INDONESIAN ASSOCIATION OF FOOD TECHNOLOGISTS – WEST SUMATERA CHAPTER

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(QID-Food 2015)

"The Quality Improvement and Development of Food Product to Enter the ASEAN Economic Community (AEC) "

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Changes of Films with Anthocyanin as an Indicator of Chicken Nugget Deterioration during Storage

Held on 18th April 2015, Bukittinggi, West Sumatera-Indonesia

Tuty Anggraini, Ph.D
Chairman
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Prof. Dr. Fauzan Azima
Chairman
Indonesian Association of Food technologists
West Sumatera Chapter

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18th April 2015, Istana Bung Hatta, Bukittinggi, West Sumatera - Indonesia

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Welcoming Remarks

WELCOMING REMARK BY CHAIRMAN OF PATPI-WEST SUMATERA CHAPTER

Assalamualaikum and good day,

Thank you to the Almighty with His divine grace and consent that we meet in the International Conference on Quality Improvement and Development of Food Product (QID-Food 2015) On this occasion, I would like to express my deepest appreciation and gratitude to the organizing committee of QID-Food2015 who have worked hard in planning and ensuring the smooth running of the conference. I would also like to welcome the Andalas University-Indonesia, Universiti Sains Malaysia, Prince Songkla University-Thailand, Universiti Sains Islam Malaysia, Perfectural University of Hiroshima-Japan and Politeknik Pertanian Negeri Payakumbuh-Indonesia for co-operating with Indonesian Food Technologist Association (PATPI) - West Sumatra Chapter for organizing committee. The aim of International Conference QID-Food 2015 is to strengthen knowledge between scholars by exchanging scientific information and sharing of mutual interests, new ideas and research findings emphasizing on quality improvement and development of food product. Through this conference, it is hoped that research collaboration between participating universities through development and improvement of food product based disciplines will be further developed and strengthened. QID-Food2015 can be an important platform for the exchange of knowledge, skills and expertise that can be used to improve the quality of research participants, particularly in the areas of food product development.

Finally, I wish to congratulate once again the QID-Food2015 organizing committee for organizing this seminar. Hopefully QID-Food will continue in the future to maintain the synergies between co-organizers.

Thank you,

Prof. Dr. Fauzan Azima

Chairman of Indonesian Assosiacion of Food Technologists –

West Sumatera Chapter

WELCOMING REMARK BY CHAIRMAN OF QID-Food 2015

Excellencies, Distinguished Delegates, Ladies and Gentlemen,

Assalamualaikum and good day,

First of all, It gives me great pleasure to extend to you all a very warm welcome to all participants and thank you for accepted our invitation to convene of the International Conference on Quality Improvement and Development of Food Product (QID-Food 2015). Qid-Food2015 was initially organized by Indonesian Food Technologist Association (PATPI) - West Sumatra Chapter. The theme this conference is "The Quality Improvement and Development of Food Product to Enter the ASEAN Economic Community (AEC) 2015". The aim of this conference is to provide a platform for learning and discussion as well as networking among international peers from both academia and industry with the issues related to develop and improve of food product.

It is an opportune time to renew contacts and discuss problems of mutual interest with delegates from USM, PSU, USIM, Unand, Unej, PUH, IPB, Univ Mataram, etc.

It is gratifying to note that the agenda of the Seminar covers a wide range of very interesting items relating to the Food product improvement, food product development, food quality, food safety, food nutrition, functional food, halal food, food packaging, food engineering, traditional food and food management, marketing and distribution.

Lastly, I would to extend my utmost gratitude and appreciation to PATPI-West Sumatera Chapter for the support given to the organizing committee of QID-Food2015. I also would like to extend my unparalleled appreciation to our co-organizers from Andalas University-Indonesia, Universiti Sains Malaysia, Prince Songkla University-Thailand, Universiti Sains Islam Malaysia, Nong Lam University, and Politeknik Pertanian Payakumbuh-Indonesia for their efforts in this conference. Before I close, I'd like to thank each of your for attending our conference and bringing your expertise to our gathering.

In concluding, I wish you every success in your presentation, research and a very pleasant stay in Bukittinggi.

Thank you,

Tuty Anggraini, Ph.D

Chairman of QID-Food 2015

WELCOMING REMARK BY USM DELEGATION

Assalammualaikum and Greetings

On behalf of Universiti Sains Malaysia, I would like to congratulate Andalas University for proper planning and arrangement of PG Joint Seminar 2015 and QID-Food Seminar 2015. Seminar or conference is an important event for academia including post graduate student. In this event we have the opportunity for direct contact and discussion with the respective researcher on several and interested topics. Post graduate student will gain valuable experience, expose and potential networking with other postgraduate student from different universities and countries.

USM with total team of 3 lecturers and 13 post graduate students will involve in both events, PG Joint Seminar 2015 and QID-Food Seminar 2015. I believe, USM and USM postgraduate student will play valuable contribution in these Seminars.

Regards

Assoc. Prof. Dr. Nurul Huda
Programme Chairman,
Food Technology Programme, School of Industrial Technology
Universiti Sains Malaysia - USM, 11800, Penang, Malaysia.

WELCOMING REMARK BY PSU DELEGATION

Message from the Chair of the Graduate Program, Prince of Songkla University, Thailand

On behalf of the Faculty of Agro-Industry, Prince of Songkla University, Hat Yai, Thailand as a co-organizer of International Conference on Quality Improvement and Development of Food Product (QID-Food 2015), it is my pleasure and privilege to welcome all participants to this important event.

The QID-Food 2015 provides a great opportunity that brings together the people who interest in same area to present work, share knowledge, exchange ideas, expand the networking, and build a future collaboration.

Agriculture plays a major role in serving the economy of many countries in Southeast Asia. Food with high quality and ensured safety is considerably important to meet the global standard for both domestic consumption and exporting. Innovations and emerging technologies are needed for improving the quality and safety of food. This QID-Food 2015 conference has a theme that provides an opportunity for the participants to improve knowledge on food science and technology and to speed up the development of new research and innovations in food processing and technology. The outcomes from this conference will show a great impact at the national level as we are getting ready for the ASEAN Economic Community (AEC).

Finally, I would like to thank all of you who have worked on putting these events together. I hope everyone enjoy the QID-Food 2015 conference here in Padang. I hope you get to know other colleagues in the field of food science and technology for future collaboration, and wish you a pleasant and memorable stay.

Thank you

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PREFACE

INTERNATIONAL CONFERENCE ON QUALITY IMPROVEMENT AND DEVELOPMENT OF FOOD PRODUCT (QID-Food 2015)

International Conference on Quality Improvement and Development of Food Product (QID-Food 2015) is a conference to gather scientists and researchers from academia and industry involved in development and improvement of food.

"The Quality Improvement and Development of Food Product to Enter the ASEAN Economic Community (AEC) 2015", is the theme for International conference QID-Food 2015, this event organized by Indonesian Food Technologist Association (PATPI) - West Sumatra Chapter and jointly organized by the Andalas University-Indonesia, Universiti Sains Malaysia, Prince Songkla University-Thailand, Universiti Sains Islam Malaysia, Nong Lam University, and Politeknik Pertanian Negeri Payakumbuh-Indonesia.

The improvement and development of food product important issue to valuable of food product in all sectors such as raw material, processing, product, distribution and marketing as the key to enter of economic community.

The main objectives of the conference are:

1. To exchange and share mutual interests, new ideas and research findings about quality improvement and development of food product
2. To provide a platform for research collaboration through quality improvement and development of food product based disciplines
3. To update on recent quality improvement and development of food product

The scopes of International Conference QID-Food 2015 are:

- Food Product Improvement
- Food Product Development
- Food Quality and Food Safety
- Food Nutrition
- Functional Food
- Halal Food
- Food Packaging
- Food Engineering
- Traditional Food/Indegenous Food
- Food Management, Marketing, and Distribution

Acknowledgement

Special Thanks to the organizations listed below for their contributions:

- PATPI West Sumatera Chapter
- Director of Graduates School, Andalas University
- Department of Food Agricultural Product Technology Faculty of Agricultural Technology Andalas University
- Universiti Sains Malaysia
- Prince of Songkla University
- Universiti Sains Islam Malaysia
- Perfectural University of Hiroshima
- Politeknik Pertanian Negeri Payakumbuh

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List of Papers

Changes of Films with Anthocyanin as an Indicator of Chicken Nugget Deterioration during Storage

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Abstract— **An indicator can be defined as a substance which indicates the presence or absence of another substance or the degree of a certain reaction through characteristic changes. Therefore, the aim of this research is to evaluate the changes of a films with anthocyanin as an indicator of chicken nugget deterioration during storage. A film made of cassava starch, glycerol, and anthocyanin was prepared using the casting technique. Chicken nugget samples were put in packaging containing an anthocyanin film and stored at 25°C. The lightness (L*), redness (a*) and yellowness (b*) of films were analyzed for a 28 day- period. Colour changes were also identified in film. Chicken nuggets samples were analyzed of moisture content, pH, and water activity (aw). Changes in moisture content, pH, and aw of samples was observed over the storage period as result of chicken nugget deterioration. However, the storage period was it possible to establish a correlation between change of colour, pH and aw with chicken nugget deterioration.**

Keywords— **Films, indicator, anthocyanins, chicken nugget, deterioration**

I. INTRODUCTION

The development of packaging technology is smart packaging, which is currently being developed where packaging is able to monitor the condition of packaged food and provide information on the quality of the food in the container during transport and storage. The Smart packaging system is able of indicating inform about a change occurred in a product, such as temperature and pH by means of visual changes (Realini et al., 2014).

The study of smart packaging in the form of biodegradable film with a color indicator to identification of deterioration of product such as using grape and spinach extract (anthocyanin and chlorophyll) as the color indicator to detect deterioration of fish fillet during storage period (Hasnedi, 2009). Indicators are a subtances that indicate the presence, absence or concentration of another substance, or the degree of reaction between two or more substances by means of a characteristics change, especially in color (Hogan, et al., 2008).

The development of indicators in smart packaging using natural pigment from vegetable source, anthocyanins have great potential as indicators in smart packaging system. These flavonoids are widely spread in nature comprising the largest group of water-soluble plant pigments, and they have been isolated mainly from flowers and fruits (Silva, et al., 2012). Color of anthocyanin is strongly influenced by its structure, pH, co-pigmentation, temperature, UV radiation, and presence of oxygen providing different colors that range from salmon-pink through red and violet to nearly black. This color instability of anthocyanins makes these pigments especially useful to monitor food quality and therefore can be used as an indicator of food spoilage in intelligent packaging system (Golasz, et al., 2012).

Golasz, L.B, Silva, J. and Silva, S.B (2012) developed a biodegradable film as packaging material based on the anthocyanin extracted from grape skin incorporation into cassava starch matrixs as indicator of the deterioration of chilled pork. The aim of this study to evaluate the performance of a bio-based film made cassava starch, glycerol, and anthocyanin extract from purple sweet potato as indicator of deterioration of chicken nuggets during storage 25°C. For 28 days, film and chicken nuggets deterioration was assessed by color change analysis, moisture content and pH value.

II. MATERIALS AND METHODS

2.1 Materials

Anthocyanin extracted from purple sweet potato, cassava starch and glycerol were used as raw materials to prepare the films. Chicken meat, flour, batter, breadcrumbs and spices were used as raw materials to prepare the nuggets used in this study.

2.2 Film preparation

Films were prepared from a filmogenic suspension of cassava starch, glycerol, and anthocyanin extracted from purple sweet potato (45:45:30) using the casting technique. The film formula was developed by Silva et al. (2011), Film-forming suspension was obtained under slow and constant stirring up to 75 °C for 30 min of starch gelatinization. Afterwards, the film was cast into glass plate were dried under vacuum oven at 50 °C for 9 hours, followed by storage at controlled conditions (22°C ± 2°C) for 48 hours.

2.3 Chicken nugget preparation

Food-grade flour and seasonings (garlic powder, salt and black pepper) were weighed and added to the formulations. They were hydrated with water and thoroughly mixed with ground chicken meat in a mixer equipped with a flat beater and operated at a low speed for 2 min. The chicken mixture was transferred to steam

machine at 90°C for 30 min. The chicken nugget was weighed to provide individual nuggets pieces (25±1g per piece), shaped into discs about 1.5 cm thick, add batter and breadcrumbs.

2.4 Analysis.

2.4.1 Moisture content

The moisture content was determined according to standard procedures (AOAC, 2000).

2.4.2 pH

The pH analysis was performed using a pH meter with a penetration electrode meter (Delta OHM, Australia), which was inserted in the solution of samples.

2.4.3 Colour analysis

Lightness L^*, redness a^* and yellowness b^* (CIE, 1978) colours of film samples were evaluated on a *Spectophotometer ColorFlex EZ* (*HunterLab Inc.*: Reston, VA) was standardized with a white colour standard.

2.5 Statistical methods

Data obtained from all the analysis were analysed by using One-Way Analysis of Variance (ANOVA) and followed by Duncan Multiple range test of statistical package for social science version 15.0 (SPSS Inc., Chicago, Illinois, U.S.A). Statistical significance was indicated at 95% confidence level.

III. RESULTS AND DISCUSSIONS

The moisture content is one of the most important parameters in food as it relates to the quality and shelf life of products, the water content in food ingredients also determines the freshness of foods (Winarno, 2004). The moisture content plays a role in influencing the level of freshness, stability, durability, chemical reaction, enzyme activity and microbial growth (Kusnandar, 2010).

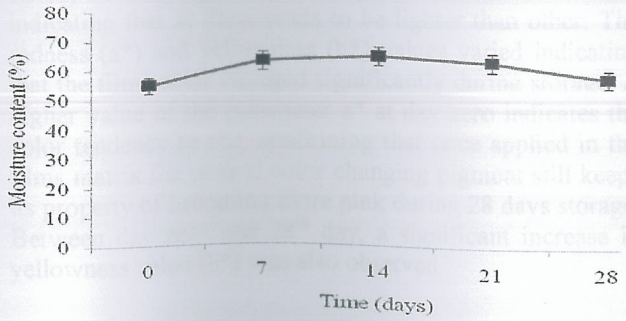

Figure 1. Moisture content of chicken nugget with film indicator

Moisture content chicken nuggets obtained during 28 days of storage in a variety of different storage period range between 54.76 - 65-01%. Figure 1 shows a comparison function of storage time on the water content of chicken nuggets. Damage caused to the product nuggets stored at freezing temperatures allegedly due to the risk of loss of product water (dehydration) and the occurrence of rancidity of the product due to fat oxidation reaction. Dehydration can be prevented by using the product packaging that has good ability in freezing temperatures with good protection properties against water vapor. At temperatures below 0°C, the water will freeze and form ice separate from the solution are similar in terms of water evaporated drying or a drop in temperature. Food products, chemical changes during freezing and cold storage can be kept to a minimum, then the quality of frozen foods can be maintained in the long term (Eddy, 1989). Therefore, nuggets in freezer temperatures have a good lasting power during storage and it is still suitable for consumption.

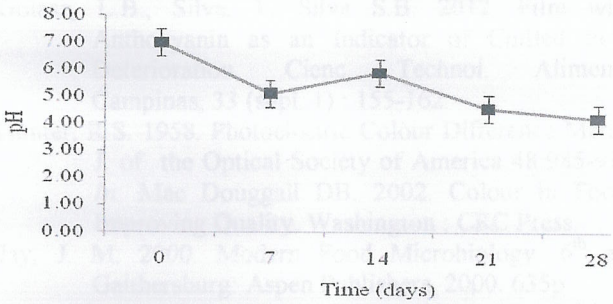

Figure 2. pH value of chicken nugget with film indicator

The pH used to monitor the shelf life of meat (Muela, E. 2010). The pH value of chicken nuggets is strongly influenced by the long treatment of storage time of the chicken nuggets. The results pH value of chicken nuggets was stored at freezer for 28 days ranged from 4.21-7.00.

From the analysis storage period factor give significant effect on the pH value. This is in accordance with the opinion of Lawrie (1995) which states that the pH of the meat can be affected by storage time. During storage, endogenous and microbial enzymes degrade protein meat and produce ammonia and amines, which increase the pH (Jay, 2000). Buckle et al., (1987) stated that the accumulation of lactic acid will stop after muscle glycogen reserves become depleted or after conditions are achieved, namely pH low enough to stop the enzymes - glycolytic enzymes in the process of anaerobic glycolysis. While the increase in pH is usually caused by a more open structure of the filament - filament miofibrilar causing a growing number of incoming water and it also supports an increase in water holding capacity (Soeparno, 1998).

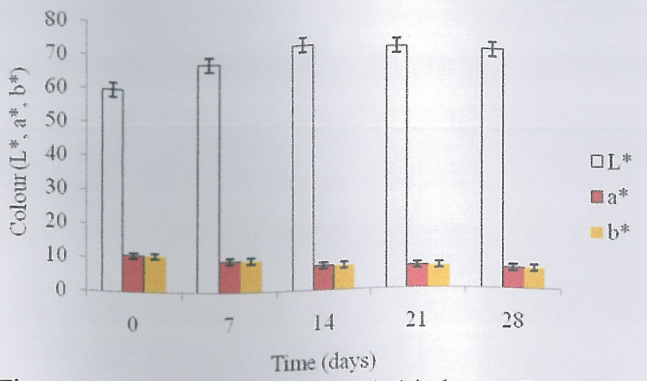

Figure 3. Color parameters (L*, a*, b*, h_{ab} , ΔE) of film indicator during storage at -5°C

Color plays an important role in the films as an indicator of chicken nuget deterioration where the color changes useful to monitor food quality and therefore can be used as an indicator of food spoilage during storage in smart packaging systems. The color analysis using a *HunterLab ColorFlex EZ Spectrophotometer*, there are 3 notation (L *, a * and b *) where the third notation is used to identify the signs of color changes that occur in the films during storage. L* indicates of lightness which has a value range from 0 to 100, where 0 indicates a dark color (black), while 100 indicates a light color (white), a* (+) is redness which ranged from 0 to 60, if a* (-) values indicate green color ranges from 0 to -60, and b* as a yellowness, if the value of b * positive value indicates color yellow that ranged from 0 to 60, if the value is negative b* indicates blue color that ranges from 0 to -60. °Hue is a term used for the classification of red, yellow, blue and others. Color analysis are shown in Figure 3.

Based on Figure 3, *L**, a*, b* changes during storage. In the beginning, the indicator film color was initially light red. After twenty eight days of frozen storage, it was observed visible change in the film indicator color. The films lost color intensity progressively and became Lightness (*L** increase), showing a more yellowish color. At day 28th, the higher value for parameter *L** was verified, indicating that at films tends to be lighter than other. The redness (a*) and yellowness (b*) values varied indicating that the films color changed significantly during storage. A higher value of the parameter a* at day zero indicates the color tendency to red, confirming that once applied in the films matrix the natural color changing pigment still keeps its property of becoming more pink during 28 days storage. Between day zero and 28th day, a significant increase in yellowness value (b*) was also observed.

IV. CONCLUSION

The developed film with anthocyanin extracted from purple sweet potato was able to detect changes in the chicken nugget during storage period through changes in the film color, moisture content and pH.

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