

Comparison of Time Duration in Fatliquor Process on Sheep Skin to Produce Waterproof Leather

Ardhi Yusuf Bachtiar¹, Mustakim², Agus Susilo²

¹Master Student at Animal Sciences Faculty in Brawijaya University

²Master Lecturer at Animal Sciences Faculty in Brawijaya University

Abstract— The sheepskin tanning process consists of wet process (Beamhouse), tanning (tanning) and finishing. The finishing process consists of neutralization, staining, oiling, fixation and paint spraying. The purposes of oiling include: lubricating the skin fibers so that the skin is tensile resistant, keeping the skin fibers from sticking to one another and making the skin waterproof. Making skin that is resistant to water must pay attention to oil material, oil concentration and drum spin time so that the skin can be waterproof (Waterproof). The purpose of this study was to determine the ratio of oil concentrations in the finishing so that the skin becomes waterproof. The research was conducted in December 2020 at the Yogyakarta Center for Leather, Rubber and Plastics. The research material used 25 sheets of sheepskin obtained from the slaughterhouse (RPH) of Yogyakarta City, derminol oil and silicone oil. The method used in this study was a completely randomized design experiment (CRD), the research using different drum playback time using derminol 6% with 90 minutes time (P0) and using silicone oil 6% (P1 30, P2 60, P3 90 and P4 120 minutes). The variables observed were oil content, ash content, water content, WVP and water absorption. Statistical analysis used one way analysis of variance (ANOVA) and was in accordance with statistical models.

Keywords— Fatliquoring, waterproof, silicon, finishing leather.

I. INTRODUCTION

Sheep livestock are spread in various areas, which are able to adapt to environmental conditions and minimum resources, and can produce functional values such as meat, milk and skin. The sheep population has increased every year, in 2018 there were 18,720,706 sheep in Indonesia compared to 2017 which amounted to 18,208,017 (BPS, 2018). The skin that is commonly used in the manufacture of products is finished leather, which is leather that has been tanned or processed using chemicals with a certain amount and time. Leather has unique properties and characteristics that are not same by other materials (Prayitno, 2014). Sheepskin originating from Indonesia also has advantages over sheep from other countries due to its smooth, flat and compact structure, so that if the skin is processed properly, it will produce good quality leather too. Indonesia is one of the world's major leather and leather exporting countries along with China, India and Thailand (Thanikaivelan, Rao, Nair and Ramasami 2005). The steps for tanning are beam house, tanning and finishing (Suparno, Anthony and Christine, 2008). One of the stages in the finishing process is the application of oil which aims to make the skin more attractive, elastic and can coat the skin.

The finishing process consists of neutralization, staining, oiling, fixation and paint spraying. The purposes of oiling include: lubricating the skin fibers so that the skin is tensile

resistance, keeping the skin fibers from sticking to one another and making the skin waterproof (Covington, 2009). Fatliquoring has an effect on the skin to hold water into the skin tissue so that it is difficult for water to penetrate the skin layers. In practice, the use of oil is only to increase physical strength without paying attention to the ability to hold water, even though if the skin has these advantages it will be an advantage and increase the selling power of the skin. Time to use the fatliquor is important because it can determine the effect of oil inside the leather and make that leather become waterproof or not. The manufacture of skin that can be resistant to water must care to the oil material, the oil concentration and the time of turning the drum so that the skin can become waterproof (Waterproof).

II. MATERIALS AND METHODS

Research Material

This research was carried out in December 2020 located at the Center for Leather, Rubber and Plastics (BBKPP) and the Laboratory for the Development and Treatment of Leather Waste (LP3K) Yogyakarta.

The research material used 25 sheets of sheepskin obtained from the slaughterhouse (RPH) of Yogyakarta city. Materials used include sheepskin, derminol oil and silicon oil. The tools used include; analytical scales, fleshing machines, gloves, plastic buckets, pH paper, thermometers, tilt boards, shaving machines, soft brushes, hand stacking machines, toggle machines, spray gans, sandpaper, measuring and labeling machines.

Research Methods

The method used in this research is an experimental method using a completely randomized design (CRD) with 5 treatments and 3 replications. The research treatment was carried out by varying different drum playback time using derminol 6% with 90 minutes time (P0) and using silicone oil 6% (P1 30, P2 60, P3 90 and P4 120 minutes). Research variables include oil content, ash content, water content, water absorption and WVP.

III. RESULTS AND DISCUSSION

The treatment of this study using different drum playback time using derminol 6% with 90 minutes time (P0) and using silicone oil 6% (P1 30, P2 60, P3 90 and P4 120 minutes).

Treatment	Tanning Average			WVP (mg/cm ² /hours)	Water absorption (%)
	Oil Content (%)	Ash Content (%)	Water Content (%)		
P0	11,14	1,41	17,33	10,49	109,00
P1	6,97	1,07	18,67	8,34	86,67
P2	7,22	1,20	18,00	8,70	84,67
P3	9,09	1,33	17,00	8,47	76,67
P4	12,26	1,52	17,67	8,51	71,00

Oil Content

The results of the research obtained oil content of 11,14% in P0, 6,97% in P1, 7,22% in P2, 9,09% in P3 and 12,26% in P4. The result showed that using longer time of drum makes the leather oilier, P4 is the highest oil content then P0 with 11,14. Less oil is not good also because it can affect the physical properties of leather. Oil that enters the leather through the skin fibers. The remaining water will be discharged through the drying process naturally in the stretching process (Pratama, 2001). The entry of oil into the skin fibers is as a pelican so that the skin fibers are more freely moved. The oil content in accordance with SNI 6-0564: 1989 is 8-15%, this means that P1 to P4 are still included in SNI, while P0 exceeds the SNI limit.

Ash Content

The results of the research showed that the treatments with a P0 is 1,41% ash content, P1 is 1,07%, P2 is 1,20%, P3 is 1,33% and P4 is 1,52% as content. Ash content is minerale content that exist in tanning skin. Ash content that sticks in leather is happen because material using to process the skin. Some of the mineral elements found in the tanned skin include potassium, calcium, iron, phosphorus, chloride, sulfate, and carbonate (Suparno, Kartika and Mubarak, 2011).

Water Content

The results showed P0 showed 17,33%, P1 showed 18,67%, P2 showed 18,00%, P3 showed 17,00% and P4 showed 17,67%. The results of the study were still in accordance with the water content according to SNI, namely <18%. Water molecules in tanned skin have two effects, namely affecting the maturity of collagen protein fibers because they are trapped in the corners of the helix which results in low tensile strength and tear strength values, as well as microbial growth media in products with high moisture content (Sahubawa, et al. 2011).

Water Vapour Permeability (WVP)

The research treatment P0 obtained results is 10,49 mg/cm²/hour, P1 is 8,34 mg/cm²/hour, P2 of 8,70 mg/cm²/hour, P3 of 8,47 mg/cm²/hour and P4 of 8,51 mg/cm²/hour. The ability of the material to be passed through/penetrated by water has a huge effect on the comfort of the leather product. Low permeability will cause wet feet. High permeability is also not enough, it must be combined with the high absorption properties, because the absorption of sweat by the material for shoes will help the feet stay dry. The

skin has high permeability and absorption properties (Gulbiniene et al., 2007).

Water Absorption

The results of the research showed that the treatments with a P0 value of 109,00%, P1 of 86,67%, P2 of 84,67%, P3 of 76,67% and P4 of 71,00%. According to Indonesian Standart, the maximum water absorption rate for water repellent skin is 90%, this result indicates that using silicon with a time of 90 minutes (P4) gives the best results. The function of oil will provide a layer for water absorption that cannot cover all the fibers of the tanned skin, or it is possible because the mimosa used as a tanning material contains a lot of sugar which can produce gallic acid which causes the skin to swell easily (Nasr et al., 2013) which will increase water absorption.

IV. CONCLUSIONS AND SUGGESTIONS

Conclusion

The conclusion from this research is that the use of silicone 6% with drum playback time 90 minutes gives the best treatment based on the result of oil content, ash content, water content, Water Absorption and WVP.

ACKNOWLEDGMENT

The author would like to thank the family who have provided moral and material support, to the supervisor who has guided the author to completion, and the Center for Leather, Rubber and Plastics who have helped the author in carrying out research, as well as colleagues who have helped the author all this time.

REFERENCES

- [1] Amertaningtyas, D., I. Thohari., Purwadi, dkk. 2008. Pengaruh Konsentrasi Larutan Kapur Sebagai Curing Terhadap Kualitas Fisiko-Kimia Dan Organoleptik Gelatin Kulit Domba Peranakan Ettawah (PE). *Jurnal Ilmu-Ilmu Peternakan*. 24 (2): 1-7.
- [2] Badan Pusat Statistika (BPS). 2018. *Populasi Domba Menurut Provinsi 2016-2018*. Badan Pusat Statistik. Jakarta.
- [3] Kasmudjiastuti, E., R. S. Murti., T. Suraya, dkk. 2019. Aplikasi minyak sulfat dari minyak kelapa sawit (*Elaeis guinensis JACQ*) sebagai *fatliquoring*. *Majalah Kulit, Karet, dan Plastik*. 35(2): 83-92.
- [4] Pratama, D. 2001. Komposisi Kimia dan Kualitas Organoleptik Kulit Biawak Jadi dengan Beberapa Kombinasi Minyak Sawit dan Telur Ayam sebagai Bahan Peminyakan. *Jurusan Ilmu Produksi Ternak*.
- [5] Prayitno. 2014. *Penelitian Pembuatan Kulit Jacket Ramah Lingkungan Menggunakan Bahan Penyamak Nabati*. Prosiding Seminar Nasional Kulit Karet Dan Plastik Ke-3. Yogyakarta.
- [6] Suparno O., A. D. Covington dan C. S. Evans. 2008. Teknologi Baru Penyamakan Kulit Ramah Lingkungan: Penyamakan Kombinasi Menggunakan Penyamak Nabati, Naftol dan Oksazolidin. *Jurnal Teknologi Industri Pertanian*. 18 (2): 79-84
- [7] Tang, K., F. Wang., J. Liu, et al. 2013. Water Vapour Permeability of Leathers By Grey System Theory. *Advanced Material Science*. 33: 373-382.
- [8] Thanikaivelan, P., J. R. Rao., B. U. Nair, et al. 2005. Recent trends in leather making: Processes, problems and pathways. *Crit. Rev. Environ. Sci. Technol*. 35:37-79.