

Lampiran 1. Metode Analisa Fisik

a. Bulk Density Cookies

Bulk density cookies dihitung dengan membandingkan massa *cookies* dengan volume *cookies*.

$$\rho = \frac{\text{massa cookies (g)}}{\text{volume cookies (cm}^3\text{)}}$$

(Lewis, 1987)

b. Kekerasan Cookies

Setelah dipanggang, kekerasan *cookies* meningkat dibandingkan adonan *cookies*. Pengukuran kekerasan ini dilakukan dengan menggunakan *Hardness Tester* (Subagio *et al.*, 2003).



Lampiran 2. Metode Analisa Kimiawi

a. Analisa Kadar Air

Sampel yang telah dihaluskan ditimbang sebanyak ± 2 gram dalam cawan porselen yang telah diketahui berat konstan. Lalu sampel dikeringkan dalam oven pada suhu $100 - 105^{\circ}\text{C}$ selama 3 – 5 jam kemudian didinginkan dalam desikator dan ditimbang sampai beratnya konstan. Pengurangan berat merupakan banyaknya air dalam bahan (Sudarmadji *et al.*, 1997). Tujuan analisa ini adalah untuk mengetahui kandungan air dalam bahan pangan yang diperlukan untuk menentukan umur simpan.

Perhitungan Kadar Air :

$$\text{Berat sampel (g)} = W_1$$

$$\text{Berat sampel setelah dikeringkan (g)} = W_2$$

$$\text{Kehilangan berat (g)} = W_1 - W_2 = W_3$$

$$\text{Kadar air (dry basis)} = \frac{W_3 \times 100\%}{W_2}$$

$$\text{Kadar air (wet basis)} = \frac{W_3 \times 100\%}{W_1}$$

$$\text{Total padatan} = \frac{W_2 \times 100\%}{W_1}$$

b. Analisa Kadar Abu

Sampel yang telah dihaluskan ditimbang sebanyak ± 2 gram dalam cawan porselen yang telah diketahui berat konstannya. Lalu sampel diabukan dalam tanur pada suhu 550°C selama 3 – 5 jam kemudian didinginkan dalam oven dan dimasukkan dalam desikator lalu ditimbang sampai beratnya konstan (Sudarmadji *et al.*, 1997). Tujuan analisa kadar abu adalah untuk mengetahui kandungan mineral yang terdapat pada bahan pangan.

Perhitungan kadar Abu :

$$\text{Kadar abu} = \frac{\text{Berat abu} \times 100\%}{\text{Berat sampel}}$$

c. Analisa Kadar Protein

Sampel ditimbang sebanyak 0,25 gram kemudian dimasukkan ke dalam labu Kjeldahl. Lalu ditambahkan 7,5 gram K_2SO_4 ; 0,35 gram HgO ; dan 15 ml asam sulfat pekat serta batu didih ke dalam labu Kjeldahl dan dipanaskan sampai diperoleh larutan jernih (selama 3 – 4 jam). Labu berisi dekstruat tersebut didinginkan kemudian dipindahkan dalam labu destilasi sambil dibilas dengan 100 ml aquadest dingin. Lalu ditambahkan 15 ml $Na_2S_2O_3$ 4%; 50 ml NaOH 50% dingin dan 0,2 - 0,25 gram Zn dalam labu destilasi. Pada erlenmeyer penampung destilat diisi dengan 50 ml HCl 0,1 N yang ditetesi indikator MM dan diletakkan di bawah kondensor dengan ujung kondensor terendam kemudian didestilasi \pm 1 jam sampai dihasilkan \pm 75 ml destilat. Destilat dititrasi dengan NaOH 0,1 N sampai titik akhir titrasi berwarna kuning. Prosedur yang sama dilakukan untuk blanko (Sudarmadji *et al.*, 1997). Tujuan analisa ini adalah untuk mengetahui kandungan protein yang terdapat pada suatu bahan pangan.

Perhitungan Kadar Protein :

$$\% N = \frac{ml\ NaOH\ (blanko - sampel) \times N\ NaOH \times 14,008 \times 100\%}{berat\ sampel\ (mg)}$$

$$\% Protein = \% N \times Faktor\ konversi$$

d. Analisa Kadar Lemak

Sampel ditimbang sebanyak 2 gram lalu dibungkus dengan kertas saring yang telah diketahui beratnya. Lalu sampel dimasukkan dalam labu soxhlet ditambah dengan pelarut eter sampai 1/3 bagian labu lalu diekstraksi selama 4 jam. Kemudian sampel dikeringkan dalam oven dan setelah itu ditimbang (Sudarmadji *et al.*, 1997). Tujuan analisa kadar lemak yaitu untuk menentukan kandungan lemak yang terdapat dalam bahan pangan.

Perhitungan Kadar Lemak :

$$\% lemak = \frac{berat\ lemak \times 100\ \%}{berat\ sampel\ (W_1)}$$

e. Analisa Kadar Serat Kasar

Sampel yang telah diekstrak lemaknya dimasukkan ke dalam erlenmeyer dan ditambahkan anti buih sebanyak 2 – 3 tetes dan batu didih. Lalu ditambahkan H_2SO_4 0,25 N sebanyak 200 ml dan dididihkan 30 menit. Residu yang terbentuk disaring dan dicuci dengan aquadest panas. Kemudian residu tersebut dimasukkan ke dalam erlenmeyer dengan ditambahkan NaOH 0,25 N sebanyak 200 ml dan dididihkan kembali 30 menit. Residu disaring kembali dengan kertas saring yang telah diketahui beratnya. Selanjutnya residu dicuci dengan 100 ml aquadest panas dan 15 ml alkohol 95%. Setelah itu kertas saring dikeringkan dan ditimbang sampai berat konstan (Sudarmadji *et al.*, 1997). Tujuan dilakukannya analisa ini adalah untuk mengetahui kandungan serat yang terdapat dalam bahan pangan.

Perhitungan Serat Kasar :

Berat serat kasar = (Berat kertas saring + residu) – (Berat kertas saring kosong)

$$\% \text{ serat kasar} = \frac{\text{berat serat kasar} \times 100 \%}{\text{berat sampel } (W_1)}$$

f. Analisa Kadar Karbohidrat

Perhitungan Kadar Karbohidrat :

$$\% \text{ Karbohidrat} = 100\% - (\% \text{ Air} + \% \text{ Abu} + \% \text{ Lemak} + \% \text{ Protein})$$

Tujuan dari analisa ini adalah untuk menentukan kandungan karbohidrat dalam suatu bahan pangan (Winarno, 1997).

g. Analisa Kadar Kalsium

Sampel sebanyak 2 - 10 gram dihaluskan dan dimasukkan dalam cawan porselen yang telah diketahui beratnya lalu diabukan dalam tanur pada suhu $750^{\circ}C$ selama 8 jam dan diperoleh abu berwarna keputih - putihan. Abu ditimbang dan dilarutkan dalam HCl (1:4), kemudian dipindahkan dalam gelas piala. Larutan tersebut dipekatkan di atas penangas air pada suhu $75^{\circ}C$ selama 1 jam. Residu yang diperoleh ditambah dengan 5 – 10 ml HCl pekat dan 50 ml aquadest lalu dipanaskan kembali di atas penangas air selama beberapa menit. Larutan kemudian disaring dan filtrat yang diperoleh diencerkan hingga volume 200 ml dengan aquadest yang kemudian disebut sebagai Aliquot A.

Aliquot A dipipet sebanyak 30 ml ke dalam gelas piala dan diencerkan hingga 200 ml. Kemudian larutan dibuat menjadi sedikit basa dengan penambahan NaOH 10% dengan 2 tetes indikator *methylorange* sampai terjadi perubahan warna larutan dari merah muda menjadi kuning muda. Larutan dibuat menjadi sedikit asam kembali dengan penambahan HCl (1:4) sampai warna larutan berubah menjadi merah muda kembali. Kemudian ditambah 10 ml HCl 0,5 N dan 10 ml asam askorbat 2,5%, dididihkan. Sambil diaduk, larutan tersebut ditambah 15 ml larutan ammonium oksalat jenuh. Larutan dipanaskan sampai terbentuk endapan granuler. Setelah endapan dingin ditambahkan 8 ml Na-Asetat 20% sambil diaduk lalu didiamkan selama 12 jam. Endapan tersebut disaring dan dicuci dengan aquadest hingga bebas HCl (pH netral). Residu yang tertinggal dipindahkan ke dalam gelas piala dengan melubangi ujung bawah kertas saring dengan gelas pengaduk, lalu siram dengan aquadest panas sampai endapan tersebut pindah seluruhnya. Kemudian larutan tersebut ditambahkan 10 ml H₂SO₄ (1:4) dan dipanaskan sampai mendidih. Setelah dingin dilakukan titrasi dengan 0,1 N larutan KMnO₄ hingga larutan berwarna merah jambu. Saat hampir berwarna merah jambu, kertas saring yang digunakan untuk menyaring endapan dimasukkan dalam larutan dan dititrasi dilanjutkan sampai titik akhir titrasi. Akhir titrasi ditandai dengan tidak hilangnya warna merah jambu selama 20 detik. 1 ml KMnO₄ sesuai dengan 0,0028 gram CaO (Sudarmadji *et al.*, 1997). Tujuan analisa kadar kalsium adalah untuk mengetahui kandungan kalsium yang terdapat dalam suatu bahan pangan.

h. Analisa Kadar Vitamin C

Sampel cookies dihaluskan kemudian ditimbang masing – masing sebanyak 20 gram ke dalam labu takar 100 ml. Selanjutnya sampel tersebut diencerkan dan disaring dengan kertas saring untuk memisahkan filtratnya. Lalu filtrat diambil sebanyak 25 ml untuk dititrasi. Sebelum dititrasi, ditambahkan 2 ml larutan amilum 1%. Kemudian dititrasi menggunakan larutan Iod 0,1 N hingga larutan berwarna biru muda (Sudarmadji *et al.*, 1997). Tujuan analisa ini adalah untuk menentukan kandungan vitamin C yang terdapat dalam bahan pangan.

Perhitungan Vitamin C:

Berat vitamin C = ml titran * 0.88 = mg asam askorbat

Vitamin C per 20 gram berat basah = berat vitamin C * 4

Vitamin C per 100 gram berat basah = berat vitamin C per 20 gram berat basah*5

Lampiran 3. Kuisisioner Sensoris

KUISISIONER

Nama :

Umur :

(L/P)

Di hadapan Anda tersaji beberapa sampel *cookies*, silakan berikan penilaian Anda dengan rentang nilai 1 hingga 5 mengenai warna, tekstur, rasa, aroma serta kesukaan dari masing-masing sampel tersebut dengan kode yang ada.

| Kode sampel | Karakter | | | | |
|-------------|----------|---------|------|-------|----------|
| | Warna | Tekstur | Rasa | Aroma | Kesukaan |
| 308 | | | | | |
| 624 | | | | | |
| 149 | | | | | |
| 760 | | | | | |

Keterangan :

1 : Sangat tidak suka (STS)

2 : Tidak suka (TS)

3 : Cukup suka (CS)

4 : Suka (S)

5 : Sangat suka (SS)

Lampiran 4. Perhitungan Uji Sensoris

Rata – rata Faktor Sensoris

$$= \frac{\sum SS \times \text{skor} + \sum S \times \text{skor} + \sum CS \times \text{skor} + \sum TS \times \text{skor} + \sum STS \times \text{skor}}{\sum \text{total panelis}}$$

$$\sum SS = 5$$

$$\sum S = 4$$

$$\sum CS = 3$$

$$\sum TS = 2$$

$$\sum STS = 1$$

| Parameter | Tingkat substitusi | $\sum SS$ | $\sum S$ | $\sum CS$ | $\sum TS$ | $\sum STS$ | \sum panelis | Rata-rata faktor sensori |
|-----------|--------------------|-----------|----------|-----------|-----------|------------|----------------|--------------------------|
| Warna | 0% | 15 | 6 | 5 | 2 | 2 | 30 | 4 |
| | 20% | 3 | 16 | 7 | 4 | 0 | 30 | 3.6 |
| | 40% | 2 | 6 | 13 | 8 | 1 | 30 | 3 |
| | 60% | 1 | 3 | 7 | 13 | 6 | 30 | 2.33 |
| Tekstur | 0% | 8 | 15 | 2 | 3 | 2 | 30 | 3.8 |
| | 20% | 2 | 13 | 10 | 5 | 0 | 30 | 3.4 |
| | 40% | 2 | 10 | 12 | 6 | 0 | 30 | 3.27 |
| | 60% | 2 | 8 | 11 | 8 | 1 | 30 | 3.07 |
| Rasa | 0% | 8 | 14 | 6 | 2 | 0 | 30 | 3.93 |
| | 20% | 6 | 14 | 8 | 2 | 0 | 30 | 3.8 |
| | 40% | 2 | 8 | 14 | 5 | 1 | 30 | 3.17 |
| | 60% | 2 | 5 | 10 | 11 | 2 | 30 | 2.8 |
| Aroma | 0% | 7 | 13 | 8 | 2 | 0 | 30 | 3.83 |
| | 20% | 3 | 9 | 13 | 4 | 1 | 30 | 3.3 |
| | 40% | 2 | 6 | 16 | 5 | 1 | 30 | 3.1 |
| | 60% | 2 | 5 | 11 | 11 | 1 | 30 | 2.87 |
| Kesukaan | 0% | 9 | 16 | 4 | 0 | 1 | 30 | 4.07 |
| | 20% | 6 | 15 | 8 | 1 | 0 | 30 | 3.87 |
| | 40% | 2 | 7 | 18 | 3 | 0 | 30 | 3.27 |
| | 60% | 1 | 6 | 11 | 11 | 1 | 30 | 2.83 |

Lampiran 5. Analisa Data Tingkat Kekerasan (*Hardness*) Pada Cookies

Tests of Normality

| PERLAKUA | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|----------|---------------------------------|----|-------|--------------|----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| 0% | ,223 | 9 | ,200* | ,838 | 9 | ,055 |
| 20% | ,209 | 9 | ,200* | ,889 | 9 | ,194 |
| 40% | ,209 | 9 | ,200* | ,889 | 9 | ,194 |
| 60% | ,156 | 9 | ,200* | ,938 | 9 | ,557 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

ANOVA

HARDNESS

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|---------|------|
| Between Groups | 9,348 | 3 | 3,116 | 260,868 | ,000 |
| Within Groups | ,382 | 32 | ,012 | | |
| Total | 9,730 | 35 | | | |

HARDNESS

Duncan^a

| PERLAKUA | N | Subset for alpha = .05 | | | |
|----------|---|------------------------|--------|--------|--------|
| | | 1 | 2 | 3 | 4 |
| 0% | 9 | 7,7111 | | | |
| 20% | 9 | | 8,2111 | | |
| 40% | 9 | | | 8,4889 | |
| 60% | 9 | | | | 9,1222 |
| Sig. | | 1,000 | 1,000 | 1,000 | 1,000 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,000.

Descriptives

HARDNESS

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|-------|----|--------|----------------|------------|----------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| 0% | 9 | 7,7111 | ,07817 | ,02606 | 7,6510 | 7,7712 | 7,60 | 7,80 |
| 20% | 9 | 8,2111 | ,10541 | ,03514 | 8,1301 | 8,2921 | 8,10 | 8,40 |
| 40% | 9 | 8,4889 | ,10541 | ,03514 | 8,4079 | 8,5699 | 8,30 | 8,60 |
| 60% | 9 | 9,1222 | ,13944 | ,04648 | 9,0150 | 9,2294 | 8,90 | 9,30 |
| Total | 36 | 8,3833 | ,52726 | ,08788 | 8,2049 | 8,5617 | 7,60 | 9,30 |

Lampiran 6. Analisa Data Bulk Density Pada Cookies

Tests of Normality

| PERLAKUA | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|-------------|---------------------------------|----|-------|--------------|----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| B_DNSITY 0% | ,220 | 9 | ,200* | ,816 | 9 | ,031 |
| 20% | ,212 | 9 | ,200* | ,823 | 9 | ,037 |
| 40% | ,233 | 9 | ,175 | ,810 | 9 | ,027 |
| 60% | ,219 | 9 | ,200* | ,818 | 9 | ,033 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

ANOVA

B_DNSITY

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|---------|------|
| Between Groups | ,050 | 3 | ,017 | 130,900 | ,000 |
| Within Groups | ,004 | 32 | ,000 | | |
| Total | ,054 | 35 | | | |

B_DNSITY

Duncan^a

| PERLAKU | N | Subset for alpha = .05 | | | |
|---------|---|------------------------|----------|----------|----------|
| | | 1 | 2 | 3 | 4 |
| 0% | 9 | ,3663167 | | | |
| 20% | 9 | | ,3995300 | | |
| 40% | 9 | | | ,4406967 | |
| 60% | 9 | | | | ,4629033 |
| Sig. | | 1,000 | 1,000 | 1,000 | 1,000 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,000.

Descriptives

B_DNSITY

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|-------|----|----------|----------------|------------|----------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| 0% | 9 | ,3663167 | ,01460356 | ,00486785 | ,3550914 | ,3775420 | ,35043 | ,38401 |
| 20% | 9 | ,3995300 | ,01126157 | ,00375386 | ,3908736 | ,4081864 | ,38671 | ,41271 |
| 40% | 9 | ,4406967 | ,01087081 | ,00362360 | ,4323406 | ,4490527 | ,42734 | ,45225 |
| 60% | 9 | ,4629033 | ,00705696 | ,00235232 | ,4574789 | ,4683278 | ,45442 | ,47067 |
| Total | 36 | ,4173617 | ,03925871 | ,00654312 | ,4040784 | ,4306449 | ,35043 | ,47067 |

Lampiran 7. Analisa Data Kadar Air Pada Cookies

Tests of Normality

| PERLAKUA | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|----------|---------------------------------|----|-------|--------------|----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| 0% | ,142 | 9 | ,200* | ,922 | 9 | ,408 |
| 20% | ,142 | 9 | ,200* | ,941 | 9 | ,594 |
| 40% | ,224 | 9 | ,200* | ,908 | 9 | ,305 |
| 60% | ,134 | 9 | ,200* | ,964 | 9 | ,835 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

ANOVA

KDR_AIR

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|-------|------|
| Between Groups | 1,778 | 3 | ,593 | 4,747 | ,008 |
| Within Groups | 3,994 | 32 | ,125 | | |
| Total | 5,772 | 35 | | | |

KDR_AIR

Duncan^a

| PERLAKUA | N | Subset for alpha = .05 | | |
|----------|---|------------------------|-----------|-----------|
| | | 1 | 2 | 3 |
| 60% | 9 | ,9894556 | | |
| 40% | 9 | 1,1235022 | 1,1235022 | |
| 20% | 9 | | 1,4063789 | 1,4063789 |
| 0% | 9 | | | 1,5506500 |
| Sig. | | ,427 | ,099 | ,393 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,000.

Descriptives

KDR_AIR

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|-------|----|-----------|----------------|------------|----------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| 0% | 9 | 1,5506500 | ,14839680 | ,04946560 | 1,4365821 | 1,6647179 | 1,38145 | 1,85759 |
| 20% | 9 | 1,4063789 | ,14839680 | ,18118701 | ,9885609 | 1,8241969 | ,38612 | 2,38190 |
| 40% | 9 | 1,1235022 | ,26837407 | ,08945802 | ,9172117 | 1,8241969 | ,73293 | 1,47937 |
| 60% | 9 | ,9894556 | ,33137217 | ,11045739 | ,7347404 | 1,2441708 | ,73293 | 1,55121 |
| Total | 36 | 1,2674967 | ,40609805 | ,06768301 | 1,1300929 | 1,4049005 | ,38612 | 2,38190 |

Lampiran 8. Analisa Data Kadar Abu Pada Cookies

Tests of Normality

| PERLAKUA | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|----------|---------------------------------|----|-------|--------------|----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| 0% | ,247 | 9 | ,119 | ,837 | 9 | ,053 |
| 20% | ,236 | 9 | ,158 | ,884 | 9 | ,175 |
| 40% | ,253 | 9 | ,102 | ,831 | 9 | ,046 |
| 60% | ,188 | 9 | ,200* | ,926 | 9 | ,440 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

ANOVA

KDR_ABU

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|--------|------|
| Between Groups | 1,310 | 3 | ,437 | 58,455 | ,000 |
| Within Groups | ,239 | 32 | ,007 | | |
| Total | 1,549 | 35 | | | |

KDR_ABU

Duncan^a

| PERLAKUA | N | Subset for alpha = .05 | | | |
|----------|---|------------------------|-----------|-----------|-----------|
| | | 1 | 2 | 3 | 4 |
| 0% | 9 | 1,8013900 | | | |
| 20% | 9 | | 1,9915411 | | |
| 40% | 9 | | | 2,1674644 | |
| 60% | 9 | | | | 2,3103578 |
| Sig. | | 1,000 | 1,000 | 1,000 | 1,000 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,000.

Descriptives

KDR_ABU

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|-------|----|-----------|----------------|------------|----------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| 0% | 9 | 1,8013900 | ,12393577 | ,04131192 | 1,7061245 | 1,8966555 | 1,67025 | 1,96055 |
| 20% | 9 | 1,9915411 | ,08678354 | ,02892785 | 1,9248334 | 2,0582488 | 1,87878 | 2,13245 |
| 40% | 9 | 2,1674644 | ,05073847 | ,01691282 | 2,1284634 | 2,2064655 | 2,11615 | 2,23886 |
| 60% | 9 | 2,3103578 | ,06644377 | ,02214792 | 2,2592846 | 2,3614310 | 2,23471 | 2,44293 |
| Total | 36 | 2,0676883 | ,21037771 | ,03506295 | 1,9965068 | 2,1388699 | 1,67025 | 2,44293 |



Lampiran 9. Analisa Data Kadar Lemak Pada *Cookies*

Tests of Normality

| PERLAKUA | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|----------|---------------------------------|----|-------|--------------|----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| LEMAK 0% | ,171 | 9 | ,200* | ,920 | 9 | ,393 |
| 20% | ,224 | 9 | ,200* | ,839 | 9 | ,057 |
| 40% | ,203 | 9 | ,200* | ,943 | 9 | ,617 |
| 60% | ,197 | 9 | ,200* | ,897 | 9 | ,238 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

ANOVA

LEMAK

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|-------|------|
| Between Groups | 12,819 | 3 | 4,273 | 2,007 | ,133 |
| Within Groups | 68,142 | 32 | 2,129 | | |
| Total | 80,961 | 35 | | | |

LEMAK

Duncan^a

| PERLAKUA | N | Subset for alpha = .05 |
|----------|---|------------------------|
| | | 1 |
| 0% | 9 | 26,13654 |
| 20% | 9 | 26,46482 |
| 40% | 9 | 27,30596 |
| 60% | 9 | 27,59961 |
| Sig. | | ,059 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,000.

Descriptives

LEMAK

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|-------|----|------------|----------------|------------|----------------------------------|-------------|----------|----------|
| | | | | | Lower Bound | Upper Bound | | |
| 0% | 9 | 26,1365400 | 1,63626321 | ,54542107 | 24,8787968 | 27,394283 | 24,01474 | 28,64582 |
| 20% | 9 | 26,4648200 | 1,54261642 | ,51420547 | 25,2790601 | 27,650580 | 24,81436 | 28,62392 |
| 40% | 9 | 27,3059622 | 1,42095140 | ,47365047 | 26,2137223 | 28,398202 | 25,44210 | 29,69406 |
| 60% | 9 | 27,5996078 | 1,20067786 | ,40022595 | 26,6766851 | 28,522530 | 26,25997 | 29,46318 |
| Total | 36 | 26,8767325 | 1,52091247 | ,25348541 | 26,3621298 | 27,391335 | 24,01474 | 29,69406 |

Lampiran 10. Analisa Data Kadar Protein Pada Cookies

Tests of Normality

| PERLAKUA | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|----------|---------------------------------|----|-------|--------------|----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| 0% | ,223 | 9 | ,200* | ,899 | 9 | ,249 |
| 20% | ,187 | 9 | ,200* | ,895 | 9 | ,226 |
| 40% | ,237 | 9 | ,153 | ,848 | 9 | ,070 |
| 60% | ,202 | 9 | ,200* | ,920 | 9 | ,390 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

ANOVA

PROTEIN

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|---------|------|
| Between Groups | 151,880 | 3 | 50,627 | 393,333 | ,000 |
| Within Groups | 4,119 | 32 | ,129 | | |
| Total | 155,999 | 35 | | | |

PROTEIN

Duncan^a

| PERLAKUA | N | Subset for alpha = .05 | | | |
|----------|---|------------------------|-----------|-----------|-----------|
| | | 1 | 2 | 3 | 4 |
| 60% | 9 | 3,6216611 | | | |
| 40% | 9 | | 5,4034756 | | |
| 20% | 9 | | | 7,1725467 | |
| 0% | 9 | | | | 9,1535356 |
| Sig. | | 1,000 | 1,000 | 1,000 | 1,000 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,000.

Descriptives

PROTEIN

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|-------|----|-----------|----------------|------------|----------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| 0% | 9 | 9,1535356 | ,45970968 | ,15323656 | 8,8001714 | 9,5068997 | 8,16545 | 9,74641 |
| 20% | 9 | 7,1725467 | ,26622873 | ,08874291 | 6,9679052 | 7,3771882 | 6,85905 | 7,56244 |
| 40% | 9 | 5,4034756 | ,33158788 | ,11052929 | 5,1485945 | 5,6583566 | 4,75563 | 5,70451 |
| 60% | 9 | 3,6216611 | ,35026635 | ,11675545 | 3,3524226 | 3,8908997 | 3,15478 | 4,11477 |
| Total | 36 | 6,3378047 | 2,11118555 | ,35186426 | 5,6234823 | 7,0521271 | 3,15478 | 9,74641 |

Lampiran 11. Analisa Data Kadar Serat Kasar Pada Cookies

Tests of Normality

| PERLAKUA | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|----------|---------------------------------|----|-------|--------------|----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| 0% | ,267 | 9 | ,063 | ,806 | 9 | ,024 |
| 20% | ,133 | 9 | ,200* | ,960 | 9 | ,797 |
| 40% | ,169 | 9 | ,200* | ,958 | 9 | ,780 |
| 60% | ,180 | 9 | ,200* | ,966 | 9 | ,863 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

ANOVA

SERAT

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|----------|------|
| Between Groups | 6,641 | 3 | 2,214 | 2373,632 | ,000 |
| Within Groups | ,030 | 32 | ,001 | | |
| Total | 6,671 | 35 | | | |

SERAT

Duncan^a

| PERLAKUA | N | Subset for alpha = .05 | | | |
|----------|---|------------------------|-----------|-----------|-----------|
| | | 1 | 2 | 3 | 4 |
| 0% | 9 | ,7662633 | | | |
| 20% | 9 | | 1,3280822 | | |
| 40% | 9 | | | 1,4447867 | |
| 60% | 9 | | | | 1,9752811 |
| Sig. | | 1,000 | 1,000 | 1,000 | 1,000 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,000.

Descriptives

SERAT

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|-------|----|-----------|----------------|------------|----------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| 0% | 9 | ,7662633 | ,02018050 | ,00672683 | ,7507512 | ,7817754 | ,74441 | ,81470 |
| 20% | 9 | 1,3280822 | ,03358534 | ,01119511 | 1,3022662 | 1,3538982 | 1,27392 | 1,37491 |
| 40% | 9 | 1,4447867 | ,02635921 | ,00878640 | 1,4245252 | 1,4650481 | 1,39826 | 1,48150 |
| 60% | 9 | 1,9752811 | ,03873677 | ,01291226 | 1,9455054 | 2,0050568 | 1,91527 | 2,04048 |
| Total | 36 | 1,3786033 | ,43658087 | ,07276348 | 1,2308856 | 1,5263210 | ,74441 | 2,04048 |

Lampiran 12. Analisa Data Kadar Karbohidrat Pada Cookies

Tests of Normality

| PERLAKUA | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|----------|---------------------------------|----|-------|--------------|----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| 0% | ,195 | 9 | ,200* | ,948 | 9 | ,665 |
| 20% | ,235 | 9 | ,165 | ,915 | 9 | ,349 |
| 40% | ,109 | 9 | ,200* | ,978 | 9 | ,956 |
| 60% | ,150 | 9 | ,200* | ,931 | 9 | ,490 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

ANOVA

KARBOHID

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|-------|------|
| Between Groups | 76,242 | 3 | 25,414 | 9,647 | ,000 |
| Within Groups | 84,305 | 32 | 2,635 | | |
| Total | 160,547 | 35 | | | |

KARBOHIDRAT

Duncan^a

| PERLAKUA | N | Subset for alpha = .05 | | |
|----------|---|------------------------|----------|----------|
| | | 1 | 2 | 3 |
| 0% | 9 | 61,56170 | | |
| 20% | 9 | 62,76090 | 62,76090 | |
| 40% | 9 | | 64,01073 | 64,01073 |
| 60% | 9 | | | 65,47891 |
| Sig. | | ,127 | ,112 | ,064 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,000.

Descriptives

KARBOHID

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|-------|----|----------|----------------|------------|----------------------------------|-------------|----------|----------|
| | | | | | Lower Bound | Upper Bound | | |
| 0% | 9 | 61,56170 | 1,69106593 | ,56368864 | 60,2618294 | 62,8615661 | 58,73630 | 63,73473 |
| 20% | 9 | 62,76090 | 1,59546459 | ,53182153 | 61,5345174 | 63,9872826 | 60,53114 | 65,27153 |
| 40% | 9 | 64,01073 | 1,72630210 | ,57543403 | 62,6837756 | 65,3376821 | 61,54896 | 66,95042 |
| 60% | 9 | 65,47891 | 1,46722504 | ,48907501 | 64,3510977 | 66,6067157 | 63,19314 | 67,26159 |
| Total | 36 | 63,45306 | 2,14174234 | ,35695706 | 62,7283970 | 64,1777197 | 58,73630 | 67,26159 |

Lampiran 13. Analisa Data Kadar Kalsium Pada *Cookies*

Tests of Normality

| PERLAKUA | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|------------|---------------------------------|----|-------|--------------|----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| KALSIUM 0% | ,129 | 9 | ,200* | ,976 | 9 | ,941 |
| 20% | ,185 | 9 | ,200* | ,917 | 9 | ,371 |
| 40% | ,171 | 9 | ,200* | ,947 | 9 | ,658 |
| 60% | ,230 | 9 | ,186 | ,806 | 9 | ,024 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

ANOVA

KALSIUM

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|----------|------|
| Between Groups | 11246,89 | 3 | 3748,962 | 44103,22 | ,000 |
| Within Groups | 2,720 | 32 | ,085 | | |
| Total | 11249,61 | 35 | | | |

KALSIUM

Duncan^a

| PERLAKU | N | Subset for alpha = .05 | | | |
|---------|---|------------------------|----------|----------|----------|
| | | 1 | 2 | 3 | 4 |
| 0% | 9 | 13,83167 | | | |
| 20% | 9 | | 27,76611 | | |
| 40% | 9 | | | 46,21167 | |
| 60% | 9 | | | | 60,29733 |
| Sig. | | 1,000 | 1,000 | 1,000 | 1,000 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,000.

Descriptives

KALSIUM

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|-------|----|----------|----------------|------------|----------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| 0% | 9 | 13,83167 | ,127162 | ,042387 | 13,73392 | 13,92941 | 13,599 | 14,008 |
| 20% | 9 | 27,76611 | ,159579 | ,053193 | 27,64345 | 27,88877 | 27,541 | 27,990 |
| 40% | 9 | 46,21167 | ,410121 | ,136707 | 45,89642 | 46,52691 | 45,662 | 46,867 |
| 60% | 9 | 60,29733 | ,360807 | ,120269 | 60,01999 | 60,57467 | 59,802 | 60,651 |
| Total | 36 | 37,02669 | 17,928116 | 2,988019 | 30,96069 | 43,09270 | 13,599 | 60,651 |

Lampiran 14. Analisa Data Kadar Vitamin C (Asam Askorbat) Pada Cookies

Tests of Normality

| PERLAKUA | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|-------------|---------------------------------|----|-------|--------------|----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| ASKORBAT 0% | ,247 | 9 | ,122 | ,852 | 9 | ,078 |
| 20% | ,245 | 9 | ,127 | ,825 | 9 | ,039 |
| 40% | ,223 | 9 | ,200* | ,838 | 9 | ,055 |
| 60% | ,223 | 9 | ,200* | ,838 | 9 | ,055 |

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

ANOVA

ASKORBAT

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|----|-------------|--------|------|
| Between Groups | 50,424 | 3 | 16,808 | 18,308 | ,000 |
| Within Groups | 29,378 | 32 | ,918 | | |
| Total | 79,802 | 35 | | | |

ASKORBAT

Duncan^a

| PERLAKUA | N | Subset for alpha = .05 | | | |
|----------|---|------------------------|--------|--------|--------|
| | | 1 | 2 | 3 | 4 |
| 0% | 9 | 2,3071 | | | |
| 20% | 9 | | 3,4222 | | |
| 40% | 9 | | | 4,4978 | |
| 60% | 9 | | | | 5,4756 |
| Sig. | | 1,000 | 1,000 | 1,000 | 1,000 |

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9,000.

Descriptives

ASKORBAT

| | N | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean | | Minimum | Maximum |
|-------|----|--------|----------------|------------|----------------------------------|-------------|---------|---------|
| | | | | | Lower Bound | Upper Bound | | |
| 0% | 9 | 2,3071 | ,66751 | ,22250 | 1,7940 | 2,8202 | 1,58 | 3,52 |
| 20% | 9 | 3,4222 | ,92760 | ,30920 | 2,7092 | 4,1352 | 2,64 | 5,28 |
| 40% | 9 | 4,4978 | ,68793 | ,22931 | 3,9690 | 5,0266 | 3,52 | 5,28 |
| 60% | 9 | 5,4756 | 1,37586 | ,45862 | 4,4180 | 6,5331 | 3,52 | 7,04 |
| Total | 36 | 3,9257 | 1,50998 | ,25166 | 3,4148 | 4,4366 | 1,58 | 7,04 |

Lampiran 15. Perhitungan Persentase Peningkatan dan Penurunan Sifat Fisik dan Kimia
Cookies

$$\% \text{ Peningkatan/Penurunan} = \frac{\text{Nilai Substitusi} - \text{Nilai Kontrol} \times 100\%}{\text{Nilai Kontrol}}$$

❖ **Sifat Fisik**

➤ *Bulk Density*

$$\begin{aligned} - 20\% &= \frac{0.40 - 0.37 \times 100\%}{0.37} \\ &= 8.11\% \end{aligned}$$

$$\begin{aligned} - 40\% &= \frac{0.44 - 0.37 \times 100\%}{0.37} \\ &= 18.92\% \end{aligned}$$

$$\begin{aligned} - 60\% &= \frac{0.46 - 0.37 \times 100\%}{0.37} \\ &= 24.32\% \end{aligned}$$

➤ **Kekerasan**

$$\begin{aligned} - 20\% &= \frac{8.21 - 7.71 \times 100\%}{7.71} \\ &= 6.48\% \end{aligned}$$

$$\begin{aligned} - 40\% &= \frac{8.48 - 7.71 \times 100\%}{7.71} \\ &= 9.99\% \end{aligned}$$

$$\begin{aligned} - 60\% &= \frac{9.12 - 7.71 \times 100\%}{7.71} \\ &= 18.29\% \end{aligned}$$

❖ **Sifat Kimia**

➤ **Kadar Air**

$$- 20\% = \frac{1.41 - 1.55}{1.55} \times 100\%$$

$$= -9.03\%$$

$$- 40\% = \frac{1.12 - 1.55}{1.55} \times 100\%$$

$$= -27.74\%$$

$$- 60\% = \frac{0.99 - 1.55}{1.55} \times 100\%$$

$$= -36.13\%$$

➤ **Kadar Abu**

$$- 20\% = \frac{1.99 - 1.80}{1.80} \times 100\%$$

$$= 10.56\%$$

$$- 40\% = \frac{2.17 - 1.80}{1.80} \times 100\%$$

$$= 20.56\%$$

$$- 60\% = \frac{2.31 - 1.80}{1.80} \times 100\%$$

$$= 28.33\%$$

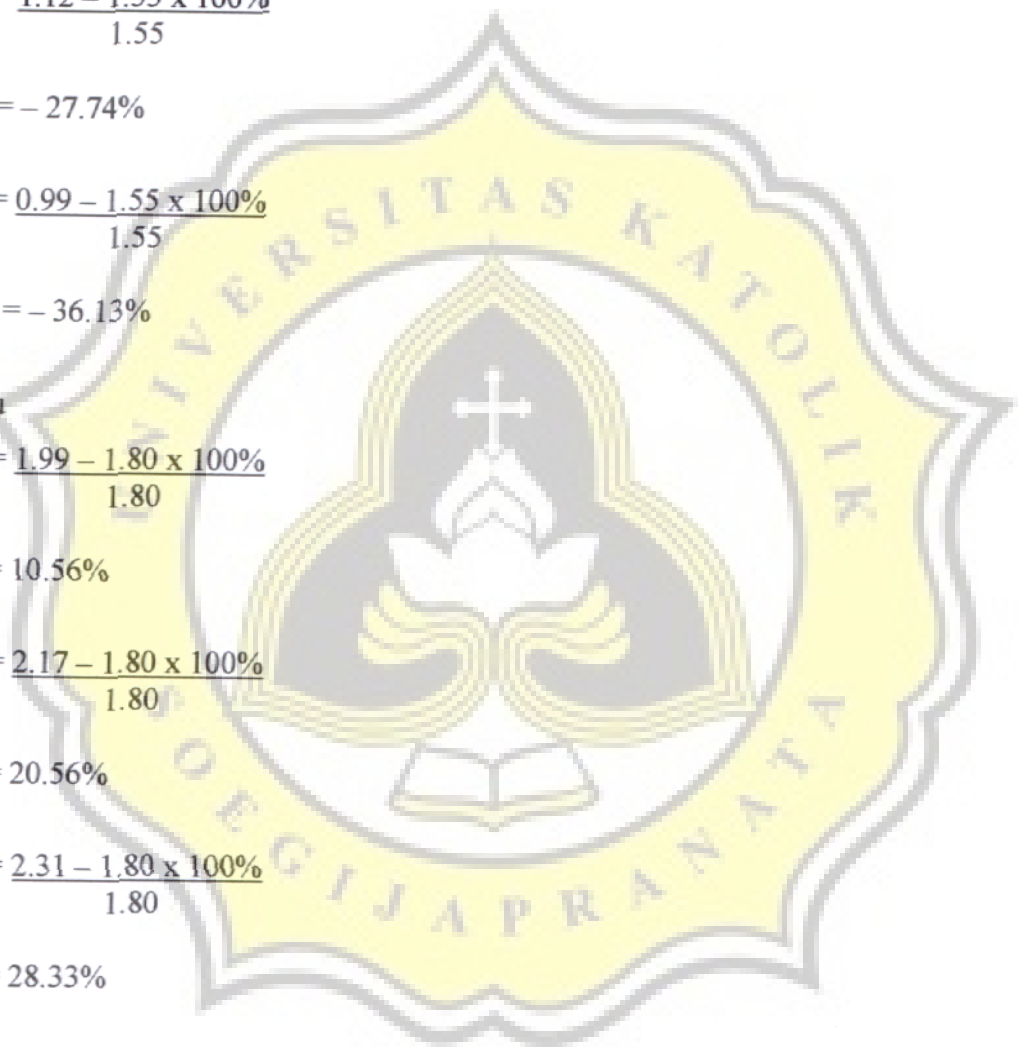
➤ **Kadar Lemak**

$$- 20\% = \frac{26.46 - 26.14}{26.14} \times 100\%$$

$$= 1.22\%$$

$$- 40\% = \frac{27.30 - 26.14}{26.14} \times 100\%$$

$$= 4.44\%$$



$$\begin{aligned} - 60\% &= \frac{27.60 - 26.14}{26.14} \times 100\% \\ &= 5.58\% \end{aligned}$$

➤ Kadar Protein

$$\begin{aligned} - 20\% &= \frac{7.17 - 9.15}{9.15} \times 100\% \\ &= -21.64\% \end{aligned}$$

$$\begin{aligned} - 40\% &= \frac{5.40 - 9.15}{9.15} \times 100\% \\ &= -40.98\% \end{aligned}$$

$$\begin{aligned} - 60\% &= \frac{3.62 - 9.15}{9.15} \times 100\% \\ &= -60.44\% \end{aligned}$$

➤ Kadar Serat Kasar

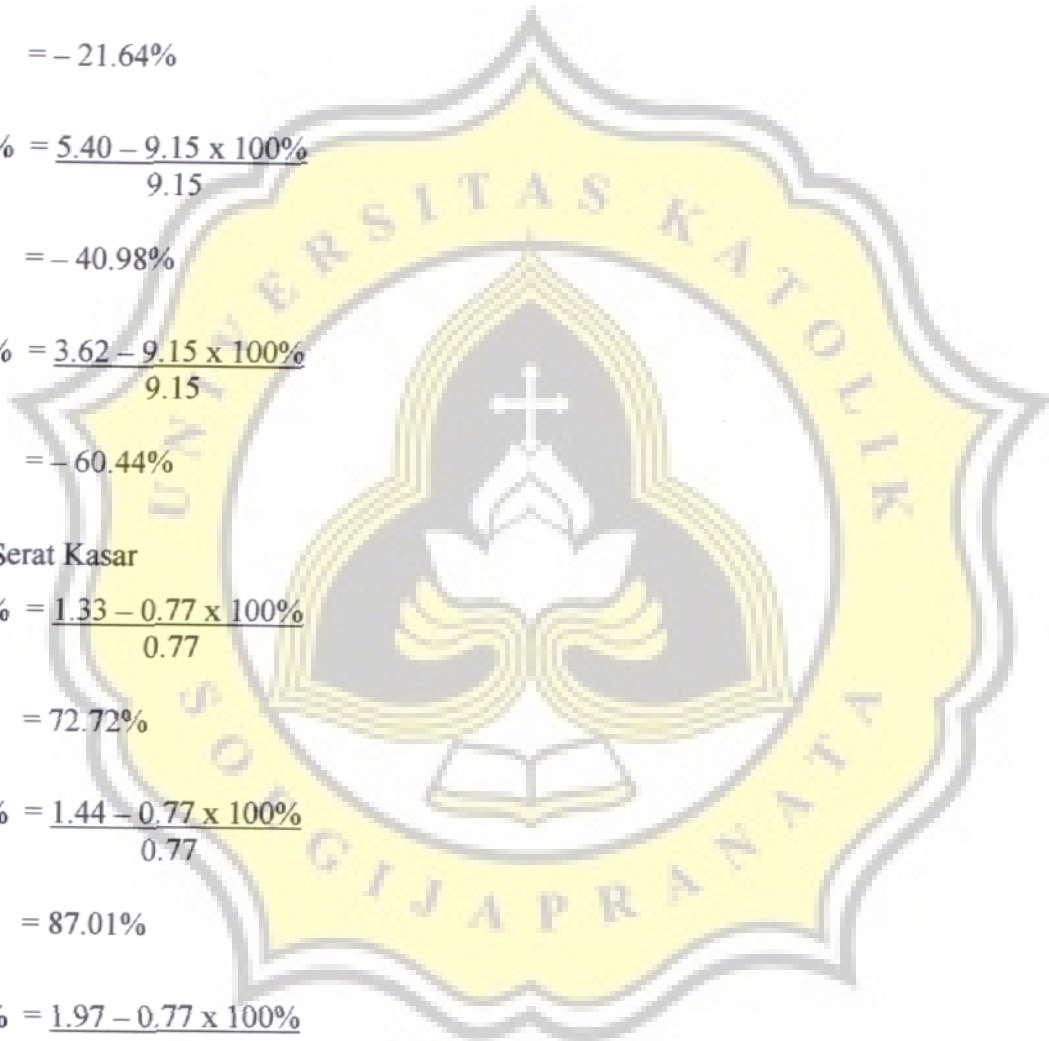
$$\begin{aligned} - 20\% &= \frac{1.33 - 0.77}{0.77} \times 100\% \\ &= 72.72\% \end{aligned}$$

$$\begin{aligned} - 40\% &= \frac{1.44 - 0.77}{0.77} \times 100\% \\ &= 87.01\% \end{aligned}$$

$$\begin{aligned} - 60\% &= \frac{1.97 - 0.77}{0.77} \times 100\% \\ &= 155.84\% \end{aligned}$$

➤ Kadar Karbohidrat

$$\begin{aligned} - 20\% &= \frac{62.76 - 61.56}{61.56} \times 100\% \\ &= 1.95\% \end{aligned}$$



$$- 40\% = \frac{64.01 - 61.56}{61.56} \times 100\%$$

$$= 3.98\%$$

$$- 60\% = \frac{65.48 - 61.56}{61.56} \times 100\%$$

$$= 6.37\%$$

➤ Kadar Kalsium

$$- 20\% = \frac{27.77 - 13.83}{13.83} \times 100\%$$

$$= 100.79\%$$

$$- 40\% = \frac{46.21 - 13.83}{13.83} \times 100\%$$

$$= 234.13\%$$

$$- 60\% = \frac{60.30 - 13.83}{13.83} \times 100\%$$

$$= 336.01\%$$

➤ Kadar Vitamin C (Asam askorbat)

$$- 20\% = \frac{3.42 - 2.31}{2.31} \times 100\%$$

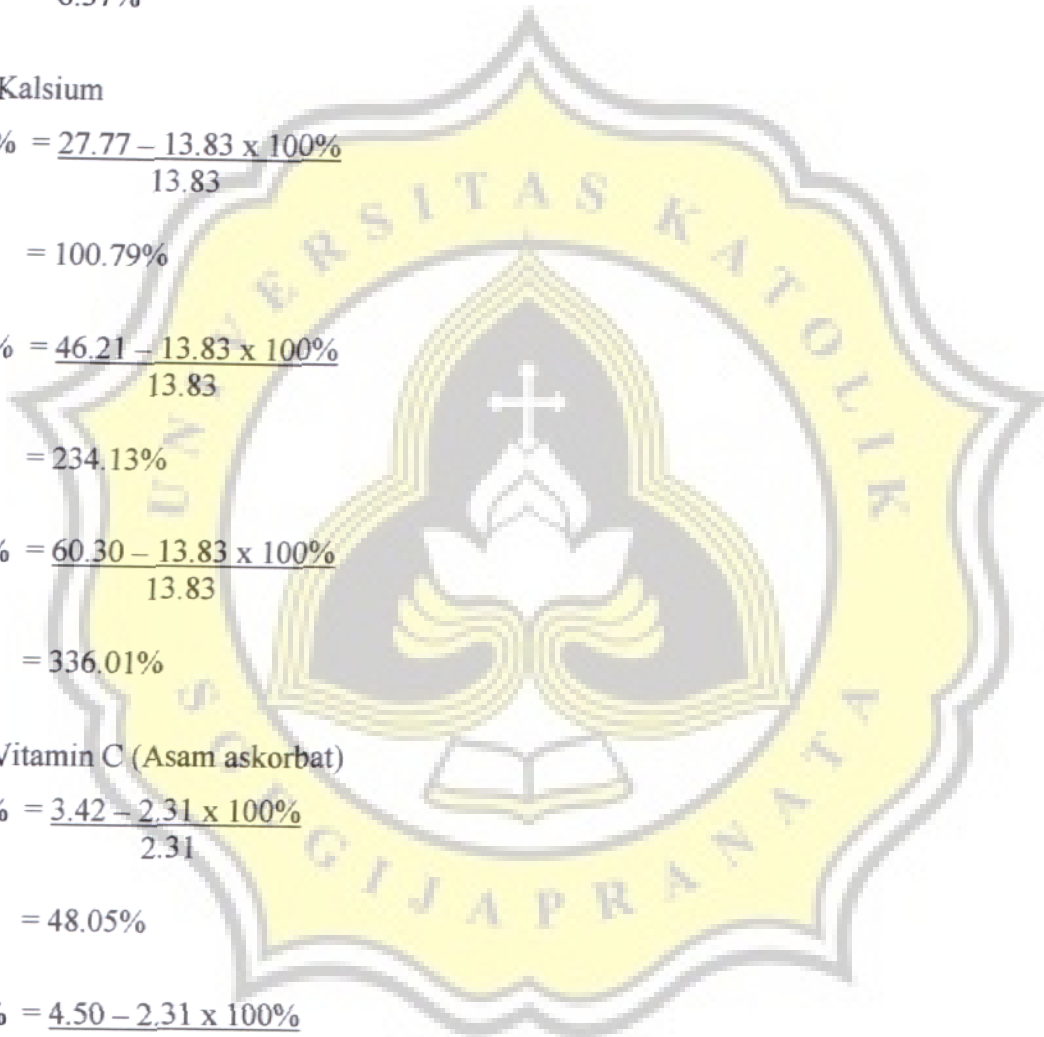
$$= 48.05\%$$

$$- 40\% = \frac{4.50 - 2.31}{2.31} \times 100\%$$

$$= 94.80\%$$

$$- 60\% = \frac{5.48 - 2.31}{2.31} \times 100\%$$

$$= 137.23\%$$



Lampiran 16. Perhitungan Jumlah Konsumsi *Cookies* Per Hari Berdasarkan Angka Kecukupan Gizi Kalsium

Tabel 8. Angka Kecukupan Gizi (AKG) Kalsium (Ca) Per Hari

| Kategori | AKG Kalsium |
|------------------------|--------------|
| Anak – anak | 500 mg |
| Remaja | 600 – 700 mg |
| Dewasa | 500 – 800 mg |
| Ibu hamil dan menyusui | > + 400 mg |

(Almatsier, 2002)

Tabel 9. Perhitungan Σ Konsumsi *Cookies* Per Hari Berdasarkan Angka Kecukupan Gizi Kalsium

| Substitusi Tepung Talas | Kandungan Ca/100 g | Σ Konsumsi <i>Cookies</i> /hari |
|-------------------------|--------------------|---|
| 0% | 13.83 mg | Anak – anak = 3615 g Remaja = 4338 g Dewasa = 3615 g Ibu hamil dan menyusui = 6507 g |
| 20% | 27.77 mg | Anak – anak = 1800 g Remaja = 2161 g Dewasa = 1800 g Ibu hamil dan menyusui = 3241 g |
| 40% | 46.21 mg | Anak – anak = 1082 g Remaja = 1298 g Dewasa = 1082 g Ibu hamil dan menyusui = 1948 g |
| 60% | 60.30 mg | Anak – anak = 829 g Remaja = 995 g Dewasa = 829 g Ibu hamil dan menyusui = 1492 g |

Keterangan Rumus Perhitungan :

Σ Konsumsi *Cookies*/hari :

Pada Anak – anak = $500 / (\text{kandungan Ca}/100 \text{ gram}) \times 100 \text{ gram cookies}$

Pada Remaja = $600 / (\text{kandungan Ca}/100 \text{ gram}) \times 100 \text{ gram cookies}$

Pada Dewasa = $500 / (\text{kandungan Ca}/100 \text{ gram}) \times 100 \text{ gram cookies}$

Pada Ibu hamil dan menyusui = $900 / (\text{kandungan Ca}/100 \text{ gram}) \times 100 \text{ gram cookies}$

