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REVIEW OF INFORMATION TECHNOLOGY UPDATE ON QUALITY CONTROL AND QUALITY ASSURANCE OF HALAL PRODUCTS

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Abstract

Technological developments are very rapid but it does not necessarily with the renewal of information technology to the public due to the limited differences in public interest. Indonesia is one of the most populous countries in the world with the majority of the Muslim population. In line with that, the Muslim community highly upholds the values of Islamic teachings contained in the Qur'an one of the concept of *Halalan Toyyiban.* Information that is rarely accepted by the public is the halal principle of an industrial product, whether food, beverage, cosmetic or other manufacturing industries. This is also supported by the human lifestyle factors on goods from outside the country regardless of the origin of the goods. As a predominantly Muslim country, it is necessary to have simple and accurate information on the use of materials in an industrial product to determine the absence of an industrial product. One of them is the use of derived compounds or single compounds derived from pigs. From several research results that have been done, obtained the image pattern from the examination result of the sample. So that people can easily obtain information about the source of materials used in everyday life.

Keywords: pattern; imagery; product; halal

1. Introduction

Technological developments cannot be avoided from the rapidly growing information update. Information obtained is very easy to obtain and spread throughout the whole society. With the internet media cause lifestyle changes the public more open in the delivery of information. In line with that, the lifestyle of the people, especially Muslims who uphold the values of Islamic teachings contained in the Qur'an one of the concept of *Halalan Toyyiban*. In accordance with Surah Al Baqarah verse 168 which means "O people eat from (food), which is lawful and good on the earth and do not follow the steps of the devil. Verily, the devil is a real enemy to you ". The kosher concept of halal products refers to the raw materials of the products used and their derivatives. The products produced by industry players are closely related to the quality that the market needs. For example the food and beverage industry is a basic requirement of Muslim society. It must include a Halal label in accordance with the rules of the institution entitled to issue such permission. Indonesia is a country with a majority Muslim community. Indonesia has an institution that is entitled to issue a Halal label on the packaging of Industrial products namely Majelis Ulama Indonesia (MUI). Regardless of these institutions, the industry itself has Quality Assurance and Quality Control before

marketing the product. Inspection or sensing technology of the products produced in advance in the production plant and then the industry can market the product thoroughly.

The products that are produced not easily trusted by the Muslim community in accordance with the concept of *halal toyyiban* so it takes the technological renewal to check the product. Due to the very fast growing information through internet media then some research has done it including MUI which has launched Halal MUI application. The public can make a preliminary check on the registration number of the product if it is certified by MUI. Several preliminary studies and technologies have been undertaken by some researchers on the guarantee and control of halal products.

2. Discussion

Use of Scanning Electron Microscope Image Pattern

In testing a product, especially products that have a role as the primary needs of the community, then analyzed chemically and physically. Chemically can see the content and the material compiler of a product produced. It is a qualitative and quantitative chemical analysis. Meanwhile, to see the condition of the product by utilizing human sensing done physical analysis or *organoleptis* test. Scanning Electron Microscope (SEM) is a microscope sensing device that has the ability to detect the surface of a material up to 20,000 times magnification. In this case the test against the use of Pig skin against marketed products include bags, wallets, waist belts, shoes and other similar will be detected directly when using the tool.

Montagna W., 1964 identifies the pig skin epidermis indicating the presence of patterns on the surface of the skin. By utilizing the results obtained in the form of image patterns on the skin of pigs and then compared with the pattern of image images on the skin of other animals so as to ensure suitability or identical. Pig skin has a regular pattern when viewed with a microscope in accordance with the figure 1 when compared with other animal skin as an example of cowhide[1]. Reinforced with image by Carrer D.C. et all, 2008 conducted a study of the surface structure of pig skin and transdermal processes of liposomes: A study of the science of microscopy[2]. So is Abeng K.A. et all, 2016 conducted a study of images of animal skin structure try at some time interval postmortem showed the same pattern at postmortem time 4 hours[3].

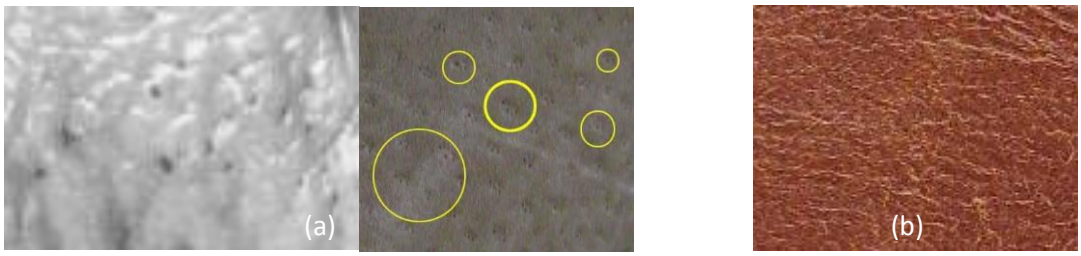

Figure 1. (a) Visual appearance of pig skin surface[4], (b) cowhide surface

Use of Chromatogram imaging pattern from Chromatography analysis

Chromatography is one method of quantitative chemical analysis which aims to separate the compounds contained in a material or sample by utilizing the process of separation based on two phases namely the stationary phase and the mobile phase. Compounds that have properties almost simultaneously with the stationary phase will be retained while the compound having different properties will be passed along with the

mobile phase. The stationary phase used is arranged in such a way in a container called a column. In gas chromatography, its gas phase is gaseous like helium, nitrogen and hydrogen. The result of the imaging of this tool is called a chromatogram. The chromatogram is strongly influenced by the retention time. The retention time is the time required for the mobile phase to separate the compound in the column throughout the column. For detection using this tool the sample used lipid or fatty compounds. This is because, the material added to an industrial product is a direct or derived compound such as triglycerides in lard. The average separation process occurs in 10-30 minutes. The results obtained are almost identical to other fatty material sources such as cows and chicken triglycerides. The difference is the composition of fatty acid content.

Guntarti A. et al, 2016 with the results of the study explains that the oleic is the highest fatty acid composite component in boars has the highest oleic acid (45,43%), then chicken (44,80%), pig (42, 94%), goats (21.71%) and cow (14.94%). In addition to oleic, linoleic acid includes unsaturated fatty acids. The highest linoleic acid content was chickens (11.12%), wild boar (8.46%), pigs (8.17%), cattle (1.15%) and goats (0.67%). The highest content of palmitoleic acid is chicken (6.83%), then boar (2.14%) and pig (1.37%). The amount of unsaturated fatty acid content between oleic, linoleic and palmitoleic acid was the highest (48.03%), wild boar (55.92)% and pig 51.11%. When viewed from the highest content of saturated fatty acids are cows (66.29%), then goats (58.59%), wild boar (36.92%), pig (32.66%) and chicken which is at least 33 , 43%. When compared to the content of saturated fatty acids in chickens, wild boar and pigs show the wild boar most saturated fatty acid content and not saturated. While in pigs content of saturated fatty acid and not the least saturated[5].

Dahimi O. et al, 2014 with research Difference on Pig fat with other fat layer by using FID Chromatography Gas and chemometry yield data that fat content of pigs consist of palmitic acid (C_{16}:0) 35,374% and stearic acid (C_{18}:0) as much as 20,491% while the myristic acid (C_{14}:0) equal to 1,864% and butyric acid (C_4:0) equal to 1,853%[6].

Rohman A. et al, 2012 with research Differences in Pig fat with other fatty layers based on triacylglycerol composition and composite component analysis. This research used High Performance Liquid Chromatography (HPLC) method to obtain data as follows: fatty acid of palmitic (C_{16}:0) 20,66% and stearic (C_{18}: 0) equal to 10,91% while myristic (C_{14}:0) was 1,30% and oleic (C_{18}:1) of 39,13%[7].

Hermanto S. et al, 2008 with research on the profile and characteristics of animal fats (chicken, beef and pig) FTIR and GCMS analysis resulted in data that pig fat contained palmitic acid (C_{16}:0) 7.01% and stearic acid (C_{18}:0) of 13.95% while the myristic acid (C_{14}:0) was 1,07% and the oleic acid (C_{18}: 1) was 40.74%[8].

From the results of the above research shows that the content of pig fat tend to be dominated fatty acid by oleic, stearic and palmitic. These results can not necessarily be used as a reference in determining the halalness of a product. Another comparative test should be performed using the original standards of lard.

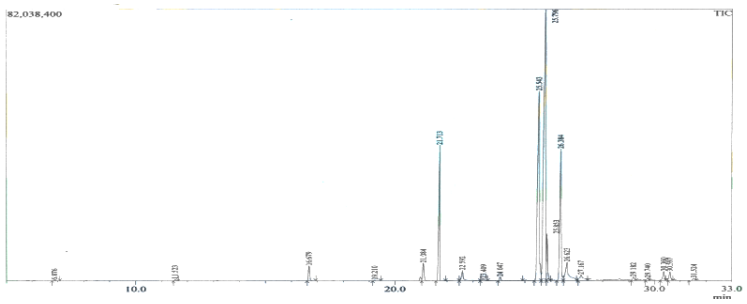

Figure 2. Chromatogram of lard separation results by GCMS QP 2010 Column RTx1-MS (Hermanto S., et all 2008)[8]

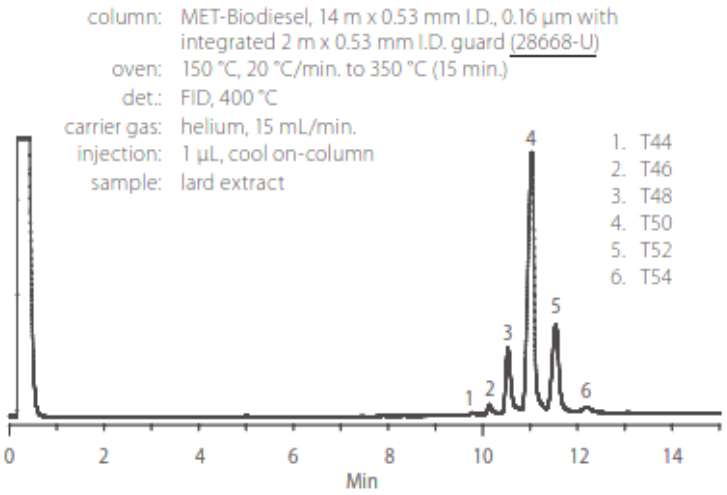

Figure 3. Chromatogram of lard triglycerides by Pavolo M., et all 2008[9]

Use of the Spectrum imagery pattern from Fourier Transform Infrared (FTIR) analysis

This FTIR analysis was exclusively conducted to determine the types of functional groups present in leathers molecule. The functional group is represented by the peak obtained after the analysis. Since the absorption is based on the vibration mode of atoms and very specific, therefore each peak at different wavenumber represents only to specific functional group. An average of 32 scans was carried out in order to determine the peaks which are significant for the statistical analysis, automatically done using the software provided. The analysis was done in mid-infrared (mid-IR) region, where the wavenumber range between 4000 cm^{-1} to 400 cm^{-1}. Most IR application employs the mid-IR, but the near-IR (14285 cm^{-1} to 4000 cm^{-1}) and far-IR (400 cm^{-1} to 0 cm^{-1}) regions can also provide information about certain materials, for example lattice vibrations. However, the majority of instruments are set up to scan only the mid-IR range.[4]

Hermanto S. et al, 2008 on profile research and characteristics of animal fats (chicken, beef and pork) FTIR and GCMS analysis showed that the difference of peak

seen in each sample in the absorption of CH stretching bond in wavelength area 3050-2800 cm^{-1}, then the uptake of the carbonyl group (O = C-H) of the aldehyde in the region of 1746-1744 cm^{-1} and in the fingerprint region 1000-900 cm^{-1}. Pork fat samples dominate by providing an overview of the peaks with elevations above other fat samples. This indicates the presence of the stretching vibration of the identical functional groups in pig fat. In this case the double bond between C = C cis indicated oleic fatty acid (C_{18}:1 cis) or linoleic fatty acid (C_{18}: 2 cis). At 1120-1095 cm^{-1} wavelengths indicating an overlapping in maximum absorption is different from other fat samples indicated by C-H bonds. Furthermore, at wavelengths 966-967 cm^{-1} indicating the presence of trans-unsaturated fatty acids that were investigated by linoleic acid (C_{18}: 2 trans).[8]

Mirghani M.E.S. et all, 2012 in rapid authentication studies on leather and leather products showed that there were differences between wavelengths of 1200-1000 cm^{-1}, 700-600 cm^{-1} and 500-400 cm^{-1}. First, the peak contained in wave 1033 cm^{-1} shows the content of pig skin material and does not look sharp compared to other samples. This shows a small amount of the molecular uptake of the carbonyl amide functional groups and the aromatic aldehyde. Secondly, it lies at a wavelength of 669 cm^{-1} which looks peak down when compared to other spectra in the same region. This shows the weak vibration interaction of the aliphatic amide functional group. Finally at the peak of 472 cm^{-1} clearly visible in the area shows the highest molecular uptake in cow fat from carbonyl group, amide group, or aromatic aldehyde group during formation due to vibration[4].

Kurniawati E. et al, 2014 in the study of analysis of lard in meatball broth using FTIR and chemometry showed that the presence of pork fat content in meatball broth at 1018-1284 cm^{-1} wave field of 1.34% (v / v). Peak with wavelength 3007 cm^{-1} shows vibration strain from C = CH cis indicated oleic acid or linoleic acid with high intensity. Wavelength 1117 and 1098 cm^{-1} show the peak of the C-O strain vibration in triacylglycerol with high intensity as well. Analysis of lard in meatball broth is shown in the wavelength 1018-1284 cm^{-1} by determining the correlation coefficient (R^2) and the root mean square prediction calibration method[10].

From the results of these studies it can be concluded that the use of FTIR against pig fat and its derivatives can be produced the pattern of images in the 3 regions of peak formation. The first area lies at a wavelength of 3000-2000 cm^{-1}, both located in the wavelength region of 1700-1000 cm^{-1}, and the third in the 900-600 cm^{-1} region.

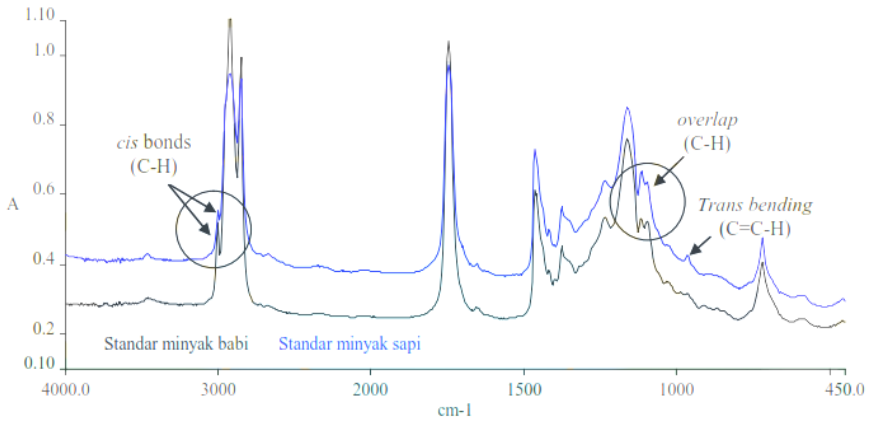

Figure 4. FTIR spectrum of lard and cow fat (Hermanto S. et all, 2008)[8]

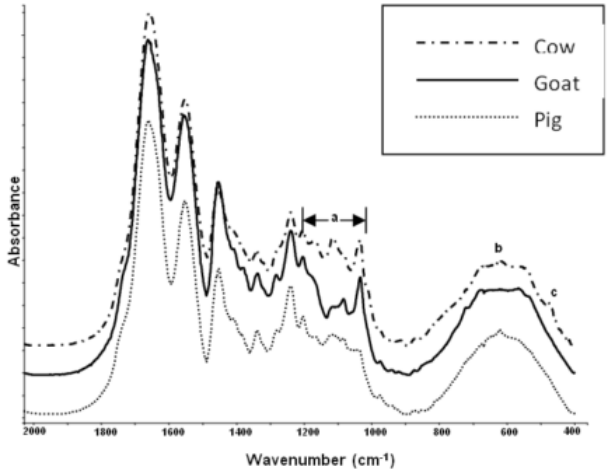

Figure 5. FTIR spectrum of cow, goat and pig (Mirghani M.E.S. et all, 2012)[4]

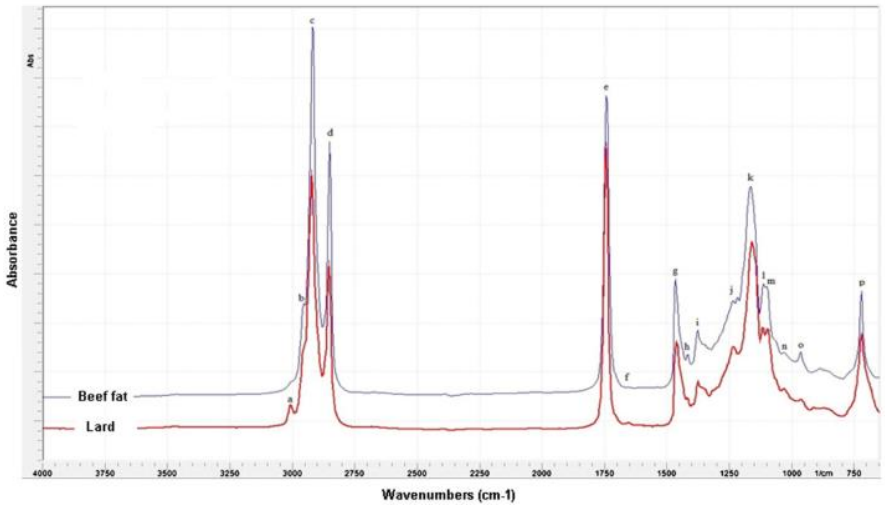

Figure 6. FTIR spectrum of beef and lard (Kurniawati E. et all, 2014)[10]

3. Conclusion

As a Muslim majority country, Indonesia is expected to be one of the examples of lifestyle adoption of halal products in the world as the Islamic teachings contained in the Qur'an. It is very important for a Muslim citizen to know early detection of halal products. Initial detection can be seen physically visible material or research studies that have been done. So that the Muslim population becomes a wise consumer and always uphold the values of Islam in life.

Reference

[1] W. Montagna and J. S. Yun, "The Skin Of The Domestic Pig," *J. Invest. Dermatol.*, vol. 170, no. 1, pp. 11–22, 1963.

[2] D. C. Carrer, C. Vermehren, and L. A. Bagatolli, "Pig Skin Structure And

Transdermal Delivery Of Liposomes : A Two Photon Microscopy Study," *J. Control. Release*, vol. 132, no. 1, pp. 12–20, 2008.

[3] K. A. Abeng, S. J. R. Kalangi, and S. Wangko, "Gambaran Struktur Kulit Hewan Coba Pada Beberapa Interval Waktu Postmortem," *J. e-Biomedik*, vol. 4, no. 1, pp. 7–10, 2016.

[4] M. E. S. Mirghani, H. M. Salleh, Y. B. C. Man, and I. Jaswir, "Rapid Authentication of Leather and Leather Products," *Adv. Nat. Appl. Sci.*, vol. 6, no. 5, pp. 651–659, 2012.

[5] A. Guntarti, A. Rohman, S. Martono, and A. Yuswanto, "Autentikasi Lemak Celeng Dengan Kromatografi Gas- Spektroskopi Massa Yang Dikombinasikan Kemometrika PCA (Principle Component Analysis)," in *Rakernas dan Pertemuan Ilmiah Tahunan Ikatan Apoteker Indonesia*, 2016, pp. 57–63.

[6] O. Dahimi, M. S. Hassan, A. A. Rahim, S. M. Abdulkarim, and S. M. A, "Differentiation of Lard from Other Edible Fats by Gas Chromatography- Flame Ionisation Detector (GC-FID) and Chemometrics," *J. Food Pharm. Sci.*, vol. 2, pp. 27–31, 2014.

[7] A. Rohman, K. Triyana, Sismindari, and Y. Erwanto, "Differentiation Of Lard And Other Animal Fats Based On Triacylglycerols Composition And Principal Component Analysis," *Int. Food Res. J.*, vol. 19, no. 2, pp. 475–479, 2012.

[8] S. Hermanto, A. Muawanah, and R. Harahap, "Profil dan Karakteristik Lemak Hewani (Ayam, Sapi dan Babi) Hasil Analisa FTIR dan GCMS," *Valensi*, vol. 1, no. 3, pp. 102–109, 2008.

[9] M. Povalo and G. Contarini, "Analysis of Triglycerides in Butter and Lard Using An MET-Biodiesel GC Column," *Eur. J. Lipid Sci. Technol.*, vol. 110, no. 11, pp. 1050–1057, 2008.

[10] E. Kurniawati, A. Rohman, and K. Triyana, "Analysis Of Lard In Meatball Broth Using Fourier Transform Infrared Spectroscopy And Chemometrics," *MESC*, vol. 96, no. 1, pp. 94–98, 2014.