Goat Milk Lotion Fortified with Curcuma xanthorizha Roxb

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ABSTRACT

The aim of the research was to determine the effect of different levels of *C. xanthorizha* Roxb to be fortified into goat milk in the manufacture of goat milk lotion on pH level, skin brightness levels, skin moisture levels, and bacterial colonies to evaluate the quality of the lotions during some periods of time. The lotion contained of 1.600 ml goat milk, 100 g *C. xanthorizha* Roxb and other ingredients. The completely randomized design method was used in this research with 4 treatments and 4 replications. P0 is a control using lotion commercially gained from the market, P1 is lotion with 25% goat milk without *C. xanthorizha* Roxb, P2 is lotion with 25% goat milk with 2% C. xanthorizha Roxb, and P3 is lotion with 25% goat milk with 2.5% *C. xanthorizha* Roxb. The research showed that results obtained that lotion pH unchanged from the initial lotion pH, pH of goat milk lotion is still within the range of normal pH based on SNI. Measurement on skin brightness did not have a significant difference from before the use of lotion until the 20th day of measurement. Variable of skin moisture level of panelists showed significantly decreased. However, the total of bacterial colonies variably tended to increase. Measurement of bacterial colonies on day 16 showed that the goat milk lotion experience microbial contamination. Colonies of bacteria contained in goat milk lotion have exceeded the maximum threshold in the set so that the use of lotion must be stopped to avoid unwanted things.

Key word : Goat milk, *C. xanthorizha* Roxb, skin brightness, skin moisture

INTRODUCTION

Dairy goat milk has many benefits for health. The nutritional content of goat milk is not much different from cow's milk and breast milk. Goat milk contains 6.83% fat, 4.81% protein, 3.33% lactose, 5.06% non-fat solid (Sulistyowati *et al.*, 2014). Besides that, goat milk also contains vitamins A, B6, C, B12, D good for skin health (Kumar *et al.*, 2011).

Goat milk is one of the foods that can be an option for some people who can't consume cow's milk. Despite, goat milk does not give an impact at low risk of allergy or cause allergies. Sodiq and Abidin (2008), stated that the goat milk fat droplet diameter is small and homogeneous measuring between 1-10 milimikron, so goat milk is more easily digested by the digestive system and is absorbed by the skin. Goat milk contains caprylic acid that makes the skin health products from goat milk with low pH level because it is alkaline products. It makes the goat milk pH near the pH of human skin as well as prevent dryness while allowing nutrients to penetrate the skin (Anonymous, 2013).

The addition of herbal materials are efficacious in goat milk lotion is expected to protect the skin from adverse environmental effects, and can prevent the presence of wrinkles (aging) as well as enlightening the skin. One of the herbal materials is temulawak (goat) with scientific name of *C. xanthorrhiza* Roxb have many benefits. One advantage of goat based on research Ranti *et al.* (2005), in the testing of the antioxidant activity in the extraction of curcuma showed that curcuma have the potential antioxidant effects amounted to 80.6% and is quite safe to use on human skin to a concentration of 7.5%. Similar to research conducted by Tilaar *et al.* (2009[b]), indeed usage of curcuma extracts in cosmetics showed antioxidant activity of 52.0% - 80.6% with a concentration of 2.5% - 7.5%. However, the high antioxidant activity in curcuma apparently did not inhibit the growth bacteria that cause acne. At a concentration of up to 7.5% use on the skin did not cause allergic reactions and irritation that is safe to use on skin (Tilaar *et al.*, 2009[a]).

Goat is believed to be herbal medicines with natural antioxidant properties, that able to fight free radicals cause skin dryness and wrinkles. This study combined goat milk and curcuma in the manufacture of lotions.The purpose of this study was to determine the effect of different levels of curcuma in the manufacture of herbal goat milk lotion for the pH level, skin moisture level, skin brightness levels , and total colony of bacteria that determine the appropriateness of lotion used and determine a long shelf lotion thus producing the best lotion.

MATERIALS AND METHODS

This study was conducted from May 17 until July 13, 2015, located at the Department of Animal Husbandry Laboratory and the Laboratory of Plant Pests and Diseases Science, Faculty of Agriculture, University of Bengkulu.

The method used in this study was completely randomized design, which consisted of 4 treatments and 4 replications. Treatment 0 (P0) is a control treatment used commercial lotion provided in the market. Treatment 1 (P1) using 25% goat milk without *C. xanthorizha* Roxb. Treatment 2 (P2) using 25% goat milk and 2% *C. xanthorizha* Roxb. Treatment 3 (P3) using 25% goat milk and 2.5% curcuma. Other ingredients were displayed on Table 1.

Table 1. Lotion formulation containing goat milk and *C. xanthorrhiza* Roxb

Ingredients	Composition (% weight)			
	P0	P1	P2	P3
Pasturized dairy goat milk	Commercial Lotion	25	25	25
C. xanthorrhiza Roxb		0	2	2.5
Essential oil		0.5	0.5	0.5
Methyl paraben		0.1	0.1	0.1
Water		60	58	57
Stearid acid		2.5	2.5	2.5
Gliserin		5	5	5
Liquid Parafin		2	2	2
Trietanolamin		1.25	1.25	1.25
Cethyl alcohol		3.25	3.25	3.25

Source: Modified Anita (2008),

The variables measured include pH levels, the level of skin brightness, skin moisture levels and total bacterial colonies during storage. Data retrieval was done on day 1, day 10 and day 20.

Preparation Procedure of Goat Milk Lotion with Addition of *C. xanthorhizza* Roxb

The principle of making lotion is mixing several ingredients with stirring and heating perfectly. The material is separated into two parts, there are oil-soluble materials and water-soluble material (Agnessya, 2008). The oil phase was mixed until homogeneous with heating at 70-75 ^{0} C to form preparation A. The aqueous phase is mixed up with heating homegen 70-75^{0}C to form preparation B. After a second homogeneous mixture is mixed at 70^{0}C which later became part C. Curcuma then mixed into the preparation C when the temperature is 40 ^{0}C and at 37 ^{0}C, methyl paraben inserted into perfomed C, stirring was continued for one minute to form goat milk lotion.

RESULTS ANF DISCUSSION

pH Lotion

Cosmetic or the products that are used for external application associated with the skin, must be in accordance with the acceptance skin pH is 4.5 to 7.5 (Anita, 2008). The average values of pH lotion based treatment and storage time are shown in Table 2.

Based on the results analysis of variance on the measurement of pH value in *C. xanthorhizza* Roxb goat milk lotion treatment showed that the significant effect on pH levels ($P < 0.001$). The highest pH level contained in commercial lotion that was equal to 7.9, while the low pH treatment contained in P1 treatment that goat milk lotion without the addition of curcuma, showed a pH value of 7.2. However, Table 2 shows the different columns lotion pH measurement based on the time of

observation on day 0 until day 20, pH lotions tended to be constant and was still within a safe range to be applied to the skin. Wasitatmadja (1997) stated that the pH values is very high or very low can cause skin irritation.

Table 2. The average values of pH of lotion containing goat milk and curcuma based treatment and storage time

Surveillance	P0	P1	P2	P3	P value
H0	7.9^{a}	7.2^{d}	7.5^{b}	7.3^{c}	.000***
H10	7.9^{a}	7.2^{d}	7.5^{b}	7.3^{c}	.000***
H20	7.7^{a}	6.7^{d}	7.1^{b}	6.9^{c}	.000***
Average	7.8ns	7.0ns	7.3ns	7.1ns	

Note: P0 (commercial goat milk lotion), P1 (goat milk lotion without curcuma), P2 (Lotion + 2% goat milk curcuma), P3 (goat milk Lotion + 2.5% curcuma). H0 (pH lotion at day 0), H10 (pH lotion at day 10). H20 (pH lotion at day 20). Ns (*Non-Significant)*. Different superscripts in the same row treatment showed highly significant (P <0.001), whereas the same superscript in the same columns showed no significant differences (P> 0.001).

Based on SNI 16-4399 - 1996 on a requirement sunscreen preparations ranged from 4.5 to 8. This study, the pH of the lotion is still within the range specified so it is still safe to use within 10 days, but if viewed on the table above pH values lotion on a variety of different treatments, allegedly because of the materials constituent the different formulations. This goes along with research conducted by Anita (2008) that the pH value of the product lotion observed within the range of 7.3 – 7.59 and pH lotion used commercially around 7.24 to 8.45.

Skin Brightness Level

The average of skin brightness level based on treatment and storage time is shown in Table 3 below. Based on the data that measuring the skin brightness before applied the lotion was not significantly different (P> 0.05) compared to the brightness of the panelists' skin after lotion was applied during 20 days. The panelists skin color was between 5-6, so if we analyzed using analysis of variance there is a difference between skin color panelists among the treatment within the same day of test

Table 3. The average of skin brightness level using lotion containing goat milk and curcuma based on treatment and storage time

Surveillance	P0	P1	P2	P3	P value
H0	5.0^{b}	5.75^{a}	5.0^{b}	5.75^{a}	.0097**
H10	5.0^{b}	5.75^{a}	5.0^{b}	5.75^{a}	.0097**
H20	5.0^{b}	5.75^{a}	5.0^{b}	5.75^{a}	.0097**
Average	5.0^{ns}	5.75^{ns}	5.0^{ns}	5.75^{ns}	

Note : P0 (commercial goat milk lotion), P1 (goat milk lotion without curcuma), P2 (Lotion + 2% goat milk curcuma), P3 (goat milk Lotion + 2.5% curcuma). H0 (skin brightness at day 0) , H10 (skin brightness at day 10). H20 (skin brightness at day 20). Ns (Non-Significant). Different superscripts in the same row treatment showed significantly different (P <0.05), whereas the same superscript in the same columns showed the observation variables were not significantly different (P> 0.05).

However, when it was compared in different days within the same treatment there was no difference (P>0.05). This indicated that the use of lotion did not give significantly increase the brightness of the skin panel in several days of usage, however there was a difference due to the addition of *C. xanthorhizza* Roxb in 2.0%.

Skin Moisture Levels

The average of skin moisture levels based treatment and storage time are shown in Table 4.

Skin moisture test was performed using 16 panelists, using a measuring device in the form of skin moisture Skin Moisture Analyzer FCM-I. Analysis of variance showed that among treatments were very significantly different (P<0.01) on moisture levels in day 10 of 5 and 10 minutes testings. While in day 20 in both testings the moisture levels were significantly different (P<0.05). However, when seen at the different time of testings within the same treatments, the moisture levels were very

very significantly different (P<0.001). These showed that the treatment and the day of testing were affected the moisture levels very significantly.

Table 4. The average of skin moisture levels using lotion containing goat milk and curcuma based on treatment and storage time

Surveillance	P0	P1	P2	P3	P value
	(---%---)				
H0	25.6 ± 0.98^{ns}	25.6 ± 0.98^{ns}	25.6 ± 0.98^{ns}	25.6 ± 0.98^{ns}	$.2640^{ns}$
H10 5 menit	49.7 ± 0.58^{b}	51.1 ± 0.58^{a}	48.9 ± 0.58^{bc}	48.2 ± 0.58^{c}	.0043**
H10 10 menit	49.2 ± 0.84^{ab}	50.6 ± 0.84^{a}	48.2 ± 0.84^{b}	47.6 ± 0.84^{b}	.0054**
H20 5 menit	49.1 ± 1.13^{b}	51.2 ± 1.50^{a}	48.7 ± 0.75^{b}	48.8 ± 0.32^{b}	.0150*
H20 10 menit	48.6 ± 1.08^{b}	50.5 ± 1.55^{a}	48.2 ± 0.81^{b}	48.5 ± 0.27^{b}	.0294*
Average	.000***	.000***	000***	.000***	

Note: P0 (commercial goat milk lotion), P1 (goat milk lotion without curcuma), P2 (Lotion + 2% goat milk curcuma), P3 (goat milk Lotion + 2.5% curcuma). H0 (moisture at day 0), H10 (moisture at day 10). H20 (moisture at day 20). Ns (Non-Significant). Different superscripts in the same row treatment showed significantly very different (P <0.01), whereas the different superscripts in the same column treatment showed significantly very very different (P <0.001).

Study conducted by Agnessya (2008), divided five criteria of skin moisture, are dry (0-27%), slightly dry (28-37%), moist (38-47%), more moist (48-57%), and very moist (> 57%). Data on Table 3 based on the time of observation that when compared with the skin moisture panelist on H0 (Before applied goat milk lotion) and H10 (measurement of moisture at day 10) the first 5 minutes and 10 minutes and H20 5 and 10 min showed significant differences (P <0.05) increase in skin moisture more panelists from dry to moist. Significant differences in the first 5 minutes of measurement, visible in treatment P1 (goat milk lotion without curcuma) has a high moisture which is about 51.15. Likewise in the next 10 minutes the measurement showed significant differences (P<0.05) on a variety of treatments, but the same thing on the measurement of the first 5 minutes, treatments that provide high moisture compared to other treatmentsthat is P1 around 50.65. Increased skin moisture from H0 to H10 because in this lotion using basic ingredients such as goat milk that has the ability to moisturize the skin that prevents it from drying so that maintains consistency contained acid mantle of the skin to keep skin moist.

Total Microbial Goat Milk Lotion

The average of Total Microbial Lotion based treatment and storage time are shown on Table 5. Based on the above data there were very significant differences (P <0.05) on the total bacterial colonies among treatments, especially at P2 and P3. However, based on research conducted by Agnessya (2008) and Anita (2008), that the manufacture of skin lotion total number of microbes does not reach 10^2cfu/ gram sample. This confirms with quality requirements lotion based on SNI-16-4399-1996 stating that contamination with the maximum microbial lotion $<10^2$ / g sample.

Table 5. The average of total microbial population of lotion containing goat milk and curcuma based treatment and storage time

Surveillance	P0	P1	P2	P3	P value
	(----10^4cfu/g---)				
H16	375 ± 71.3^{ab}	133 ± 84.7^{ab}	69 ± 8.7^{b}	577 ± 32.2^{a}	.0411**
H20	8 ± 2.12	68 ± 3.53	26.5 ± 5.30	72 ± 45.9	$.5094^{ns}$

Note: P0 (commercial goat milk lotion), P1 (goat milk lotion without curcuma, P2 (Lotion + 2% goat milk curcuma), P3 (goat milk Lotion + 2.5% curcuma), H16 (total bacterial colony at day 16). H20 (total bacterial colony at day 20) . Ns (Non-Significant). Different superscripts in the same row showed significantly different (P <0.01).

This study of goat milk lotion, microbial contamination have exceeded the maximum limits of $>10^4$/gram sample. So it is not secured enough to be used within a period exceeding 16 days. However analysis conducted on day 20 showed the average total bacterial colonies of the treatment

$<10^4$/ gram sample, this is because before the 20th day analysis lotion samples were refrigerated so that the activity of microorganisms was suspended. This is thought to be due to differences in the building blocks in the form of a lotion so provision methyl paraben preservatives can not be equated with a previous study using different base materials. According to Mitsui (1997), the addition of preservatives lotion still quite safe to use up to a concentration of 1%.

CONCLUSION

Based on research conducted at the quality test of goat milk with herb (*C. xanthorrhiza* Roxb) lotion with variabls including pH lotion during storage, skin brightness levels, skin moisture levels, and bacterial plate counts. it can be concluded that the measurement of pH lotion during storage tended to be stable, in the safe range to be applied to the skin. The skin brightness was good with lotion fortified with 2% of *C. xanthorrhiza* Roxb. The moisture level of the skin increased in day 10 of lotion usage. The total tested bacterial colonies on day 16 lotion showed microbial contamination that exceeds a predetermined maximum threshold.

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