

The Opportunities of Using Malay Apple (*Syzygium malaccense* (L). Merr. & Perry) Wood Stem Extract as Halal and Thayyib Antidiabetic Drugs

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ABSTRACT

The use of existing antidiabetic drugs generally causes dangerous side effects, while the use of insulin has a problem with the halal status of the ingredients. Treatment with halal and thayyib medicinal ingredients is needed by Muslims, so it is necessary to find antidiabetic drugs that are halal and thayyib. The use of natural materials such as malay apple can be a solution for halal medicine. The study on antihyperglycemic activity of extracts of malay apple stem wood have been done. In vivo studies were carried out on animal experiments in male swiss webster mice using the glucose tolerance method. The experimental results showed a decrease in blood glucose levels after feeding with extract of malay apple stem wood at doses of 100 mg/Kgbw, 200 mg/Kgbw and 400 mg/Kgbw, which were significantly different compared to the control group (p <0.05), but effective doses shown at a dose of 100 mg/Kgbw. Measurement of moisture and ash content, levels of heavy metal and microbial contamination, showed that the simplicia of malay apple stem wood is safe. The results of this study indicate that malay apple wood extract is a material that is very likely to be used as antidiabetic drugs that are halal and thayyib.

Keywords: antidiabetic drugs, extract wood stem, halal and thayyib, malay apple.

1. Introduction

Diabetes mellitus (DM) is a degenerative disease that characterised by metabolism disruption of carbohydrate, fat and protein, with high levels of glucose in the blood (hyperglycemia) or blood sugar levels of urine (glucosuria) (Rismayanthi, 2010). DM is known as the silent killer, because it is often not realized by patient until complications occurred such as coronary heart disease, stroke and kidney failure. The mortality risk of DM is twice than non-DM in common (Anonim, 2014).

People with severe diabetes, must be given insulin therapy because of the insulin hormone in the body of people with DM cannot be used properly (Rismayanthi, 2010). The insulin hormone is released by the organs of the body called the pancreas; the insulin that being used in the therapy is generally isolated from the pancreas of cows or pigs (Nuryani et al., 2015). In Islamic law the use of parts of pigs and their derivatives is unlawful (haram), according to alqur'an in Al-Baqoroh 173 and Al-An'am 145

(Rahman, 2010), the use of this prohibited ingredients in drugs will have a negative impact on the user's faith, i.e the worship is invalid, not acceptable (in vain), sinful, and threatened with hell. The goal of treatment is to heal the patient, halal medicine guarantees healing and blessing from Allah SWT as stated in the Hadith narrated by Abu Daud from Abu Darda which said, Allah has sent down both the disease and the cure, and He has appointed a cure for every disease, so treat yourselves medically, but use nothing unlawful' (Sfaat, 2013).

Most of antidiabetic drugs that have been used have dangerous side effects (D'Adamo et al., 2006). It's became big challenge to find safe antidiabetic drugs. A safe material, is a material that is free from pathogenic microbes and harmful chemicals. It is also called an ingredient which is thayyib (Santosa, 2015). Natural antioxidants contained in plants have the ability to inhibit the occurrence of degenerative diseases, so the consumption of natural antioxidants can prevent or slow down diabetes

effects (Arumugam et al., 2014). The use of Malay Apple (*S. malaccense*) wood stem extract, is expected to give us new diabetes drugs that are halal and thayyib.

The Opportunities of Using the Malay Apple (*S. malaccense*) wood stem extract as antidiabetic are likely to be like the leaf part, that showing antioxidant and antidiabetic activity (Arumugam et al., 2014). The antioxidant activity of Malay Apple (*S. malaccense*) wood stem extract has been proven from previous studies (Fauziah & Musthapa, 2019), while the chances of antidiabetic activity can be seen from the presence of antihyperglycemic activity.

2. Materials and Methods

2.1. Plant Material

The Malay Apple tree that used as raw material source was taken from Sukawening village of Garut regency, West Java, in April 2018. The material that we used was a wooden tissue of Malay Apple stem without the bark, which then made dry powder with 2 weeks drying process.

2.2. Reagents and Solvents

The chemicals used in this research were ethanol as solvent extract, glibenclamide, tragacanth 1%, demineralized water, ethanol 95%, chloral hydrate, toluene, chlorophome, Na₂SO₄ anhydrous

2.3. Moisture and Ash Content

Determination of water content and ash content was carried out with the aim to determine the feasibility of a material as a raw material for medicine. In this study, the gravimetric method was used to determine ash content (BPOM, 2000) and distillation with toluena method for moisture content (Dewar & McDonald, 1961)

2.4. Determination of Metals and Microbial Contaminant

Determination of metals and microbial contamination were carried out at Agro Based Industry Calibration and Analytical Laboratories (ABICAL), Bogor, Indonesia. Determination of lead and cadmium levels with the test method that refers to AOAC 999.1 1 (9. 1.09.2005). Determination of lead and mercury refer to SNI 01-2896-1998 and arsenic refers to SNI 01-4866-1998. While the determination of microbial contamination, that is, *E. coli* refers to BAM 2002, *Salmonella* refers to ISO 6579: 2002.

Fungi and yeast refers to BAM 2001, and *Bacillus cereus* refer to AOAC 18th ed. 2005

2.5. Extraction

Simplicia of stem of Malay Apple (0.4 kg) was macerated for 3 x 24 hours using 95% ethanol (Aksara et al., 2013). The extract that has been collected was then evaporated using a Rotary Vacuum Evaporator IKA RV 10 B to obtain dry ethanol extract.

2.6. Measurement of Hyperglycemia

The antihyperglycemic activity was carried out using glucose tolerance method (Adnyana et al., 2004). Thirty (30) Swiss webster male mice at age 2-3 month were weighed after fasting for 18 hour without limitation drinking acces. Measurement of glucose level was done using a glucometer. Mice were divided into 6 groups, the negative control group was given aquadest, positive control group was given suspension of 1% tragacanth, comparison group was given glibenclamide 5 mg/kgbw, test group 1, 2, and 3 were given ethanol extract of Malay Apple wood stem at doses of 100, 200, and 400 mg/kgbw respectively. 30 minutes later, glucose solution 2 g/kg bw were given to all group except negative control. The measurement of blood glucose level were carried out at 30, 60, 90, 120 after glucose feed

3. Results and Discussion

The results of the sample determination from the laboratory at the School of Biological Sciences and Technology of ITB stated that the samples taken from plants known as Jambu bol or Malay apple or pomerac were from the species of *Syzygium malaccense* (L). Merr. & Perry, familia of Myrtaceae, Myrtales, Rosidae class, Magnoliopsida Class, and Magnoliophyta Division. The determination shown water content and ash content of simplicia were below the maximum level that means the wooden of Malay Apple stem is safe to use as medicine or food (Table 1) (Sardjon et al., 2012).

Table 1. Moisture and ash content of wooden tissue of malay Apple

Parameter	Wood tissue	Standard* (Maximum Level)
Moisture content (%)	4,6%	≤ 10%
Ash Content(%)	3,22%	≤ 10%

*Indonesia Ministry of Health Regulations no 661/MENKES/SK/VII/1994

The examination results on metal contaminant and microbial contamination refer to previous studies with the same sample (Fauziah & Musthapa, 2019). The analysis was based on SNI (Indonesian National Standard) 7387: 2009 concerning the maximum limit of metal contaminants in food. It shows that the contents of Pb, Cadmium (Cd), Tin (Sn), Mercury (Hg) and Arsenic (As) in the simplicia on wooden tissue of Malay Apple stem were under the maximum limit. This shows that simplicia is safe for use as medicine and food. Likewise, the results of the examination of microbial contamination showed similar results (Sardjon et al., 2012). Because of the simplicia is safe for use as medicine and food, so the extract of wooden tissue of Malay Apple stem have thoyyib category.

The selection of extraction techniques was based on the physicochemical properties of the extract being studied. The selected extraction method was cold maceration. The dried and powdered of the wooden Malay Apple (0.4 kg) was macerated with ethanol 95% (Fauziah & Musthapa, 2019). Extraction results obtained in the form of a clear yellow solution with a distinctive aroma of Malay Apple (*S. malaccense*), after evaporation obtained 11.03 g of dried extract.

The results of the antihyperglycemic activity test on ethanol extract from the wooden tissue of the Malay Apple stem are shown in the Figure 1.

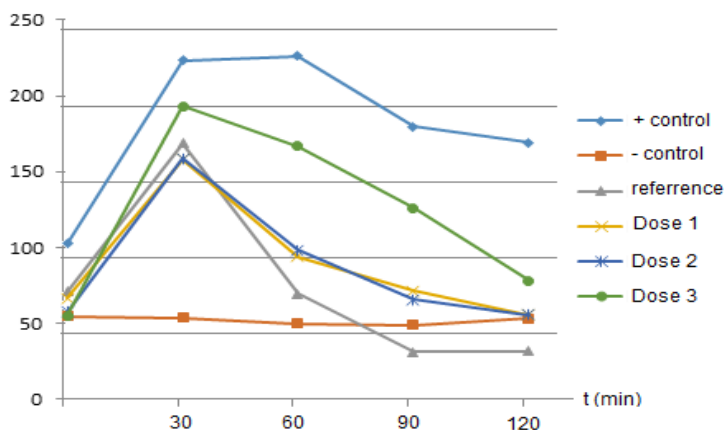


Figure.1. Graph of Average Blood Glucose Levels in Mice Before and After Treatment.

The negative control group (without glucose induction), showed stable glucose levels, indicating a validation as other factors beyond glucose induction did not interfere with the validation of the test results.

Mice that were only given a glucose solution (control group) showed an increase in blood glucose levels (hyperglycemia) in the 30th minute and in the 120th minute the glucose level returned to decline, but still in the condition of hyperglycemia. This happens because glucose induction can cause an increase in blood glucose levels and after 2 hours returned to decline because of some glucose has entered the cell (Adnyana et al., 2004).

The pattern of changes in the reference group, the 1, 2 and 3 dose groups were almost the same, indicating that Malay Apple stem wood extract had an antihyperglycemic effect similar to glibenclamide which was a reference

drug (Adnyana et al., 2004). The ability of ethanol extract of malay Apple stem wood in reducing sugar blood levels might be due to the content of secondary metabolites it has such as flavanoids, tannins, saponins, steroids / triterpenoids, phenols and quinones (Fauziah & Musthapa, 2019).

Based on data (Figure 2), it appears that the control group (+) in the 30th minute experienced an increase in blood glucose levels because the positive control was only given a tragacanth 1% suspension and was unable to suppress blood glucose levels after glucose absorption which can stimulate insulin release so that in the 60th minute to the 120th minute there was a decrease in blood glucose levels

The results of the Kruskal-Wallis (Wulandari, 2016) statistic test showed a significant decrease in blood glucose levels ($p < 0.05$) in the positive group compared to the

negative control group in the 60th, 90th and 120th minutes. The Dose of 100 mg/Kgbw extract showed a significant difference of $p < 0.05$ with positive control at 60th, 90th, 120th min, with a decrease in blood glucose as much as 27.4 mg/dL, 4.8 mg/dL, -11mg/dL. The dose of 200 mg/Kgbw extract, showed a significantly different $p < 0.05$ with positive controls at 60, 90 and 120 minutes with a decrease in blood glucose of 40.6 mg/dL, 8.2 mg/dL, -2 mg/dL. Moreover, the dose of 400 mg/Kgbw showed a

significantly different $p < 0.05$ with positive control at 120 minutes with a decrease in blood glucose 23.4 mg/dL. These indicate that the dose of 1, 2, 3 has the effect of decreasing blood glucose or hyperglycemic levels, but the dose of 100 mg/Kgbw is the most effective dose as antihyperglycemia because the activity is better than the dose of 200 mg/Kgbw and 400 mg/Kgbw

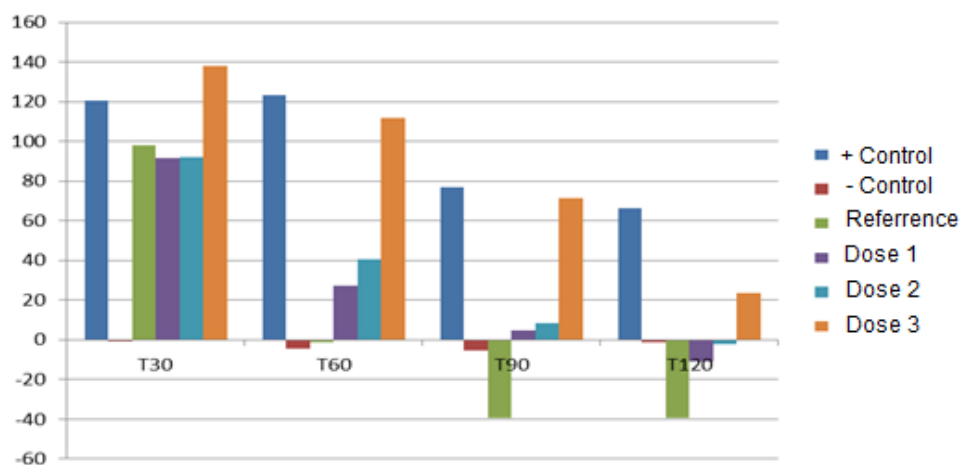


Figure 2. Difference in Blood Glucose Levels in Mice Before and After Treatment

4. Conclusion

The results of this study showed that the wood stem of Malay Apple extract have antihyperglycemia activity, and have a big potential to become halal and thayyib antidiabetic drug. The most effective dose of the wood stem of Malay Apple extract was 100 mg/Kgbw.

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References

- Adnyana, I. K., Yulinah, E., Soemardji, A.A., Kumolosasi, E., Iwo, M. I., Sigit, J. I. & Suwendar. (2004). Uji Aktivitas Antidiabetes Ekstrak Etanol Buah Mengkudu (*Morinda citrifolia* L.). *Acta Pharmaceutica Indonesia*, 29(2), 43-49.
- Aksara, R., Musa, W. J. A. & Alio, L. (2013). Identifikasi Senyawa Alkaloid dari Ekstrak Metanol Kulit Batang Mangga (*Mangifera indica* L.). *Jurnal Entropi*, 8(1), 514-519.
- Anonim. (2014). Situasi dan analisis Diabetes, Pusat Data dan Informasi Kementerian Kesehatan RI.
- Arumugam, B., Manaharan, T., Heng, C. K., Kuppasamy, U. R. & Palanisamy, U. D. (2014). Antioxidant and Antiglycemic Potentials of a Standardized Extract of *Syzygium malaccense*. *LWT - Food Science and Technology*, 59(2), 707-712.
- BPOM. (2000). *Parameter Standar Umum Ekstrak Tumbuhan Obat*. Jakarta: BPOM Direktorat Pengawasan Obat Tradisional.
- D'Adamo, Peter, J. & Catherine, W. (2006). *Diabetes: Penemuan Baru Memerangi Diabetes Melalui Diet Golongan Darah*. Yogyakarta : Bentang Pustaka.
- Dewar, W. A. & McDonald, P. (1961). Determination of Dry Matter in Silage By. *Journal of the Science of Food and Agriculture*, 12(11), 790-795.
- Fauziah, N. & Musthapa, I. (2019). The Utilization of Jambu Bol (*Syzygium malaccense* (L). Merr. & Perry) Stem as a New Source of Antioxidants (Pemanfaatan Kayu Batang Jambu Bol (*Syzygium malaccense* (L). Merr. & Perry)

- sebagai Sumber Antioksidan Baru.) *Jurnal Ilmiah Farmako Bahari*, 10(1), 33-41.
- Giugliano, D., Ceriello, A. & Esposito, K. (2008), Glucose Metabolism and Hyperglycemia, *Am J Clin Nutr*, 87, 17-22.
- Nuryani, A., Pratiwi, N. & Mohammad, A. B. (2015). *Fikiran Masyarakat*, 3(1), 13 -21.
- Rahman, Z. A. (2010). *Jemaah Haji Malaysia Menggunakan Vaksin Haram?*. Retrived from www.zaharuddin.net.
- Rismayanthi, C. (2010). *Terapi Insulin Sebagai Alternatif*. 7(2), 29-37.
- Santosa, U. (2015). *Makanan Yang Thayyib*, *Jurnal Civitas Akademika*. Retrived from sivitasakademika.wordpress.com/
- Sardjon, R. E., Musthapa, I., Solihin, H. & Ramdhani, R. (2012). Physicochemical Composition of Indonesian velvet bean (*Mucuna pruriens* L.) *Global Journal of Research on Medicinal Plants & Indigenous Medicine*, 1(4), 101-108.
- Sfaat, I. (2013). MUI : Produk Farmasi dan obat-obatan Harus Halal. Retrived from <https://www.nahimunkar.org/>
- Wulandari, W. (2016). Uji Efektivitas Antihiperqlikemia Kombinasi Jus Pare (*Momordica charantia* L) dan Jus Tomat (*Solanum lycopersicum* L) pada Tikus Wistar Jantan dengan Metode Toleransi Glukosa. *Pharmaceutical Sciences and Research*, 3(3), 145-154.

Detection of Porcine DNA in Processed Beef Products Using Real Time – Polymerase Chain Reaction

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ABSTRACT

Meat is one of food materials which has protein source and mostly consumed by non-vegetarian. Consuming halal food is an obligation for every Muslim. Meat processed products usually contaminated by pork. One of technique that is often chosen as an authentication process for proofing halalness of the product is PCR technique, one of PCR technique which most commonly used is RT-PCR. RT-PCR technique was chosen as identification method because it has high accuracy for detection of porcine DNA in fresh meat and processed products. RT-PCR is the amplification technique in the specific regions that are restricted by two oligonucleotide with the help of polymerase enzymes. Annealing is the first process of RT-PCR analysis who was primary attachment to the DNA template that determines the specificity and amount of DNA produced. In this study, extraction kit and detection kit were used for analysis Porcine DNA in meatballs. The results obtained from this study were from whole DNA samples, which had DNA purity ranging from 1.82 to 1.93. From the all samples three of them containing porcine DNA. The positive samples shown from amplification curves who was specifically formed when probes reacts with porcine gene.

Keywords: DNA, Meatballs, Porcine, RT-PCR

1. Introduction

Halal food is good for all people, both physically and spiritually. Halal food is food that is permitted to be consumed or not bound by provisions prohibiting it, both thayyib and appeasement (Girindra, 2006). In the present, the number of cases of halal food contamination with ingredients that are not halal is the problem faced by Muslims. Processed food products that must be concerned its sausages, nugets, ground meat, corned beef, meatballs, mayonnaise, chewy candy, chocolate, jelly, flavor. In addition to processed food products, there are food additives to oversee for halalness, such as gelatin, lecithin, collagen, glycerol/glycerin, improver, shortening, renin or pepsin and animal derivatives. Muslim consumers have strict orders regarding the rules of food that can be consumed. Every Muslim has different compliance regarding orders, this difference can be seen from the halal application (Salehudin, 2010).

The advancement of technology in the molecular biology is the best option to identify material contamination that is not halal. For example pork contaminants can be detected by

PCR or RT-PCR. The Taqman RT-PCR system with minor groove binding has also been used in the detection of quantification of DNA of cows, pigs, sheep, chickens, turkeys and ostriches. Some testing of meat contamination in Indonesia has also used molecular technology. According to Margawati & Ridwan (2010), the tests conducted did not show any contamination of beef meatballs using the species specific PCR method using primers from the pig leptin gene.

The main focus of authentication for Muslim consumers in processed meat is the porcine substitution of pigs, blood clots, organs in pig animals, and food processing plants that using derivatives from pigs (such as enzymes) because they have cheaper price and guaranteed availability. DNA molecules are the target components for species identification compared to proteins because of the different stability of these two components and their amount in tissue (Hamzah, 2014).

A number of published works have reported the advantages of using Real Time – PCR compared with conventional PCR for species identification. The ability to detect very small size products, since it eliminates the need

for gel visualization, the reduced risks for crossover contamination, as reaction are kept confined during amplification and analysis and capability for large scale processing and high automated throughput. Probe is using among the most broadly applied Real Time – PCR technologies to detect banned animal material in feedstuffs (Pegels, 2012).

2. Materials and Methods

The materials used were various of processed meat products. Meat products which are estimated to contain pork or their derivatives such as sausages and meatballs that have been labeled halal or which have not been labeled halal. The other materials used were DNeasy Mericon Food (QIAGEN), Mericon Pig Kit (QIAGEN) (Figure 1), Chloroform and Ethanol.

Number of reactions		24	96
Yellow	mericon Assay*	2 x 12 reactions	1 x 96 reactions
Red	Positive Control DNA	20 reactions	20 reactions
	QuantiTect® Nucleic Acid Dilution Buffer	1.5 ml	1.5 ml
	RNase-Free Water	1.9 ml	1.9 ml
Blue	Multiplex PCR Master Mix†	2 x 130 µl	1040 µl
	50x ROX Dye Solution	45 µl	210 µl

Figure 1. Content of Mericon Pig Kit

DNA Extraction

The 200 mg of sample was prepared by the addition of 1 mL food lysis buffer (either directly 1 mL or gradually 500 µL and 500 µL, depending on the type of sample). Followed by a purification process by taking 1 mL of sample and adding 2.5 proteinase-K, vortex and incubation at 60 OC for 30 minutes. Centrifuge at 2500xg for 5 minutes. Add 500 µL of Chloroform to the new 2 ml tube. The clear layer from the lysis tube was removed, without touching precipitation on the bottom of the tube. 500 µL of samples were put into tube containing Chloroform. Vortex for 15 seconds and centrifuge at 14000xg for 15 minutes. A clear layer was taken and the volume was measured, then PB buffer was added with the ratio 1:1 then vortex for 15 seconds. Placed all liquid into the Qiaquick spin column and centrifuge 17900xg for 1 minute. The liquid was disposed and stored in the collection tube. 500 µl of Buffer AW2 were added, 17900xg centrifuge for 1 minute and the supernatant was removed. Place

Qiaquick spin column in 2 mL of the new collection tube and centrifuge it again at 17900xg for 1 minute on the dry membrane. The collection tube was discharged and placed into the Qiaquick spin column in the new 1.5 ml tube. 150 µl of EB was added and incubate for 1 minute at room temperature then centrifuge for 1 minute. The eluted DNA can be directly used for PCR or stored at -20°C.

RT – PCR Analysis

The 130 µL multiplex PCR master were mixed into mericon assay tube, vortex and centrifuge. The positive was dissolved then 200 µL quantitec nucleic acid dilution buffer was added, vortex and centrifuge. Set up all the sample and control of reaction.

Table 1. Set Program of RT – PCR

Step	Time	Temperature	Comments
Initial PCR activation step	5 min	95°C	Activation of HotStarTaq Plus DNA polymerase
3-step cycling:			
Denaturation	15 s	95°C	Data collection at 60°C
Annealing	15 s	60°C	
Extension	10 s	72°C	
Number of cycles	45		
Detection	Reporter	Excitation/emission	Channel
Target	FAM	495/520 nm	Green
Internal control	MAX	524/557 nm	Yellow

The program of RT – PCR was set and the tubes containing the sample and control were inserted into the machine then run according to the RT-PCR program.

3. Results and Discussion

Results of this study presented in Table 2. The amplification curves that indicates positive samples might show the safety of food we are consumed. Food that are sold in the market may be contaminated by pork. This test aimed to conduct testing directly on the market. The result of positive samples will be given to the competent authority as a reference for further action.

Table 2. Extraction Result of Beef Processed Product

	260	280	Conc ng/ μ l	Ratio	Result
A1	0,0027	0,0014	2,7	1,93	+
A2	0,1159	0,0633	115,95	1,83	-
B1	0,1044	0,0574	104,45	1,82	-
B2	0,0467	0,0257	46,75	1,82	+
C1	0,1143	0,0631	114,35	1,81	+
C2	0,0372	0,0198	37,25	1,88	-
D1	0,0551	0,02995	55,1	1,84	-
D2	0,0646	0,03485	64,6	1,85	-
E1	0,0013	0,0007	1,3	1,86	-
E2	0,0511	0,02735	51,1	1,87	-

In this study, all the samples was isolated, then analyzed the purity using Tecan Nanophotometer at a wavelength of 260/280 nm which is the wavelength used specifically for DNA. The results obtained from the all samples have purity in the range 1.81 - 1.93, the range has passed for further testing using Real-Time PCR.

From all samples that had DNA purity in the range 1.8 - 1.9, the identification of porcine with RT-PCR was conducted to determine porcine contamination in processed meat products, the results of RT-PCR analysis can be seen in Figure 2.

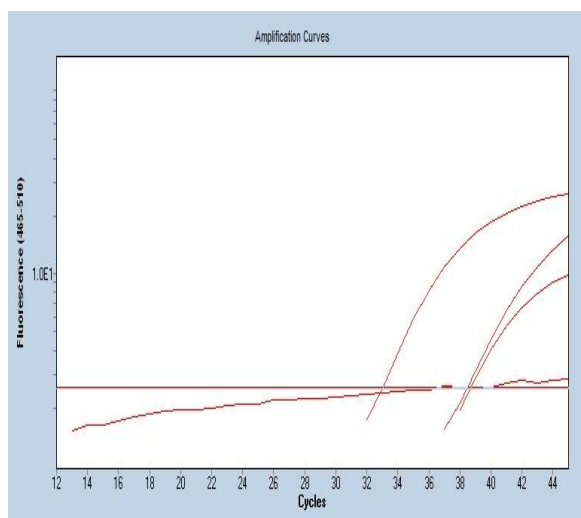


Figure 2. Analysis Result of Porcine DNA Contaminant Using RT – PCR

Compounds with basic components of DNA or RNA will be absorbed maximally at ultraviolet wavelengths at 260 nm, while amino acids with aromatic rings absorb light with maximum absorbance at 280 nm wavelengths. In the analysis of DNA purity, it appears that the entire sample has DNA purity in the range 1.8 - 2.0. According to Yoon (2016), the ratio used is the absorbance ratio of 260 and 280 nm to see

the purity of nucleic acids with a ratio between 1.8 - 2.0, so that it can be obtained purely. The DNA produced in this study had fulfilled the purity criteria for porcine DNA analysis testing using PCR. DNA extraction was carried out using species-specific methods. The aim of this method was to identify contaminants in food products that can cause food poisoning and damage the human immune system.

In the testing of porcine DNA contaminants using the RT-PCR method, obtained the results that among all samples analyzed found three samples which was positive contain porcine DNA. The three samples were A1, C1 and B2. This can be seen from the CP (crossing point) value of the three samples which are at <35 when compared with positive control with the CP value 32.63. The content of porcine DNA in meatball and beef sausage products can be caused by cross-contamination in the production process, because there are processed meat products that have obtained halal certificates from LPPOM MUI.

Similar results were also obtained by Khatani (2017), where tests conducted on various of processed meats showed that some products found positive containing porcine DNA with of Ct values at 34 - 37.45, it could also caused by cross contamination during processing due to porcine DNA concentration found in samples showed a low concentration of ≤ 0.0001 ng / μ L.

4. Conclusion

The RT - PCR method is the accurate and fast method to be used to identify porcine DNA contamination in a processed product. These method using probe which was species specific analysis for detection of porcine DNA. From all the samples that has been analysed, three samples which positive contain porcine DNA were found.

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References

- Alaraidh, I. A. (2008). Improved DNA Extraction for Porcine Contaminants, Detection in Imported Meat to The Saudi Market. *Saudi Journal of Biological*

- Sciences*, 15(2), 225-229.
- Bohari, A. M., Hin, C. W. & Fuad, N. (2013). The Competitiveness of Halal Food Industry in Malaysia: A SWOT ICT Analysis. *Geografia Online Malaysia Journal of Society and Space*, 9(1), 1-9.
- Cai, H., Gu, X., Scanlan, M. S., Ramatlapeng, D. H. & Lively, C. R. (2012). Real – Time Assays for Detection and Quantification of Porcine and Bovine DNA in Gelatin Mixtures and Gelatin Capsules. *Journal of Food Composition and Analysis*, 25, 83 – 87.
- Cavalcanti, P M., Silva, R. & Gomes, Y. M. (2010). Comparison of Real-Time PCR and Conventional PCR Detection of *Leishmania infantum* Infection: A Mini Review. *The Journal of Venomous Animals and Toxins including Tropical Diseases*, 16, 537-542.
- Hamzah, A., Mutalib, S. A. & Babji, A. S. (2014). Porcine DNA detection in finished meat products using different mitochondrial DNA (mt – DNA) on Polymerase Chain Reaction. *J. Nutr Food Sci*, 4(6).
- Khatani, H. A., Ismail, E. A. & Ahmed, M. A. (2017). Pork Detection in Binary Meat Mixtures and Some Commercial Food Products Using Conventional and Real – Time PCR Techniques. *Journal of Food Chemistry*, 219, 54–60.
- Khairala et al. (2005). Rapid Detection of Pork in Processed Food Using Polymerase Chain Reaction Amplification Technology: A Preliminary Report. *Pakistan Journal of Biological Sciences*, 8 (3), 501 – 504.
- Kumar, A., Sharma, B. D., Mendiratta, S. K. & Gokulakrishnan, P. (2012). Species Specific Polymerase Chain Reaction (PCR) Assay for Identification of Pig (*Sus domesticus*) Meat. *African Journal of Biotechnology*, 11(89), 15590-15595.
- Mursyidi, A. (2012). The Role of Chemical Analysis in the Halal Authentication of Food and Pharmaceutical Products. *J. Food Phar.Sci.*, 1, 1 – 4.
- Mutalib, S. A., Nazri, W. S. W., Shahimi, S., Yaakob, N., Sani, N. A., Abdullah, A. Babji, A. S., Ghani, M. A. (2012). Comparison Between Pork and Wild Boar Meat by Polymerase Chain Reaction-Restriction Fragment Length Polymorphism (PCR-RFLP). *Sains Malaysiana*, 41(2), 199–204.
- Pegels, N., Gonzales, I., Fernandez, S., Garcia, T. & Martin, R. (2012). Sensitive Detection of Porcine DNA in Processed Animal Proteins Using a TaqMan Real Time – PCR Assay. *Food Additive & Contaminants: Part A*, 29(9), 1402-1412.
- Sahilah, A. M., Norhayati, Y., Norrakiah, A. S., Aminah, A. & Wan Aida, W. M. (2011). Halal Authentication of Raw Meats Using PCR Amplification of Mitochondrial DNA. *International Food Research Journal*, 18(4), 1489-1491.
- Salehudin, I. (2010). Halal Literacy: A Concept Exploration and Measurement Validation. Dept. of Management, Faculty of Economics, University of Indonesia. *Asean Marketing Journal* 2(1).
- Sawyer, J., Wood, C., Shanahan, D., Gout, S. & McDowell, D. (2002). Real – Time PCR for Quantitative Meat Species Testing. *Food Control*, 14, 579 – 583.
- Unajak, S., Meesawat, P., Anyamaneeratch, K. Anuwareepong, D., Srikulnath, K. & Choowongkamon, K. (2011). Identification of Species (Meat and Blood Samples) Using Nested-PCR Analysis of Mitochondrial DNA. *African Journal of Biotechnology*, 10(29), 5670-5676.
- Wardani, A. K. & Sari, E. P. K. (2015). Molecular Detection of Pork Contamination in Cattle Meatballs in Traditional Market in Malang City Using PCR. *Journal of Food and Agro-Industry*, 3(4), 1294 – 1301.
- Xiao, X., Zhang, J., Zhang, Q., Wang, L., Tan, Y., Guo, Z., Yang, R., Qiu, J. Zhou, D. (2011). Two Methods for Extraction of High – Purity Genomic DNA From Mucoïd Gram – Negative Bacteria. *African Journal of Microbiology Research*, 5(23), 4013-4018.

The Effect of Storage Duration on Fruit Juices Made With or Without the Addition of Yeast Towards Its Alcohol Content

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ABSTRACT

Fruit juice is a healthy beverage. However, we must be careful in handling or consuming such juice, especially in relation to its storage time. The Prophet of Muhammed PBUH in his hadith prohibits to drink fruit juices that have been stored for more than 3 days, as its legal status changes from Halal into Haram. In accordance with the development of science and technology, many methods could be used to measure alcohol content in a sample; such as Gas Chromatography-Mass Spectroscopy method (GC-MS). Therefore the objective of this research was to analyze the alcohol content of various fruit juices made with or without the addition of yeast and being stored within 1, 2, and 3 days using GC-MS, as well as its relation to the hadith Matn of the Prophet Muhammad PBUH regarding its law. Results showed that alcohol (ethanol) content of various fruit juices : red grapes, green grapes, dates, pomegranate and durian, made without the addition of yeast which stored for 3 days, in consecutive order were 0.524; 0.144; 0.214; 0.143 and 0.314% v/v . While alcohol (ethanol) content of various fruit juices : red grapes, green grapes, dates, pomegranate and durian, made with the addition of 10 g/L yeast were and stored for 3 days were 0.618; 0.921; 0.901; 0.575 and 1.202% v/v constitutively. Alcohol content of red grapes fruit juices of 0.524% v/v was the highest alcohol content (in juices) which is still Halal to be consumed.

Keywords: fruit juices, GC-MS, Hadith Matn., the law of Halal and Haram.

1. Introduction

Ethanol (alcohol) is naturally present in fruits (Riswiyanto, 2009). Fruits are often processed into juice. The Prophet Muhammad in his hadith forbade the drinking of fruit juice that had been left/fermented for more than 3 days, because it was intoxicating (became khamr), and its legal status changed from being halal to haram.

With the rapid development of science and technology in the manufacture of various food products, beverages, medicines and cosmetics, many producers of these products have to use alcohol (ethanol) or deliberately add alcohol (ethanol) to the product made. Therefore the Indonesian Ulama Council (MUI) has enacted several fatwas related to alcohol (ethanol), including the 2009 MUI Fatwa which decided the law on the use of alcohol (ethanol) for the manufacture of food products, beverages,

medicines, and cosmetics, as follows :

- 1) The use of alcohol (ethanol) from non-chemical products (whether they are chemical synthesis product/from petrochemicals, or khamr industry) for the production of food, beverages, drugs, and cosmetics categorized as "mubah" if medically harmless,
- 2) The use of alcohol (ethanol) from khamr industry (whether they are chemical synthesis product/from petrochemicals, or non-chemical products) for the production of food, beverages, drugs, and cosmetics categorized as "haram" if medically harmful, (MUI, 2009).

However, the MUI does not clearly state or specify how much the alcohol content (ethanol) that can still be permitted in these products, so the fatwa might confuse Muslim producers and consumers.

From the habit of the Prophet Muhammad (PBUH) above, who did not drink fruit juice after more than 3 days of storage, implies that drinking fruit juice that has been stored for more than 3 days may harmful for health.

Therefore, the purpose of this study was to analyze the alcohol content of various fruit juices made with or without the addition of yeast and stored for 1, 2 and 3 days using the GC-MS method and analyze the relevance of alcohol content in these juices in accordance with the Hadith Matn of the Prophet Muhammad PBUH about the law changing of fruit juice.

2. Materials and Methods

The research experiment used various fruit juice samples with various long storage time made with or without the addition of yeast. A factorial experimental design (5x2x3) with 3 replications was used in this experiment. The first factor was the type of fruit that is made into juice. The second factor was juice made with or without the addition of yeast. The third factor was the duration of juice storage, namely: 1, 2 and 3 days. (Gaspersz, 1991; Steel & Torrie, 1989).

Sample Preparation

a. Fruit Juice Making (Red Grapes, Green Grapes, Dates (Arab), Pomegranate (India), and Durian).

The fruits were washed in the running water, and then rinsed with distilled water. 0.5 kg of fruit that has been cut into small pieces was blended for 5 minutes after the addition of 200 ml of distilled water. The juice was filtered with a stainless steel filter/muslin cloth, the residue was removed, and the filtrate volume was then measured.

b. Samples

Table 1. The level of alcohol (ethanol) in fruit juice with or without the addition of yeast and stored for 3 days

Day	Without Yeast (% v/v)					With Yeast (% v/v)				
	Red Grapes	Green Grapes	Dates	Pomegranates	Durian	Red Grapes	Green Grapes	Dates	Pomegranates	Durian
0	undc*	0,028	0,067	0,011	0,642	0,044	0,043	0,101	0,014	0,725
1	0,043	0,049	0,068	0,024	0,435	0,618	0,795	1,467	0,527	1,408
2	0,103	0,064	0,115	0,041	0,694	0,669	0,877	1,846	0,512	1,585
3	0,524	0,144	0,214	0,143	0,314	0,618	0,921	1,901	0,575	1,202

*undc = undetected

The filtrate was divided into 2 with the same volume.

Part I : stored at room temperature, without adding yeast

Part II : stored at room temperature, with the addition of yeast (as much as 10 g/L of solution) (Crueger & Crueger, 1984)

The filtrates (Parts I & II) were then put into small, closed bottles (volume 150 mL) and stored until ready for analysis. The filtrate was mixed with 1% acetonitrile in a ratio of 1: 10. The samples were filtered with Millipore filter or with syringe filter (size 2 µm). 0.2 µl sample was then injected into the GC-MS.

Data Collection

The parameter measured was the alcohol concentration in various fruit juices made with or without the addition of yeast and stored for 1, 2 and 3 days. Measurement of alcohol content based on the method of Wang et al. (2003) using Gas Chromatography-Mass Spectroscopy (GC-MS) (Thermo Scientific).

Data Analysis

Data measured analyzed using ANOVA SPSS portable 16. While the analysis of Hadith Matn using a critic's study of Hadith Matn with a scientific approach (chemically) by the analytic description method together with literature study.

3. Results and Discussion

The Level of Alcohol (Ethanol) in Fruit Juice With or Without The Addition of Yeast and Stored for 3 Days

The analysis results of alcohol content (ethanol) in various fruit juices made with or without the addition of yeast and stored for 1, 2 and 3 days (Table 1)

The analysis results of the alcohol content of fruit juices made without the addition of yeast and stored for 3 days (Table 2)

Table 2. The alcohol content in various fruit juices made without the addition of yeast and stored for 3 days

Day	Repetition	Without yeast (% \forall_v)				
		Red Grapes	Green Grapes	Dates	Pomegranates	Durian
0	1	undc	0,028	0,067	0,011	0,658
	2	undc	0,028	0,067	0,011	0,639
	3	undc	0,028	0,067	0,011	0,629
	Average	undc	0,028	0,067	0,011	0,642
1	1	0,043	0,049	0,068	0,024	0,409
	2	0,043	0,049	0,068	0,024	0,438
	3	0,043	0,049	0,068	0,023	0,458
	Average	0,043	0,049	0,068	0,024	0,435
2	1	0,101	0,064	0,115	0,042	0,688
	2	0,103	0,065	0,115	0,040	0,697
	3	0,105	0,064	0,115	0,042	0,697
	Average	0,103	0,064	0,155	0,041	0,694
3	1	0,534	0,142	0,210	0,138	0,305
	2	0,515	0,147	0,217	0,137	0,314
	3	0,524	0,144	0,215	0,154	0,324
	Average	0,524	0,144	0,214	0,143	0,314

undc = undetected

The types of fruits used for juice making in this study were: red grapes, green grapes, pomegranate (India), dates (Arabic), and durian (local). The selection of grapes, pomegranates, and dates in this study refers to the types of fruits found/mentioned in the Quran, besides those types of fruits often made into juices. The durian fruit was chosen because today many durian juices are sold, and often consumers get drunk after consuming durian fruit. So it is interesting to find how much alcohol content (ethanol) in the durian which made many consumers get drunk due to drinking juice from durian fruit.

Table 1 showed that both fruit juice made with or without the addition of yeast have contained alcohol since the 0th day (zero), even though no alcohol detected in red grape juice in the same day. However, it can not be concluded that the grape juice does not contain alcohol on day 0 (zero). Undetectable alcohol in red grape juice is due to the limitations (limit detection) of the tools used in this study, as the lowest alcohol content that can still be detected is 0.011% \forall_v (Table 1). So the alcohol content on day 0 (zero) in red grapes might lower than 0.011% \forall_v .

The presence of alcohol (ethanol) in fruit juices that were not given the additional yeast on 0th day (zero), gives evidence that alcohol is actually present in fruits, and what forbidden by Allah SWT is not alcohol (ethanol) but khamr.

After three days of storage, the levels of alcohol (ethanol) from fruit juices made with or without the addition of yeast tend to increase compared to previous days, except for red grape juice (added yeast) and local durian juice (with and without yeast). The alcohol (ethanol) content of fruit juice made without the addition of yeast, after being stored for 3 days ranges between (0.143 - 0.524)% \forall_v , which is lower than the alcohol content (ethanol) in yeast-added fruit juices, which ranges from (0.575 - 1.901)% \forall_v (Table 1). This happened because in the yeast-added fruit juices occurred fermentation of alcohol (ethanol), whereas in non-yeast-added fruit juices only occurred the spontaneous fermentation.

The ANOVA results on alcohol (ethanol) content of 5 fruit juice samples made with or without the addition of yeast and stored for 1, 2 and 3 showed that the p-value was 0 for all sources of diversity, at alpha testing 5% (p-value <0.05). Therefore, H₀ is rejected (with H₀ saying that the source of diversity does not affect alcohol content). The effect of interaction between storage days, the use of yeast and fruit types significantly affected alcohol content. Therefore, the effect of storage days differs depending on the use of yeast and the type of fruit.

Alcohol Content in Fruit Juice and Its Relation to The Hadith of The Prophet Muhammad PBUH

Alcohol or ethanol can be produced through the fermentation process of fruits or grains such as dates, grapes, apples, or wheat. The benefits of fermented products are to provide a benefit for the future through bio-nutritional technology, minerals, flavor and aroma enhancement. This process also improves health. However, if the alcohol content produced during fermentation is high, the fermentation product can be intoxicating and become haram for consumption (Riaz & Chaudry, 2004)

In Islam, the determination of justified alcohol levels can be investigated based on a hadith of the Prophet Muhammad PBUH related to the ripening of Nabidh (juice). In the hadith it is explained that:

"From Yahya bin' Ubaid. Abu Umar Al-Bahrani, he said: "I heard Ibn Abbas say:" *Usually Rasulullah PBUH was made Nabidh at the beginning of the night and he drank it in the morning, in the day and night, in the next morning and the following night, and the following day until Ashr. If there still something left, then he gave it to the servant or asked him to throw it away*" (HR. Muslim).

Nabidh comes from the word "nabadha" which means water immersion from dates, raisins or grapes. And based on the hadith above, the rest of the nabidh which was stored by the Prophet Muhammad PBUH on the third day of the evening after Ashr will be discarded or given to his servants, because the nabidh can be intoxicating and make drunk for those who drink it.

Therefore, in order to obtain justified alcohol content more clearly, an approach based on scientific studies is needed to support the view of Fiqh correctly and impressively. In this study, the focus of scientific studies was conducted on determining the alcohol content of fruit juices made without the addition of yeast and stored for 3 days. The alcohol content of various fruit juices made without the addition of yeast and stored for 3 days is presented in Table 2.

Based on table 2, the alcohol content in fruit juices increased to coincide with the length of storage. However, on the 0th day (zero), the alcohol content in local durian juice was already

high, by 0.642% $\%_v$ and it did not increase afterward, alcohol content should be higher than 0.642% $\%_v$ after 3 days of storage. this alcohol content (0.642% $\%_v$) was greater than the alcohol content in red grape juice made with the addition of yeast and stored for 3 days at (0.618% $\%_v$) (Table 1), which the law has changed from halal become haram. Therefore local durian juice which was made without the addition of yeast and stored for 3 days was not included in the study of alcohol content that is still halal, based the Hadith Matn of the Prophet Muhammad. In other words, the fruit juice was analyzed its halal status in accordance with the Prophet Muhammad PBUH in this study were red grapes, green grapes, dates, and pomegranates.

Based on ANOVA results and Duncan's comparison alcohol content from juices of red grapes, green grapes, dates (Arabic) and pomegranate (India) after 3 days of storage, respectively were 0.524; 0.144; 0.214; and 0.143% $\%_v$. These are the highest alcohol content of each fruit juices that were stored for 3 days. In other words, the highest alcohol content of fruit juice that can still be consumed by Muslims is 0.524% $\%_v$. This result was different from Rizqiyah (2007) that reported the halal highest alcohol content of fruit juice of 0.51% $\%_v$; Aditya et al (2005) in the amount of 0.95% (for grapes), 0.45% for apples and 0.56% for date palm; Najiha et al. (2010) in the amount of 5.81% $\%_w$ for grapes, 4.70% $\%_w$ for apples, and 0.636% $\%_w$ for dates.

It also differs from the MUI fatwa on Halal Fatwa Standardization which states that "The use of ethanol in the form of pure compound that is not derived from the Khamr Industry for the industry of the food production process:

- a. Mubah, if alcohol is **not detected** on the final product
- b. Haram, if alcohol is **detected** on the final product

These differences are caused by several things, such as:

- a. Differences of date palm species such as dates: Medina, Tunisia, Egypt, and Arabic and the maturity of dates such as ruthab (fresh dates) and tamar (processed dried dates)
- b. Differences in the preparation of fruit juice samples, such as the addition of yeast, sugar

and others

- c. Differences in the methods used to identify and measure alcohol content, such as Micro Conway Diffusion, HPLC, and GC- MS.

4. Conclusion

Fruit juice of red grapes, green grapes, dates (Arabic), pomegranates (India), and local durian have been contained alcohol (ethanol) since the first day. Alcohol content (ethanol) from various fruit juices mentioned above, whether made with or without the addition of yeast increase with the length of storage. The alcohol content (ethanol) from the fruit juices above, which were made without the addition of yeast, range between (0.143 - 0.524) % v/v after 3 days of storage. The alcohol (ethanol) content of the fruit juices above, which were made by adding yeast after 3 days of storage have higher the alcohol content (ethanol) of fruit juice without the addition of yeast and stored for 3 days

Suggestion, Due to differences results from the previous studies in term of in alcohol content (ethanol) from date palm juice (Arabic) after 3 days of storage, we suggest to do a repetition study, especially the determination of alcohol content (ethanol) from various types of dates stored for 3-5 days, either fresh dates (ruthab) or dried dates (tamar); and various types of grapes with or without the addition of yeast, so that we can give recommendations to the MUI regarding the levels of alcohol (ethanol) in the final products of food, drinks, cosmetics, and drugs that do not endanger health.

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References

- Aditya, R, Syah, D. & Arintawati, M. (2015). Fermentation Profiles of Nabidh (Fruit juice). *Journal of Halal Research.*, 1, 25-29.
- Apriyantono, A. (2006). Penentuan Kehalalan Produk Pangan Hasil Bioteknologi: Suatu Tantangan Retrieved from www.indohalal.com/doc_halal3.html.
- Brill, S. K. & Wagner, M. S. (2012). Alcohol Determination in Beverages Using Polar Capillary Gas Chromatography-Mass Spectroscopy and an Acetonitrile Internal Standard. *Concordia College Journal of Analytical Chemistry*, 3, 6 -12.
- Crueger, W & Crueger, A. (1984). *Biotechnology: A Textbook of Industrial Microbiology*. Madison, WI 53705. Science Tech., Inc.
- Gaspersz, V. (1991). *Metode Perancangan Percobaan*. Bandung: Armico
- Majelis Ulama Indonesia. (2011). *Himpunan Fatwa Majelis Ulama Indonesia Sejak 1975*. Jakarta: Sekretariat MUI.
- Najihah, A., Tajul, A. Y., Norziah, M. H. & Wan Nadiyah, W. A. (2010). A Preliminary Study on Halal Limits for Ethanol Content in Food Products, *Middle East Journal of Scientific Research*, 6(1), 45-50.
- Penning, M. (1996). *Aqueous Shellac Solution for Controlled Release Coating*. In D.R. Karsa and R.A. Stephenson (Eds.) *Chemical Aspects of Drug Delivery System*. 146–147. London: Royal Society of Chemistry.
- Riaz, M. N. & Chaudry, M. M. (2004). *Halal Food Production*. London: CRC Press.
- Riswiyanto. (2009). *Kimia Organik*. Jakarta. Penerbit Erlangga.
- Rizqiyah, R. (2007). Pengaruh variasi waktu pemeraman terhadap kadar etanol jus buah kurma. *Skripsi*. Yogyakarta: Fakultas Sains dan Teknologi Universitas Islam Negeri Sunan Kalijaga
- Steel, R. E. D. & Torrie, J. H. (1989). *Prinsip dan Prosedur Statistika*. Bambang Sumantri (penerjemah). Jakarta: PT Gramedia
- Taymiyyah, I. (1987). *Al-Fatawa Al-Qubro li Ibnu Taymiyyah*. Beirut-Libanon: Dar Al-Kutub Al-'Ilmiyah
- Wang, M. L., Choong, Y. M., Su, N. W & Lee, M.H. (2003). A Rapid Method for Determination of Ethanol in Alcoholic Beverages using Capillary Gas Chromatography. *Journal of Food and Drug Analysis*, 11, 133-140.
- Winter, R. (1999). *A Consumer's Dictionary of Cosmetic Ingredients*. 5th ed. New York: Three Rivers Press.

Study of Critical Point Analysis on Meat-Based Foods in Bandung

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ABSTRACT

Halal is a term of lawful or permitted to do according to Islamic law which regulates all aspects of life especially in consuming food. Halal critical point is a condition of food processing. Halal food has a possibility transformed into haram if there are non-halal ingredients used during the food processing. The concept of Halalan Tayyiban is not widely understood by the Muslim, although it is necessary for all human according to health and hygiene. This research was a descriptive study with a qualitative approach. The interview and observation to 8 informants were carried out to the seller of sausages (chicken and beef), cilok, burger, bump and three types of meatballs. The results of the halal condition analysis of processed meat-based foods which is supported by the results of observations and interviews directly pursued into two main important discussions, namely in terms of the composition and processing of processed meat-based food.

Keywords: critical control, halal, meat-base food, snacks, tayyib.

1. Introduction

Indonesia is a country that has a Muslim majority population. The U.S. Commission on International Religious Freedom (2017) states that Indonesia is the country with the largest Muslim population, accounts for more than 87 percent of the population of 258 million whose lives are Muslim. As someone who declares himself as a Muslim has a full responsibility to carry out all kinds of rules which have been stated in the Al Qur'an and hadiths. One of Muslim identity that must be taken seriously is the provisions regarding halal rules.

Halal is a term from Arabic language that refers to the legality or permissibility of a case according to religious law. The opposite of halal is haram which means it is not justified or prohibited by religious provisions (Nakyinsige et al., 2012; Denyingyhot et al., 2017). Halal has a very broad scope in various aspects of life including action, conversation, and or all forms of legitimate behavior that is carried out by the Islamic law. Halal also regulates various kinds of human needs such as clothing, rules of sale and purchase, marriage, jewelry, issues of life in the family, raising animals, beliefs, muamalah, traditions, social relations with fellow Muslims or non-Muslims, and especially in terms of

behavior to food needs or consuming food products (Sukiati, 2013).

The halalness of a product becomes a mandatory requirement for every Muslim consumer, not only in the form of foodbut also in the form of medicine or other consumer goods. As the number of Muslim consumers in Indonesia reaches 204.8 million people in Indonesia, the Indonesian market naturally becomes a very large Muslim consumer market (Charity, 2017). Food is a very important aspect and needs to be considered about the rules in the concept of halal. At present, the halal of food products currently circulating in the community is a very important aspect for continuous monitoring (Syafriada, 2017; Waharini & Purwantini, 2018).

Consuming haram foods will have serious consequences in the world and hereafter. Allah said consuming halal food is good and healthy for humanity itself (Sani, 2017). The case of halalness food product that occurred in Indonesia is a public unrest that is often faced with uncertainty and threatened to consume food products that are not halal because of ignorance that the food they consume turns out to contain a mixture of ingredients that are forbidden in Islam or even from other reviews there are some

the stages that cause food to become haram. Winarsih et al. (2017) reported the contamination of pork in instant noodle in Surabaya. Fibriana et al. (2012) reported contamination of pork found in meatball snacks in Salatiga. These occurred in the home-based food products such as meat-based children's snacks in the form of meatballs, sausages, burgers, and many others that are found circulating in the community even do not have a halal certificate. In the process of making processed meat-snacks, there are many gaps that can be analyzed regarding the critical point of halal.

The Critical point in food is a condition where halal food has the possibility of becoming haram. It can be identified from the processing, storage, additive ingredients used, and especially the used of raw materials (Atma et al., 2017). Food is halal not only concerning contamination of materials which are forbidden by Islam including blood, carcasses, pork, and animals slaughtered on behalf of other than Allah (Surah Al-Maidah: 3 and Al-Baqorah: 173) but also concerning the concept of food safety and comfort that leads to human health. Another term in Islam is *Tayyib*. The food can be consumed if it meets the requirements of *Halalan Tayyiban*.

One of the most pressing issues is that nowadays many processed food and beverage products, medicines and cosmetics which are not yet clear its halalness. Eating halal and good food (*thayib*) is a command of Allah SWT that must be carried out by every believer. This command is equal to piety (*Taqwa*) to Allah. Thus, consuming halal food based on faith and piety for following the command of Allah is a worship that brings reward and provides the good of the world and the hereafter. On the other hand, acts of consuming haram is immorality which brings sin and ugliness both the world and the hereafter (Sani, 2017).

Knowledge about the *Halalan Tayyiban* concept is still not widely understood by Muslim. Our knowledge is limited to the knowing halal food it is a food that does not contain pork or other haram ingredients. In fact, considering another side, there are many stages that may cause halal food to become haram. This study aimed to analyze the possibilities or halal critical points on meat-based snacks as one of Indonesian's favorites food. This study can be used as reference material for other types of food in the matter of ensuring its halal law.

2. Materials and Methods

This research was a descriptive study with a qualitative approach. Sources of information consisted of eight informants. The selection of informants used the stratified random sampling method. The population of this research was meat-based food from streets trader. This research was conducted with in-depth interviews and observation. This study also used the photovoice method, it is a method by explaining based on images or photos needed to assist informants in explaining the information needed about the critical point analysis. Primary data in this study were in the form of data from interviews with traders and observations of some meat-based snacks in the city of Bandung.

3. Results and Discussion

Observation and interview in this primary data collection used 8 types of selected processed meat-based snacks and represent the distribution of meat-based foods in Bandung. The types of samples were two types of sausages (chicken and beef), cilok, burger, bump and three types of meatballs.

Description of Meat-Based Foods

Meat-based food is a type of food that easily to find. It has a very broad target market as it is favored by various groups to make snacks. Meat-based snack is needed as a light food in each region. To explore the quality of meat-based foods sold in the city of Bandung, interviews were conducted with several vendors based on the type of sample regarding how to process and manufacture it. In general, the method of making meat-based snacks tends to be the same, the difference is the measurement of ingredients and special recipes of each type of snacks. Most meat-based sellers sell their own processed products and there are some that sell products from the distributors. The method for making meat-based children's snacks briefly as follows.

Required ingredients are basic ingredients of meat (chicken or beef), starch, eggs, aci, ground pepper, salt, garlic, fried shallots, ice cubes, and clean water. Firstly, based on a statement from the meatball maker, it is necessary to prepare ground meat; meatball grinding is usually carried out in the market because only few meatball makers have their own grinding tools. The ground beef is put into a container, mixed with starch, cassava starch, eggs, ground pepper, salt, flavoring, mashed

garlic, and fried shallots according to the specified amount. All ingredients are kneaded by hand or a tool until everything is mixed perfectly. If it is felt the dough is still soft and difficult to form, then you can add ice cubes slowly until it feels like the dough can be formed. Next prepare boiled water to boil in a pan of sufficient size. Meat dough and ingredients were formed using hand shaped meatballs, sausages, burgers, bumps, and cilok according to the size of the sale (usually large, medium, and small). Then put the dough that has formed into hot water that has been prepared. If the meatballs have floated, the meatballs are cooked and can be removed to be stored in the freezer for long time. Stages of other special manufacturing are also carried out in accordance with the types of snacks to be made.

Analysis Critical Points of Meat-based Foods Processing

Halal food is one of Islamic Shari'ah, in the term of foods both raw materials, additional ingredients used and how to produce them are necessary so that the food can be consumed by Muslims (Muslims) without causing sin. Determination of halal and haram is only by Allah SWT (Dahlah, 1996). In Islamic teachings there are many regulations that guide the consumption of food properly, starting from halal and haram rules, food ethics, to regulating food identity and quality. One important thing is the prohibition on consuming foods that are haram. In this case, it is necessary to explore which aspects causing food to be haram or doubtful, so it is recommended not to be consumed.

According to Zulaekah & Yuli (2005) food is considered halal if it meets the following requirements:

1. It does not originate or contain material from animals which are prohibited to muslims according to sharia or come from animals that are not slaughtered according to sharia law.
2. Does not contain haram ingredients according to Islamic law.
3. Not presented or processed with materials or equipment those are exposed to haram according to Islamic law.
4. The procurement, manufacturing, processing and storage processes are not close together or in contact with haram materials.

Halal is an absolute provision in the law to

meet food needs. Sourced from the 4 conditions described earlier as reference material to analyze the halal conditions of food It is necessary to explore in detail which parts can be a critical point gap in a child's processed meat-based snacks. The results of the analysis of the halal conditions of processed snacks made from meat that are supported by the results of direct observation and interviews leads into two important discussions, namely as follows.

1. Food Composition

Based on the results of interviews obtained the composition of children's snacks made of meat is divided into two, namely the main ingredients in the form of meat (chicken or beef) and supplementary materials such as flour, cassava starch, water and food added ingredients (BTP). Basically, the use of the main ingredients derived from animals need to be carried out an in-depth search. In this case, it is necessary to ensure that the type of meat used is halal meat in accordance with what Allah SWT has determined.

If it has been confirmed that the meat used is halal, then it is necessary to explore how to obtain meat or proper way in processing meat. Although this factor is difficult to identify, it is better to be careful when choosing meats as it is very important ingredient. According to Islamic law explained by MUI (2010), terms of haram (object) cases are divided into two, namely haram li-zatih and haram li-gairih. The first group, the substance of the object is forbidden by religion; the second is the substance of the law is halal (not haram) but the way to handle or obtain it is not justified by Islamic teachings.

Thus, during the selection of meat, it has the possibility to be haram if the object is halal but how to handle it is not justified by Islamic teachings. For example, cows or chickens that are not sharply slaughtered in the name of Allah SWT. Even though on an industrial scale, the slaughtering of animals remains a priority choice for consumption of meat. Then the thing that allows halal meat to be haram is if it is obtained by means or methods prohibited by religion, for example, the results of corruption, deception, stealing that is not right, and so on. This is difficult to trace. It would be better if we remain vigilant and make it a lesson as a form of self-introspection that the mistakes we make can cause violations of religious law. According to Sani (2017) Fatwa of animal meat that is sold in a slaughtered condition, it necessary to know the

origin of the slaughter through news (from people) that can be trusted. If it is known that the animal was slaughtered by Muslims, such as the meat of an animal slaughtered at an official slaughterhouse in an Islamic country, or according to news from a person who can be trusted, then it is halal. However, if it is unknown who slaughtered it, while those who sell meat are polytheists, so the law is haram.

The Second is related to the supplementary materials such as flour, oil, and Food Additives (BTP) used. Just like the selection of meat as a basic ingredient, complementary materials also need to be explored at a critical point that can cause the halal end product. We must ensure that the selection of complementary products is halal-certified, so that we are sure that the halal traceability has been carried out from raw materials to products that have permission to distribute. For example, the selection of flour, there is a critical point in the process of making flour, which is the stage of bleaching that usually done using activated carbon derived from bone. Tracing the type of bone used is an important point of the flour. The MUI issued a fatwa stating that: if food that uses preservatives is a type of fruit or vegetables or is made from fish then it is halal, because it is sourced from halal material, except the preservative that is mixed with haram objects then it is forbidden to be eaten.

It is also very important to understand that halal food in Islamic law can also be interpreted as *thayyib* food. That is a food that delicious, nutritious and has balanced flavor and does not have a negative impact on the body of the person who eats it, both physically and intellectually. As according to Masthu (1995) explained the concept of *thayyib* in Islamic teachings in accordance to the findings and research of nutritionists, as follows: 1. Healthy; Healthy food is food that has adequate, complete and balanced nutrition. 2. Proportional; i.e. consuming nutritious, complete and balanced food for humans who are in a period of human growth. For example fetuses and infants or toddlers as well as adolescents need to be given food that contains builders (protein). 3. Safe; food consumed by humans will affect the health and body fitness. If the food is healthy, complete and balanced, then the physical condition of people who consume it will always be healthy and protected from various diseases.

Based on the findings in the field, the third

point is something that really needs to be traced. Meat-based snacks makers have a strategy so that their products generate substantial profits by adding supplementary ingredients that exceed the main ingredients such as meat and also adding food additives in the form of preservatives and coloring so that the product has an appeal to the buyers also can be stored for a long time. The addition of excess BTP may cause food becoming not *tayyib*. Then it is not recommended for consumption, in-depth search and education to the seller is a shared responsibility.

2. Processed snacks made from processed meat

The process of processing from the procurement, manufacture, storage, and presentation is a critical stage of processed meat snacks that can cause contamination with haram materials so that it becomes unlawful for consumption. According to Euis (2011) Contamination can be divided into three ways, namely:

- a. Direct contamination is the presence of contaminants that enter the food directly because of ignorance or negligence either intentionally or unintentionally. For example, haircuts go into rice, use of cloth dyes and so on.
- b. Cross contamination is contamination that occurs indirectly as a result of ignorance in food processing. For example, raw foods come into contact with cooked foods, foods that come in contact with dirty clothes or utensils, such as plates, bowls, knives or cutting boards.
- c. Recontamination is contamination that occurs to the food that has been cooked perfectly. For example, rice contaminated with dust or flies because it is not covered

The critical point on the halal of processed foods made from meat can occur for several reasons. Mixing halal meat with haram meat such as pork resulted in haram products. The point where we hesitate to determine whether the food is halal or haram because it seems the possibility of contamination of haram materials both in terms of ingredients, storage, processing, etc. in Islam is called *syubhat*. In the teachings of Islam, the Prophet said "if you face something that is doubtful then leave it". This basis requires us to be more careful in sorting out food, especially foods derived from processed meat.

Simple things cause contamination can be

due to the use of cooking utensils and food serving equipment components. For example, food products that have gravy for example meatballs containing fat contaminated with pork. Then the fat containing oil is attached to the walls of the bowl. Most of the sellers of food products such as meatballs in the process of washing their tools (spoons, cups, plates, bowls, etc.) often do not use soap cleaners. Mostly they just dipping the tool directly into a pool of water and then dried it. So there is a possibility that the fat which contains the element of pork is still attached and can even become a chain process to contaminate other equipment. The case is an example of the teachings of the Prophet for something that is doubtful (Sari, 2018).

In the field case it was found that the average seller of processed children's snacks did not have their own grinding tools so they grind the meat in public places such as markets. The particular concern is that the mill is not specific to halal meat, so it is likely that pork contamination can easily occur. Based on the explanation above, we always have to be careful in choosing food. Because according to Kulsum (2018) in the MUI fatwa based on Qaidah fihiyyah explained that "When the halal and the haram are mixed, then the haram won ". According to Sani (2017) the attitude of a Muslim should be among these three things, taking the halal, leaving the haram and staying silent from the doubtful until clear the law. This is in order to protect themselves from honor, as those who underestimate small sins slowly he will fall into big sins.

4. Conclusion

Analysis of meat-based snack critical points can be assessed from the main ingredients. In the form of meat whether or not it contains ingredients from animals which are prohibited to be consumed or come from animals that are not slaughtered according to Sharia law, do not contain ingredients which is haram according to Islamic law, and is not presented or processed (procurement, manufacturing and storage) with materials or equipment that are exposed to odious according to Islamic law.

References

- Charity, M. L. (2017). Jaminan Produk Halal di Indonesia (Halal Products Guarantee in Indonesia). *Jurnal Legislasi Indonesia*, 14(1), 99-108.
- Dahlan, A. A. (1996). *Ensiklopedi Hukum Islam*. Jakarta Pusat: Ikhtiar Baru Van Hoeve.
- Denyingyhot, A., Phraephaisarn, C., Vesaratchavest, M., Dahlan, W. & Keeratipibul, S. (2017). Simultaneous Detection of Three Forbidden Animals (Porcine, Canine and Rat) In Halal Food by Using High Resolution Melting Analysis. *Scientific Bulletin. Series F. Biotechnologies*, XXI, 284-288.
- Fibriana, F., Widiarti, T., Retnoningsih, A., dan Susanti. 2012. Deteksi Daging Babi Pada Produk Bakso di Pusat Kota Salatiga menggunakan Teknik *Polymerase Chain Reaction*. *Biosaintifika*. 4(2).
- Kulsum, Y., Adawiyah, A., Shofwaturrohmani, F. & Nurjanah, D. (2018). Pig Sample Handling in Laboratory Scale. *Indonesian Journal of Halal Research*, 1(1), 14-17
- Majelis Ulama Indonesia. (2010). Halaman 17
- Masthu, H. (1995). Makanan Indonesia dalam Pandangan Islam. Kantor Menteri Negara Urusan Pangan Republik Indonesia. halaman. 55-106
- Nakyinsige, K., Man, Y. B. C., Sazili, A Q., Zulkifli, I. & Fatimah, A. B. (2012). Halal Meat: A Niche Product in the Food Market. In *2012 2nd International Conference on Economics, Trade and Development IPEDR vol. 36 (2012) © (2012) IACSIT Press, Singapore Halal (Vol. 36, pp. 167-173)*.
- Nurlaela. E. (2011). Keamanan Pangan dan Perilaku Penjamah Makanan di Instalasi Gizi Rumah Sakit. *Media Gizi Masyarakat Indonesia*, 1(1), 1-7
- Sani, A. (2017). Metode Penetapan Standarisasi Produk Makanan Halal (Studi Perbandingan Majelis Permusyawaratan Ulama Aceh Dan Majelis Agama Islam Patani). *Skripsi*. Fakultas Syari'ah Dan Hukum Prodi Perbandingan Mazhab Universitas Islam Negeri Ar-Raniry Darussalam - Banda Aceh
- Sukiati. (2013). Konsep Halal dan Haram dalam Al-Quran Kajian Hukum Islam dengan Pendekatan Tafsir. *Doctoral Thesis*. Pascasarjana UIN-SU
- Syafrida. (2017). Sertikat Halal Pada Produk dan Minuman Memberi Perlindungan dan Kepastian Hukum Hak-Hak Konsumen Muslim. *Adil: Jurnal Hukum*, 7(2), 159-174.

- U.S. Commission on International Religious Freedom. (2017). *Annual Report*. WWW.Uscirf.Gov @Uscirf
- Waharini, F. M. & Purwantini, A. H. (2018). Model Pengembangan Industri Halal Food di Indonesia. *Muqtasid: Jurnal Ekonomi dan Perbankan Syariah*, 9(1), 1–13.
- Winarsih, Nihayati, K. dan Khoiriyah, R., A. 2017. Deteksi Fragmen Dna Rendah Pengkode Gen Sitokrom B (Cyt B) Babi Pada Sampel Mie Instan Menggunakan Metode Polymerase Chain Reaction (PCR). *Biotropic The Journal of Tropical Biology*. 1(1).

Factors Influencing Purchase Intention of Halal Products in Pontianak City

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ABSTRACT

Halal certification is a halal recognition by MUI on a product that is important especially for Muslim consumers. The existence of a halal label on a product provides added value to businessmen while consumers getting a consumer guarantee. Based on The Republic of Indonesia Law No. 33 of 2014 regarding the guarantee of halal products, the provisions of halal products are based on ingredients and processing. This study focuses on the halal production process based on Islamic Shari'a. This study aimed to identify the factors influencing consumer interest in halal food products. The results showed that halal certification, halal awareness, food ingredients affect purchase intention. These three factors may become consideration for the producer to produce their product.

Keywords: *halal, Pontianak towards a halal city.*

1. Introduction

The city of Pontianak has the characteristics of a heterogeneous society consisting of 3 ethnic groups namely TIDAYU (Tionghoa, Dayak and Malay). Based on population statistics of West Kalimantan Province, the population of non-Muslims in West Kalimantan was recorded as 2/3 of the Muslim population as many as 3,206,084 people. The people of Pontianak City, in particular, have behaviors/habits to eat outside for habitual reasons or just want to try tasting new culinary delights.

According to data from the Central Statistics Agency (BPS) since 2015, in the city of Pontianak, the developments in the trade, hotel, and restaurant sectors continue. The types of culinary in Pontianak City are more diverse, which make competition in this business more creative. In terms of taste and aesthetics to the consumer's guarantee become the attention of business owners. Competition in terms of taste and aesthetics is the creativity demanded by each food business owners; however, the issue of consumer's guarantee is actually related to the halal certification in the products produced.

The Muslim community of Pontianak City, they should be careful in choosing the desired location/type of food they intend to eat

as it is an obligation for a Muslim to eat halal food. The presence of a halal logo on the products issued by MUI makes it is easier and sure for Muslim communities in choosing halal products. The halal logo on products guarantees legal protection for Muslim consumers in Indonesia. This has been stated in Law No. 33 of 2014 related to the guarantee of halal products.

However, most IKMs have not yet got the halal certification on their products. Therefore, this study aimed to identify the factors influencing consumer interest in halal food products as well as provide knowledge on development strategies and increase business value by having a halal logo as an added-value product.

2. Materials and Methods

The blue ocean strategy is characterized by unexplored market space, demand creation, and very profitable growth opportunities. (Kim, 2005). The blue ocean strategy is a strategy that focuses on growing demand by creating new market spaces that have not been explored by competitors. In this case, the added value which becomes the main focus is the halal logo on the product. IKM products that have the MUI halal logo will become the main attraction to increase sales value.

The tools that being used in Blue Ocean Strategy including a six paths framework, a strategy canvas and a value curve, three tiers of non-consumers, a four action framework, the Eliminate-Reduce-Raise-Create (ERRC) Grid and a blue ocean strategy series to identify the competition factors, so that the formulation of strategies for business development can be generated. This research facilitates business owners by providing knowledge about the importance of halal certification in products.

a. Halal Certification

The Halal certification in Indonesia is officially issued by the MUI. Products that have halal certification are products that have been passed the halal test and can be consumed by Muslims. Products that have been halal-certified are proved by the inclusion of a halal logo on the product packaging (www.halalmui.org).

b. Purchase Intention

Based on the Planned Behavior Theory which is used as a basis for measuring consumer buying intention, some researchers agree that intention is an indication to show individual beliefs to buy halal food products. For example, a Muslim consumer has the intention to buy halal food products which are displayed in the product arrangement.

c. Object of Research

The objects in this study were IKM/UKM in Pontianak City that were not halal-certified by MUI. This study used a quantitative approach. The survey method was chosen as the primary data source. The survey method focused on collecting the respondent's data. Data collection from the respondents was conducted using questionnaires. Primary data was obtained through interviews directly with the owner.

d. Data Collection Methods

This study was conducted from June to August 2018 in several samples of IKM/UKM in the City of Pontianak. The simple random sampling which was tested its validity and reliability was used to determine the samples. The methods of data collection used in this study were observation, interviews, discussions, and questionnaires.

3. Result and Discussion

Results of 2 Variables Analysis

The results of the descriptive analysis of the halal certification variables show in the table below:

Table 1. Variable Categorization of Halal Certification

Category	Internal Score	Frequency	Percentage
High	$x \geq 63,988$	44	20,5%
Moderate	$52,161 > x \geq 63,987$	135	62,8%
Low	$52,161 > X$	36	16,7%
Total		215	100%

Based on the table, it can be concluded that some respondents only use halal certification to choose halal food. While the results of purchase intention variables analysis are as follows:

Table 2. Category of Purchase Intention Variables

Category	Internal Score	Frequency	Percentage
High	$X \geq 34,068$	38	17,7%
Moderate	$28,741 > X \geq 34,068$	135	62,8%
Low	$28,741 > X$	42	19,5%
Total		215	100,00%

The result of the analysis of purchase intention showed that out of 215 respondents, there were as many as 135 people (62.8%) have moderate purchase intention. 42 people (19.5%) were on the low category, and a total of 38 people (17.7%) have high purchase intention. This is suggesting that some respondents have sufficient interest to buy halal food products.

Hypothesis Testing

In this study, it hypothesized that there is a positive effect of halal certification, halal awareness and food ingredients towards purchase intention. Multiple regression analysis was conducted using SPSS 20 to analyze the result.

Table 3. Results of Multiple Regression Analysis

Variable	Coeff. (B)	t- value	Sig.	Conclusion
Halal Certification	0,106	3,654	0,000	Significant
Halal Awareness	0,251	3,994	0,000	Significant
Food Ingredients	0,191	2,555	0,011	Significant
Constanta = 13,467				
Adjusted R2 = 0,288				
F Value = 29,835				
Significance = 0,000				

The results showed that the fourth hypothesis, namely halal certification, halal awareness, and material composition, as well as the three variables jointly affecting purchase intention are statistically acceptable.

Table 4. Summary of hypothesis verification

No	Hypothesis	Verification
1	Halal certification has a positive and significant effect on purchase intention	Accepted
2	Halal awareness has a positive and significant effect on purchase intention	Accepted
3	food ingredients has a positive and significant effect on purchase intention	Accepted
4	Halal certification, halal awareness, food ingredients have positive and significant effect on purchase intention	Accepted

4. Conclusion

Halal certification, halal awareness, food ingredients affect purchase intention by 28.8%. While the remaining 71.2% is influenced by other factors that were not examined by the researcher. The result showed that all variables affect the purchase intention of consumers. it means that halal certification, halal awareness, and food ingredients may cause the consumer's buying intention high in halal food products.

The suggestion is the producer of the food product should consider the three factors namely halal certification, halal awareness, and food ingredients on the product as nowadays Muslims are consumers which become potential markets for halal food products.

References

- Halal Majelis Ulama Indonesia Kalimantan Barat.
- Kim, W. C. & Marborgne, R. (2017). *Blue Ocean Shift; Pergeseran Samudra Biru Melampaui Persaingan*. Jakarta: PT. Gramedia.
- Kim, W. C., Marborgne, R. (2015). *Blue Ocean Strategy*. Cetakan IV. Jakarta: PT. Serami Ilmu Semesta.
- Kim, W. C., Marborgne, Re. (2016). *Blue Ocean Strategy; Menciptakan Ruang Pasar Tanpa Pesaing dan Menjadikan Persaingan Tidak Lagi Relevan*. Jakarta: Noura Books.
- Kotler, Philip., Keller, Kevin Lane. (2007). *Manajemen Pemasaran; edisi dua belas jilid 2. Indonesia*. PT. Indeks.