lifted during the process of unhairing, which makes the appearance of feather cleanliness cleaner than other skin soaks.

Protease enzymes with optimal conditions in the unhairing process cause reactively enzymatic on the skin; enzymes can break peptide bonds in proteins found in the basement membrane and the base layer of the epidermis and lead to hair release. This enzymatic reaction will spread to other skin substances. The hair roots are targeted by proteases so that the hair can be released from the hair follicle without any damage, and ultimately, the hair follicle and the granular structure of the skin are also destroyed (Sivasubramanian *et al*., 2008a).

In treatment C, the results of feather cleanliness in the sensory test decreased the cleanliness quality of fur on the skin and got the lowest mark from every treatment. This was caused after the process of *unharnessing* took place; quite a lot of remaining hair on the cow's skin was attached to the skin, meaning the fur looked relatively clean.

Decline activity enzyme on treatment this becomes wrong. It influences a decrease in the sensory value of feather cleanliness. Protease enzymes are needed to produce clean skin from hair. Many things influence enzyme activity, thus affecting the quality of the protease produced.

Prayitno (2010) explained that the efficiency/activity of protease depends on pH, temperature, and process time. Protease from the pancreas is active at pH 7.5-8.5, and protease of active fungi at pH 3.5-5.0, while proteases in bacteria are active at alkaline pH ranging from 6-10. Enzymes have an optimum pH, which causes maximum activity. In this study, the pH range of the IMO solution obtained was neutral and close to alkaline; this was because IMO solutions generally have a pH of around 3.5-4.0, and the addition of lime to the process immersion causes pH to go on so that pH approach neutral or base. This will affect the content/concentration of the protease enzyme itself. As well as the influence of temperature, an increase in temperature from 35^{o} to 45^{o} C can affect protease production with a pH range of 7 to 9 (Devi *et al*., 2008).

Cleanliness Skin

Results Table 2 shows the average sensory hygiene values of unhairing cowhide using IMO solution, ranging between 3.22 (somewhat clean) and 3.94 (net). The average sensory value cleanliness of unhairing skin with IMO solution was highest on treatment B with soaking time in IMO solution for 24 hours, and the lowest average sensory value cleanliness skin with unhairing skin was on treatment A with long immersion at noon. Results analysis showed that the difference in soaking time skin in the skin detailing process had a real impact ($P<0.05$) on the quality of sensory cleanliness on the skinned cow.

Duncan's further test results showed that treatment A differed significantly from treatments B, D, and E. However, the difference was not accurate with treatment C. High sensory value of cleanliness of the skin in treatment B affected enzyme levels of protease contained in IMO solution under optimal conditions during the soaking process so that during the unhairing process, the fur skin can be cleaned; this was because the enzymatic reaction of the protease works well in breaking the peptide bonds in the proteins found in the outermost layer of the skin (base layer of the epidermis), which leads to the shedding of hair on the cow's skin. So, the appearance of the hedonic cleanliness tests the skin cow in a way that produces clean skin. Sylvie *et al.* (2014) explained that the considerable protease activity produced makes the enzyme work more optimally to hydrolyze non-collagen proteins, causing the skin tissue structure more open and the tanning agent more easily with the skin.

The lowest hedonic value for skin cleanliness was in treatment C. In this treatment, the skin cleanliness value in the sensory test decreased the quality of cleanliness of skin on the appearance of skin as a whole, and we got value from every treatment. After the unharnessing process as this progressed, quite a lot of remaining hair on the cowhide was attached to the skin, making the skin look relatively clean. The decrease in the quality of skin cleanliness was caused by a decrease in keratin enzyme levels during soaking.

The stability of the enzyme can be affected by various factors, including storage time, temperature, pH, and compounds that can deactivate enzymes, for example, proteases and denaturation. Also, the degree of pH acidity, temperature, and inhibitory substances influence enzyme activity (Prayitno, 2010).

Color

Table 2 shows the average mark color sensory on skin cows in the unhairing process using IMO solution. It ranges from 3.38 (tortillas) to 4.63 (eggnog). The highest average sensory value of color in unhaired skin with elephant grass IMO was in treatment B with a soaking time in IMO solution for 48 hours, and the lowest average sensory value of color in unhaired skin was in treatment E with a soaking time of 60 hours. The analysis of variance shows that differences in

 DOI: 10.25077/alive.v1.n1.p1-8.2024

the length of soaking skin in the skin detailing process have a significant effect (P<0.05) on the sensory value of color in the skin. Duncan's further test results showed that treatment A significantly differed from treatments B and E but not significantly from treatments C and D.

Based on the test sensory, the color of the skin was *eggnog*, namely in treatment B. This was because the skin's surface looked clean from the hair on the cow's skin, and some of the roots on the skin had also been removed. Produces skin that looks cleaner and brighter than other treatments. Skin fully will produce an appearance which different moment enzyme proteases with sufficient Content so that it will produce a clean skin appearance from remaining hair and fur, as well as ideally lifted hair roots; this is to research by Syafie (2014) with sufficient enzyme content, histology that skin produced visible structure collagen start open, the skin is clean, and there are no remaining hairs attached.

The results of research by Sivasubramanian *et al.* (2008b) also explain that proteases, with the right concentration, will target the hair roots so that the hair can be released from the hair follicles without any damage, and ultimately, the hair follicles and the granular structure of the skin will be removed.

CONCLUSION

The use of elephant grass IMO in unhairing dry salt-cured skin had no significant effect (P>0.05) on testing moisture content, protein, texture, and lightness (L*). However, it significantly affects (P<0.05) sensory testing of fur cleanliness, skin cleanliness, and cow skin color. Results the best in this research was the soaked treatment for 24 hours with grass elephant IMOs with an average moisture content of 64.76%, protein content of 31.51%, texture of 56.88h, lightness (L*) 45.81 and sensory value of feather cleanliness 3.97 (clean), skin cleanliness 3.94 (clean), and color 4.63 (sand).

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