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The Addition of Super Red Dragon Fruit (Hylocereus Costaricensis) Peels Concentrate To Physico-chemical and Microstucture of Chicken Saussage

Dita Eka Oktaviningsih1, Lilik Eka Radiati2, and Firman Jaya2
1Student of Faculty of Animal Husbandry, University of Brawijaya
2 Lecturer of Faculty of Animal Husbandry, University of Brawijaya
E-mail : ditaekaokta@gmail.com

ABSTRACT

The purpose of this research was to determine the addition of SRDF (Super Red Dragon Fruit) peel concentrate on Physico-chemical quality and Microstucture by SEM (Scanning Electron Microscope) of chicken sausages. The method research was experimental and designed using completely randomized design (CRD), which consists of 5 treatments and 5 replications. The treatments were T0: Chicken Sausage + 0% of SRDF peels concentrate (control), T1: Chicken Sausage + 5% SRDF peels concentrate, T2: Chicken Sausage + 10% of SRDF peels concentrate, T3: Chicken Sausage + 15% of SRDF peels concentrate, T4: Chicken Sausage + 20% of SRDF peels concentrate. The variables measured were moisture content, fat content, color measure L*a*b*, texture and microstructure. Data were analyzed using one-way Anova, if there were a significant effect between the treatments then continued with Duncan's Multiple Range Test. The addition 20% of SRDF peels concentrate on chicken sausage could decreasing color L* of 43.56± 1.30, increasing the color a* of 33.78± 2.36, decreasing color b* of 12.96±0.48, decreasing fat content of 40.87 ± 0.68, decreasing texture of 3.16± 0.35, and increasing moisture of 44.75 ± 8.7. The advantages of this reseach were that red color of sausage increased consumer attractiveness and that the content of fat and moisture suited the standart T0 and National Standart Indonesia. Disadvantages of the results were that the texture decreased because the concentration of SRDF peel concentrate.

Keywords: Chicken sausage, super red dragon fruit, anthocyanin, natural dyes, microstructure.

INTRODUCTION

Meat consumption in Indonesia was found to relatively low than compare to other countries. Indonesia was found to have a consumption 3.494 kg per capital, compare to 20 kg per capital in Africa and china 38 kg per capital (Social economi survey, 20012). However, the demand and consumption of chicken meat continues to grow. This trend was make the processing industry growth rapidly, and that transformed to chicken meat, because its more economical. Chicken meat product became a favorite menu, it was reflected by the high consumption in Indonesia society. Besides that, it has an important role as the source of protein, it also contains few nutrients like calories, fat, vitamin A, vitamin B and minerals. The variation of chicken meat product was give a bright prospect to run this business, such as making a sausage. In 2014 the sausage market was widely open, ranging from beef sausage, chicken sausage, until the sausage of fish. The popularity of sausage was supported by the colour, most of the customer like red sausage. This condition make the sausage industry uses synthetic coloring.

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The use of food additives, especially for colorings will abuse non-food grade dye. Some synthetic dyes was not safe it is toxicgenic even carcinogenic (Andersen and Bernard, 2001). Due to the security aspect of customer, the encourage of natural pigments such as anthocyanins, betalain and other natural dyes is need to developed. Dragon fruit is a new fruit crop that grown in Indonesia starting from year 2000. Dragon fruit that mostly popular in the consumer recently is the type of super red dragon fruit (Hylocereus costaricensis) as it has a sweeter flavor without any unpleasant taste than others and it believed more nutritious for the body's, health and have attractive colors (Anonymous, 2009). SRDF (Super red dragon fruit) peel has a proportion of 30% -35% from fruit weight and not use optimally. It gives potential to be developed into functional foods (Wahyuni, 2011). In Indonesia, the production of red dragon fruit is high, especially in Banyuwangi, East Java. In 2014, the red dragon fruit production reached 28.819 tons. To fulfill the market demand, fresh red dragon fruit was also manufactured into instant foods such as chips, syrup, dodol and others. The treatment process, there are waste untapped peel.

SRDF peel has a nutrients value content such as total solids of 86.66 %, ash content of 20.22 %, crude protein content of 9.26%, crude fiber value of 23.39%, crude fat content of 2.38% and antocyanin value of 0.45 ppm. Total dietary fibre content in the SRDF peel was very high, dietary fiber can binding the water and build the texture. Protein is a component for build up the texture. SRDF peel could potentially be used as thickening agent and natural dyes for the anthocyanin pigment (Harivaindaram et al., 2008). SRDF peels (Hylocereus costaricensis) has ability as a dyes additive in chicken sausage because it has a bright color thus will removing bad effect for the health. According to Wanitchang, et al (2010) SRDF peels was rich in anthocyanin. Anthocyanins pigment are also used as natural dyes in foods. For increase functional value and commercial chicken Sausages, needs to be done research on the effect of the addition of super red dragon peels concentrate on chicken sausages.

MATERIAL AND METHOD

1. MATERIAL

Concentrate peel super red dragon fruit was obtained from the peel of super red dragon fruit grinded without solvents to get the pure essence of dragon fruit peel without removing or damaging the active substance content. SRDF was obtained from traditional market with characteristic has a red peel, and harvesting around 50-55 days fron the bud. The sausage chicken made of 20% of chicken meat , 20% of tapioca flour,2% of garlic, 3% of onions, 0.25% of pepper, 0.25% of nutmeg, 2% of sugar, 2% of salt, 20% of oil, 5% of egg, 1% of STPP (sodium tripholyphospate) 0, 20% of ice cubes.

2. RESEARCH METHOD

The research method was experimental using completely randomized design (CRD), which consists of 5 treatments and 5 replications as following:

T1 = Chicken Sausage + 0% of SRDF peels concentrates as controls.
T2 = Chicken Sausage + 5% of SRDF peels concentrates.
T3 = Chicken Sausage + 10% of SRDF peels concentrates.
T4 = Chicken Sausage + 15% of SRDF peels concentrates.
T5 = Chicken Sausage + 20% of SRDF peels concentrates.

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3. RESEARCH VARIABLE.

The variables observed in this research were the physical quality of chicken sausage included:

a. Moisture content measurement by method of AOAC (1995).
b. Fat Content Analysis (AOAC, 2002).
c. Texture was observed by method of AOAC (1995).
d. Color test was observed by method of Siregar (2006).
e. Microstructure was observed by SEM.

4. DATA ANALYSIS.

Data from this research were analyzed by using one-way Anova (Analysis of Variance) based on Completely Randomized Design which consists of 5 treatments and 4 replication. If appear significant effect then continued with Duncan Multiple Range Test. And best result for Microstructure analysis.

RESULT AND DISCUSSION

The anthocyanin, sugar, betalain and dietary fiber content in SRDF peels was expected to improve the quality of chicken sausages in term of moisture, fat content, color L*a*b* and texture. The concentration of SRDF peels used was 0 %, 5%, 10 %, 15%, and 20% . Mean value of the quality of chicken sausages such as moisture, fat content, color L* a* b*, and texture are shown on Table 1.

Table 1. The average test results of moisture, fat content, texture, and color of the L * a * b *.

Treatment	Moisture	Fat Content	Texture	Color L* (brightness)	Color a* (Redness)	Color b* (yellowness)
TO	39,49 ± 0.48	42.36 ± 0.66	3.92± 0.19^{b}	57.82± 0.63^{e}	14.94± 0.18^{a}	17.42± 0.37^{d}
T1	40,28 ± 0.3	40.95 ± 1.1	4.32± 0.46^{a}	50.54± 0.44^{d}	24.32± 0.71^{b}	15.12± 0.35^{c}
T2	40.73 ± 0.75	40.53 ± 1.6	3.48± 0.30^{a}	47.92 ± 0.74^{b}	28.24± 0.81^{c}	14.94± 0.61^{b}
T3	40.99 ± 2.87	40.97 ± 0.66	3.56± 0.77^{a}	46.42± 1.03^{c}	29.86 ± 2.49^{d}	13.14± 1.26^{a}
T4	43.31 ± 2.81	40.87 ± 0.68	3.16± 0.35^{a}	43.56± 1.30^{a}	33.78± 2.36^{e}	12.96±0.48^{a}

Notes: The different superscript letters (a, b, c, d) in the same coloumn show highly significant (P<0.01).

1. MOISTURE.

The result showed that there was no significant effect (P>0.05) on the moisture of chicken sausages. The lowest moisture was obtained from T0 38.93±4.8 % and the highest value come from T4 44.75±8.7 %. Mean value among the treatments were relative similar, although increased from T0 to T4. This value complay with National Standard Indonesia (SNI) where maximum moisture of sausages was 67% (SNI, 2005). Moreover, all of moisture values of sausage were lower when compared to the moisture of chicken sausage with the addition of red pumpkin was 65.78-68.43% (Khotimah, 2013). Higher concentration of SRDF peels concentrate due to increase moisture content in chicken sausage.

The SRDF peels contains high level of dietary fiber up to 23.39%, the compound increase water holding capacity, stability, and improved the texture of the meat product (Darojat, 2010).

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Dietary fiber bind the free water, because their wide surface area and structure of the capillary have the ability to absorb water (Budianta, 2001).

2. FAT CONTENT.

The SRDF peel concentrate sausage content similar fat. This is supposedly due to the lack of interaction with the addition of SRDF peels concentrate. It can be due to the fat content of the SRDF peels was low (2.38%) (Daniel, 2014), so it is not able to increase fat content of sausages significantly (Wahyuni, 2012). It is suspected because of the SRDF peels concentrate added with different percentage. As known, the percentage of the amount of SRDF peels concentrate filling the total solid, so as consequence fat content cannot increase.

3. TEXTURE.

The result showed highly significant ($P<0.01$) on chicken sausage texture. T1 as the highest value (3.92 ± 0.19) and T4 as the lowest value (3.16 ± 0.35). Decrease in the texture value might be caused by the addition of SRDF peels concentrate, with the increasing of SRDF concentrations which tends to cause the reducing of compactness. According to Daniel (2014) that moisture in the peels of fresh dragon fruit was still high and the crude fiber content of approximately 23-26%. This is proven by T4 which has the softest texture. Ambarsari (2009) also noted that the presence of crude fiber in food products increased the compactness, so the tenderness will adequately acceptable.

4. COLOR L* (BRIGHTNESS)

The treatment had highly significant ($P<0.01$) on color L* (brightness) of chicken sausage. It is due to chicken has white meat type, this can be seen from the decreasing in the level of brightness on the sausage despite with addition of SRDF peels concentrate. Nonetheless, red color has produced in chicken sausages due to anthocyanin in SRDF is a coloring agent (Winarti, 2008). Anthocyanin gives a red color and potential as natural dyes which safer for health. According to Rekna (2011), the value of color L on the jelly with SRDF peels decrease from 37,83 to 24,27. Decreasing value caused increasing the propotion of SRDF peel addition make more redness color.

5. COLOR a* (REDNESS)

The result showed highly significant ($P<0.01$) on color a* of chicken sausage. T4 showed the highest value on the color a* (redness) and the lowest in T0. This may be due to the anthocyanin contained in the dragon fruits peel is used as a pigment, so increased value of color a* (redness) on SRDF treatment especially on T4. According to Daniel (2014), there was 0.45 ± 0.26 ppm natural anthocyanin substances in SRDF peels which was higher than the other natural sources of anthocyanins. Jaafar et al. (2009) noted that the SRDF peel contains active compounds including alkaloids, terpenoids, flavonoids, thiamine, niacin, pyridoxine, cobalamin, phenolic, carotene, and fitoalbumin.

6. COLOR b* (YELLOWNESS)

The treatment had highly significant ($P<0.01$) on color b* of chicken sausage. T0 showed the highest value on color b* (yellowish) and the lowest in samples of T4. It is due to SRDF peels contains anthocyanin as red coloring agent. According to Winarti (2008) the dragon fruit peels containing high substance of natural dyes anthocyanin. The value of color b* (yellowness) on T4 decreased but increased the value of color

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a* (redness). So, the mean value of color b* (yellowness) decreased because the presence of red color in anthocyanin pigment on SRDF peels concentrate.

7. MICROSTRUCTURE BY SEM.

The microstructure of the chicken sausage with or without SRDF peel concentrate addition are showed on Figure 1.

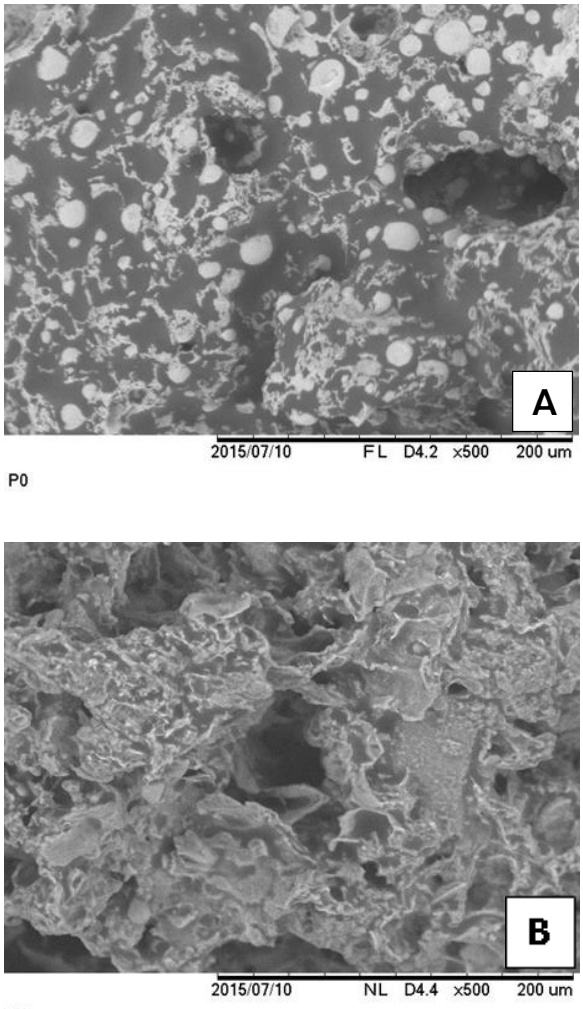

Figure 1. Scanning electron micrograph at 500x magnification of chiken sausage : (A) T0 sample without SRDF peel concentrate addition and (B) T4 sample with 20% SRDF peel concentrate addition.

Micrograph demonstrated a difference in chicken sausages of T0 as control and T4 with 20% SRDF peel concentrate added. The T0 has more protein and fat globula fiiling the spaces of the large voids. In these micrograph (Figure 4) show the gelling process, were suspected to be caused by an interruption of myofibrillar gelation. Water holding will be change at 60oC, caused of denaturing the myofibril on the meat so can increase the displacement of water into the extracellular (Soeparno,2005). The high temperature can lead to the gel formation by the presence of protein and starch. The gel formation caused a decrease the amount of water bound. The establishment of a gel involving protein , starch and water (Purnomo, 2000). The fat of T0 chicken sausages was high with 42.36± 0.66% showed with the fat globula in these micrograph.

The T4 micrograph showed the structure was more compact. This is proven by 20% addition of SRDF peel concentrate effect due to fill the total solids in chicken sausage. In these micrograph apperance total solid such as the fiber. Gelling process and fat globula not appreance as the T0 micrograph. The SRDF peel content the 23.39% of fiber to increase the power of water holding and fill voids. According to Ambasari (2009), the presence of crude fiber to food products caused the resulting product become more compact but decreased the tenderness. It caused the SRDF peels concentrate contain acid can decrease a pH, and the protein will hidrolyzed. The SRDF peel concentrate also decrease the fat caused the total solids.

CONCLUSION

The addition 20% of SRDF peels paste on chicken sausage could decreasing color L* 43.56± 1.30, increasing the color a*

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33.78± 2.36, decreasing color b* 12.96±0.48, decreasing fat content 40.87 ± 0.68, decreasing texture 3.16± 0.35, and increasing moisture 44.75 ± 8.7.

SUGGESTION

Further analysis of this research product should be conducted in term of identifying the nutrient profile content such as proximate analysis as well as the organoleptic evaluation to give the resprensetative decision for the consumen.

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