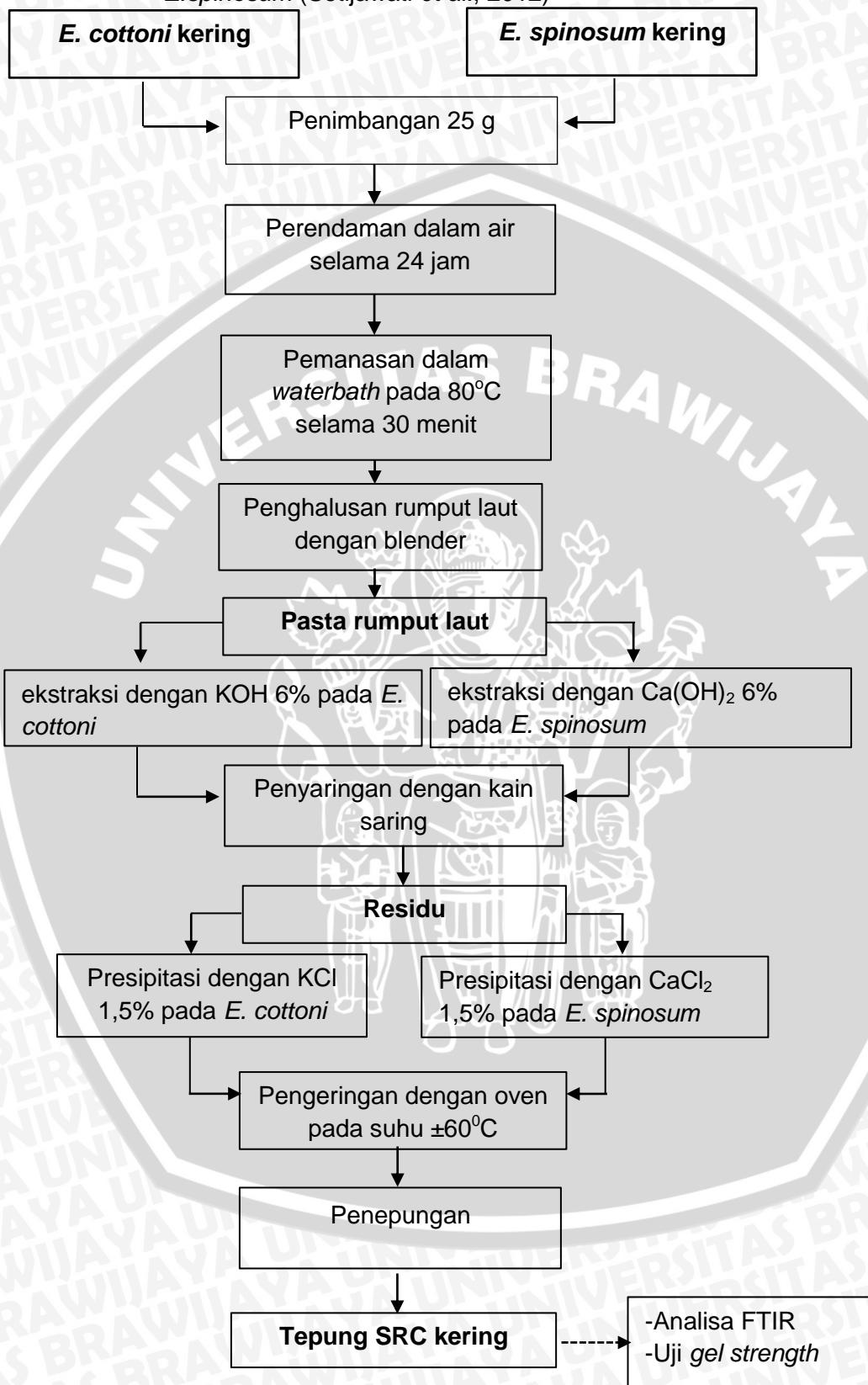
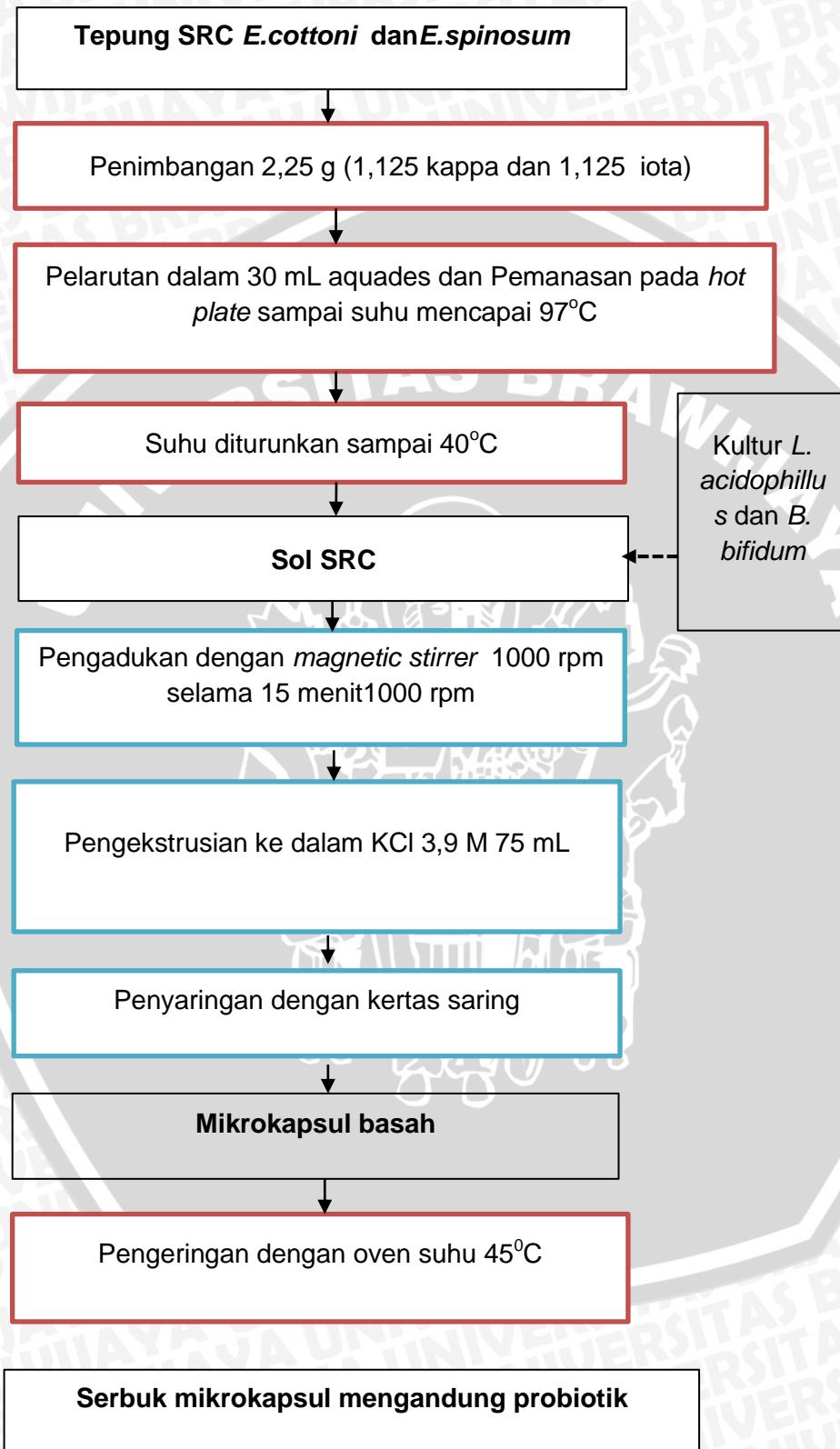


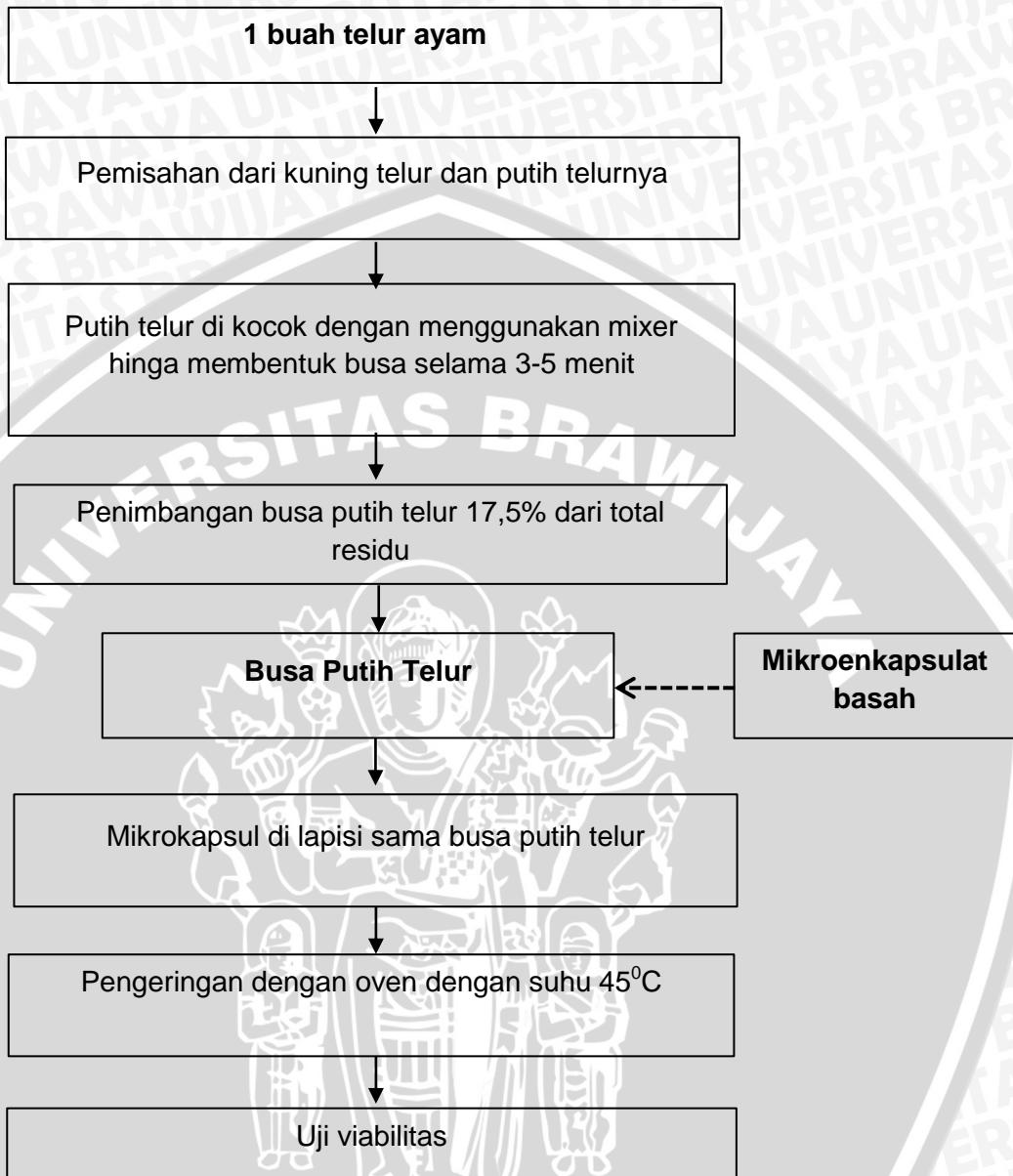
Lampiran 1. Pembuatan Semi Refined Carrageenan (SRC) *E.cottoni* dan *E.spinosum* (Setijawati et al., 2012)



Lampiran 2. Pembuatan Mikrokapsul Probiotik (Manojlovic *et al.*, (2010) dan Setijawati *et al.*, (2012))



Lampiran 3. Pengeringan *foam-mat drying* (Veni, 2013)



Lampiran 4. Pembuatan Semi Refined Carrageenan (SRC) *E. cottoni* dan *E. spinosum*



Rumput laut *E. spinosum* dan *E. cottoni*



Penimbangan rumput laut



Perendaman rumput laut selama 24 jam



Pemanasan rumput laut pada suhu $80^{\circ}\text{C} \pm 30$ menit



Penghalusan rumput laut



Pencampuran pasta *E. cottoni* dengan KOH 6% dan pasta *E. spinosum* 6%



Proses ekstraksi pasta rumput laut suhu $\pm 80^{\circ}\text{C}$ selama 2 jam



Pencucian pasta *E. cottoni* dengan KCl 1,5% dan *E. spinosum* dengan CaCl 1,5%



Penyaringan Filtrat pasta rumput laut



Penepungan pasta rumput laut



Tepung rumput laut *E. spinosum* dan *E. cottoni*

Lampiran 5. Pembuatan Mikrokapsul Probiotik



Preparasi alat dan bahan



Proses pemanasan sol karagenan dengan suhu 98°C



Pencampuran sol karagenan dengan suspensi bakteri



Ekstrusi mikrokapsul dengan KCl 3.9 M



Pegeringan mikrokapsul dengan suhu 40°C



Hasil mikrokapsul yang telah di oven

Lampiran 6. Pengeringan mikrokapsul dengan metode foam



Telur ayam



Pemisahan putih dan kuning telur



Putih telur di kocok dengan mixer selama 3 menit



Putih telur sampai terbentuk busa



Busa putih telur ditimbang

Pelapisan mikrokapsul dengan busa putih telur



Sampel mikrokapsul yang telah dilapisi

Proses pengeringan dengan oven suhu 42°C

Lampiran 7. Uji viabilitas mikrokapsul



Alat dan media yang akan disterilisasi



Sterilisasi alat dan bahan selama 2 jam suhu 121°C



Alat yang akan digunakan di sinar UV selama 30 menit



Penimbangan mikrokapsul



Shaker mikrokapsul pada pengenceran 10^1



Pengenceran dan penanaman mikrokapsul



Pemadatan media



Inkubasi

Lampiran 8. Hasil analisa spektrofotometer FT-IR SRC *E. cotonii* dan *E. spinosum*

Analisa FT-IR SRC *E. cotonii*

No	Peak	Intensity	Base(H)	Base (L)	Area	Corr. Area
1.	846,75	48,942	867,97	821,68	13,9	0,361
2.	927,76	48,787	958,62	900,76	17,25	0,819
3.	1238,38	50,171	1246,02	1197,79	14,08	0,189
4.	2611,62	58,143	2613,55	2393,66	48,995	0,216

Analisa FT-IR SRC *E. spinosum*

No	Peak	Intensity	Base (H)	Base (L)	Area	Corr Area
1.	711,73	22,693	758,02	680,87	42,505	1,931
2.	804,32	31,056	825,53	790,81	17,291	0,277
3.	846,77	30,057	875,54	802,31	18,934	0,352
4.	873,75	15,325	893,04	854,47	23,644	4,285
5.	933,55	30,516	952,84	908,47	21,956	0,874
6.	1159,22	26,891	1114,86	1051,23	34,795	1,212
7.	1226,73	29,754	1195,87	1145,72	26,011	0,209
8.	1225,66	28,878	1236,37	1197,79	20,392	0,313
9.	1436,97	14,628	1303,88	1246,02	29,328	0,486
10.	1793,83	36,765	1440,83	1305,81	85,049	1,351
11.	2139,06	56,143	1826,59	1776,44	17,274	2,252
12.	2511,32	42,165	2247,07	2094,69	37,081	0,548
13.	2873,94	43,693	2640,55	2401,38	66,815	11,256
14.	2978,09	41,698	2887,44	2650,19	67,652	0,309
15.	3277,06	32,948	3001,24	2889,37	41,127	0,864
16.	3351,63	32,241	3278,99	3018,63	111,462	0,725

Lampiran 9. Data dan analisa data viabilitas mikrokapsul probiotik

- Data pengamatan viabilitas mikrokapsul tanpa *foam*

Total plate count viabilitas mikrokapsul probiotik (cfu/mL)

Jenis Probiotik	Ulangan		
	1	2	3
<i>B. bifidum</i>	$6,6 \times 10^5$	$5,2 \times 10^5$	$7,6 \times 10^5$
<i>L. acidophilus</i>	$4,9 \times 10^5$	$5,7 \times 10^5$	$2,8 \times 10^5$
<i>L. acidophilus + B. bifidum</i>	$1,1 \times 10^6$	$1,2 \times 10^6$	$1,1 \times 10^6$

Total plate count viabilitas mikrokapsul probiotik (log cfu/mL)

Jenis Probiotik	Ulangan		
	1	2	3
<i>B. bifidum</i>	5,81	5,71	5,88
<i>L. acidophilus</i>	5,69	5,75	5,44
<i>L. acidophilus + B. bifidum</i>	6,04	6,07	6,04

- Data pengamatan viabilitas mikrokapsul dengan *foam*

Total plate count viabilitas mikrokapsul probiotik (cfu/mL)

Jenis Probiotik	Ulangan		
	1	2	3
<i>B. bifidum</i>	$2,5 \times 10^6$	$1,6 \times 10^6$	$1,5 \times 10^6$
<i>L. acidophilus</i>	$2,2 \times 10^6$	$2,3 \times 10^6$	$2,7 \times 10^6$
<i>L. acidophilus + B. bifidum</i>	$2,2 \times 10^6$	$2,4 \times 10^6$	$2,0 \times 10^6$

Total plate count viabilitas mikrokapsul probiotik (log cfu/mL)

Jenis Probiotik	Ulangan		
	1	2	3
<i>B. bifidum</i>	6,39	6,20	6,17
<i>L. acidophilus</i>	6,34	6,36	6,43
<i>L. acidophilus + B. bifidum</i>	6,34	6,38	6,30

Analisa Data Viabilitas Mikroenkapsulat Probiotik

Metode Pembuatan	Jenis Bakteri	Perlakuan			Total	Rerata
		1	Ulangan	3		
Mikrokapsul dengan Foam-mat Drying	<i>B. bifidum</i>	6,39	6,20	6,17	18,77	6,25
	<i>L. acidophilus</i>	6,34	6,36	6,43	19,13	6,37
	<i>Mix</i>	6,34	6,38	6,30	19,02	6,34
Mikrokapsul tanpa foam-mat drying	<i>B. bifidum</i>	5,81	5,71	5,88	17,41	5,80
	<i>L. acidophilus</i>	5,69	5,75	5,44	16,89	5,63
	<i>Mix</i>	6,04	6,07	6,04	18,16	6,05
Jumlah		36,63	36,49	36,27	109,40	36,46

Descriptive Statistics

Dependent Variabel : Uji_Viabilitas

Mikroenkapsulasi	Probiotik	Mean	Std. Deviation	N
Menggunakan Foam	<i>B. Bifidum</i>	6,253	,119	3
	<i>L. acidophilus</i>	6,376	,047	3
	<i>L. acidophilus + B. bifidum</i>	6,340	,040	3
Tanpa Foam	Total	6,323	,086	9
	<i>B. Bifidum</i>	5,800	,085	3
	<i>L. acidophilus</i>	5,626	,164	3
Total	<i>L. acidophilus + B. bifidum</i>	6,050	,017	3
	Total	5,825	,206	9
	<i>B. Bifidum</i>	6,026	,265	6
	<i>L. acidophilus</i>	6,001	,424	6
	<i>L. acidophilus + B. bifidum</i>	6,195	,161	6
	Total	6,074	,298	1
				8

Tests of Between-Subjects Effects

Dependent Variable:Uji_Viabilitas

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1.411 ^a	5	,282	32,125	,000	,930
Intercept	664,180	1	664,180	7,562	,000	1,000
Mikroenkapsul	1,115	1	1,115	126,948	,000	,914
Probiotik	,133	2	,066	7,553	,008	,557
Mikroenkapsul * Probiotik	,163	2	,082	9,287	,004	,608
Error	,105	12	,009			
Total	665,696	18				

a. R Squared = ,930 (Adjusted R Squared = ,902)

Estimated Marginal Means

Probiotik * Mikroenkapsul

Dependent Variable:Uji_Viabilitas

Probiotik	Mikroenkapsulasi	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
<i>B. bifidum</i>	Menggunakan Foam	6,253	,054	6,135	6,371
	Tanpa Foam	5,800	,054	5,682	5,918
<i>L. acidophilus</i>	Menggunakan Foam	6,377	,054	6,259	6,495
	Tanpa Foam	5,627	,054	5,509	5,745
<i>L. acidophilus</i> + <i>B. bifidum</i>	Menggunakan Foam	6,340	,054	6,222	6,458
	Tanpa Foam	6,050	,054	5,932	6,168

Post Hoc Tests

Probiotik Homogeneous Subsets

Uji_Viabilitas

	Probiotik	N	Subset	
			1	2
Duncan ^a	<i>L. acidophilus</i>	6	6,0017	
	<i>B. bifidum</i>	6	6,0267	
	<i>L. acidophilus</i> + <i>B. bifidum</i>	6		6,195
	Sig.		,652	1,000

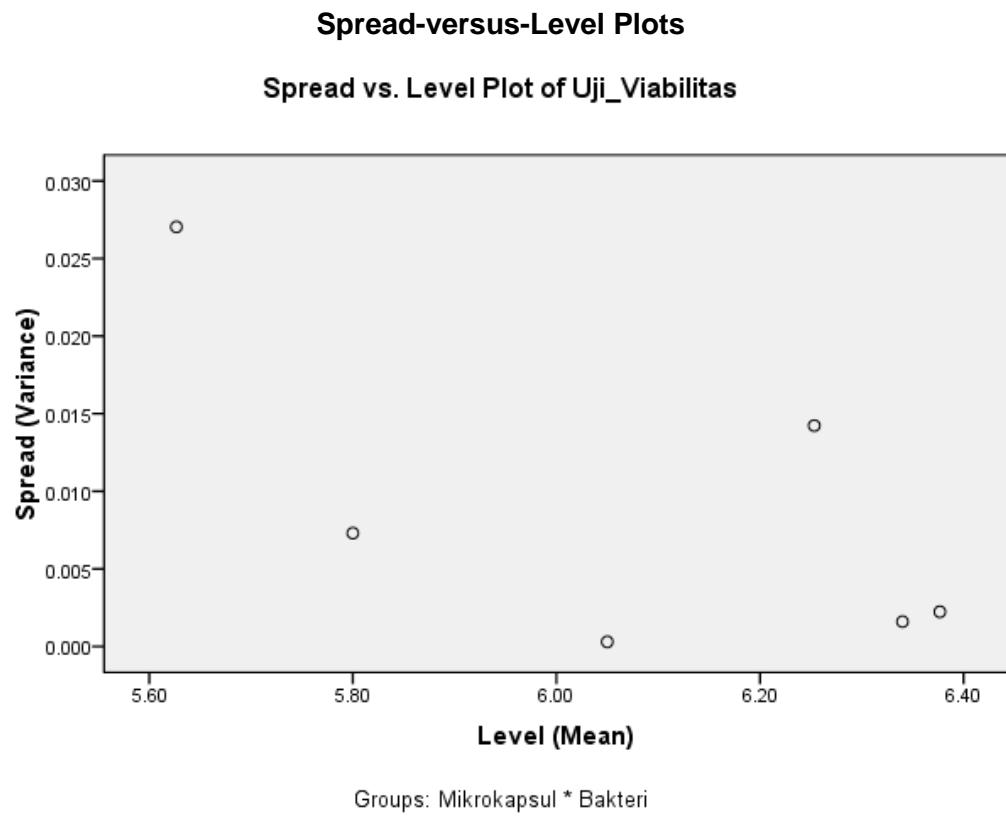
Means for groups in homogeneous subsets are displayed.

Based on observed means.

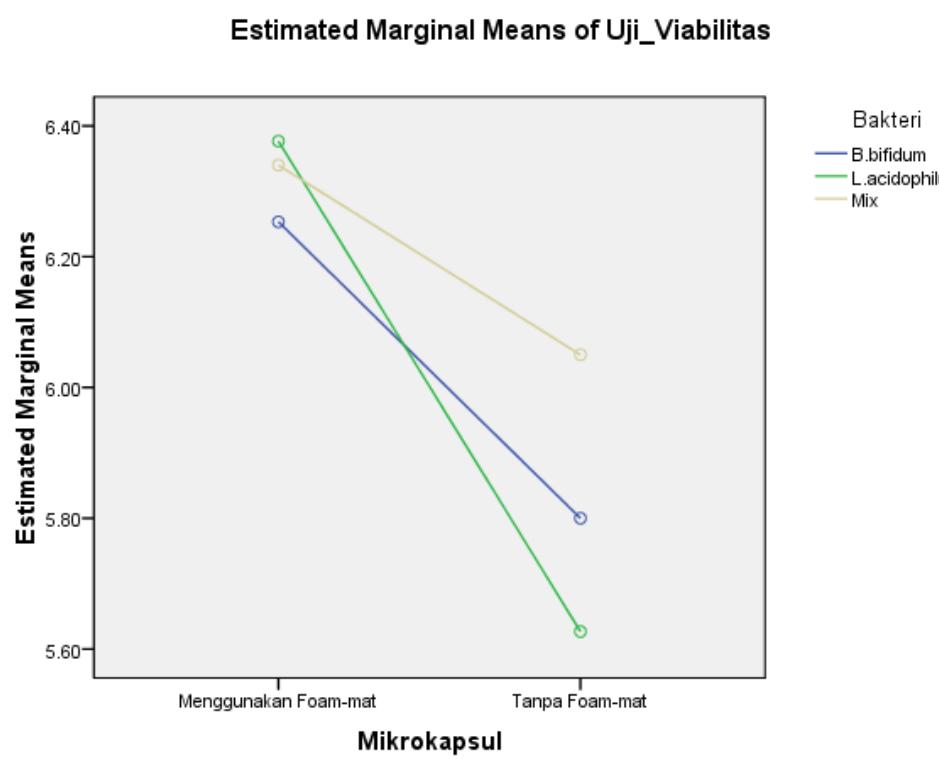
The error term is Mean Square(Error) = .009.

a. Uses Harmonic Mean Sample Size = 6.000.





Profile Plots



ANOVA

Uji_Viabilitas

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1,411	5	,282	32,125	,000
Within Groups	,105	12	,009		
Total	1,516	17			

Homogeneous Subsets

Uji_Viabilitas

Interaksi	N	Subset for alpha = 0,05			
		1	2	3	4
Duncan ^a tanpa foam - <i>L. acidophilus</i>	3	5,6267			
tanpa foam - <i>B. bifidum</i>	3		5,8000		
tanpa foam - <i>L. acidophilus + B. bifidum</i>	3			6,0500	
menggunakan foam - <i>B. bifidum</i>	3				6,2533
menggunakan foam - <i>L. acidophilus + B. bifidum</i>	3				6,3400
menggunakan foam - <i>L. acidophilus</i>	3				6,3767
Sig.		1,000	1,000	1,000	,151

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.



Lampiran 10. Yield Mikrokapsul

Jenis Probiotik	No	N	Yield Mikrokapsul (%)
<i>B. bifidum</i>	6,4	6,2	96,87%
<i>L. acidophilus</i>	6,4	6,3	98,43%



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Lampiran 11. Data dan analisa data viabilitas probiotik setelah di simpan 14 hari

- Data pengamatan viabilitas mikroenkapsulat pada suhu 5°C

Suhu Penyimpanan	Masa simpan	Perlakuan			Ulangan
		1	2	3	
<i>B. bifidum</i>	0	$2,5 \times 10^6$	$1,6 \times 10^6$	$1,5 \times 10^6$	
	14	$1,6 \times 10^5$	$4,5 \times 10^5$	$3,9 \times 10^5$	
<i>L. acidophilus</i>	0	$2,2 \times 10^6$	$2,3 \times 10^6$	$2,7 \times 10^6$	
	14	$1,8 \times 10^6$	$1,1 \times 10^6$	$1,0 \times 10^6$	
<i>B. bifidum + L. acidophilus</i>	0	$2,2 \times 10^6$	$2,4 \times 10^6$	$2,0 \times 10^6$	
	14	$1,3 \times 10^6$	$8,0 \times 10^5$	$9,8 \times 10^5$	

- Data pengamatan viabilitas mikroenkapsulat pada suhu 37°C

Suhu Penyimpanan	Masa simpan	Perlakuan			Ulangan
		1	2	3	
<i>B. bifidum</i>	0	$2,5 \times 10^6$	$1,6 \times 10^6$	$1,5 \times 10^6$	
	14	$0,5 \times 10^5$	$0,4 \times 10^5$	$0,6 \times 10^5$	
<i>L. acidophilus</i>	0	$2,8 \times 10^6$	$1,9 \times 10^6$	$2,4 \times 10^6$	
	14	$1,8 \times 10^6$	$1,1 \times 10^6$	$1,0 \times 10^6$	
<i>B. bifidum + L. acidophilus</i>	0	$2,2 \times 10^6$	$2,4 \times 10^6$	$2,0 \times 10^6$	
	14	$5,6 \times 10^5$	$4,1 \times 10^5$	$8,9 \times 10^5$	

Analisa data viabilitas probiotik setelah disimpan 14 hari

Suhu	Jenis Probiotik	Masa Simpan		Jumlah	Rerata
		0	14		
5°C	<i>B. bifidum</i>	6,259	5,482	11,742	5,871
	<i>L. acidophilus</i>	6,378	6,098	12,477	6,238
	<i>B. bifidum + L. acidophilus</i>	6,341	6,002	12,343	6,171
37°C	<i>B. bifidum</i>	6,259	4,693	10,952	5,476
	<i>L. acidophilus</i>	6,378	6,098	12,477	6,238
	<i>B. bifidum + L. acidophilus</i>	6,341	5,770	12,111	6,055
Jumlah					

Tests of Between-Subjects Effects

Dependent Variable:Nilai Viabilitas

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2,087 ^a	6	,348	2,840	,136
Intercept	433,081	1	433,081	3,5373	,000
Kelompok	1,217	1	1,217	9,942	,025
Suhu	,085	1	,085	,697	,442
Jenis_Probiotik	,700	2	,350	2,860	,149
Suhu *	,084	2	,042	,342	,726
Jenis_Probiotik					
Error	,612	5	,122		
Total	435,779	12			
Corrected Total	2,699	11			

a. R Squared = .773 (Adjusted R Squared = .501)

Post Hoc Tests

Jenis Probiotik Homogeneous Subsets

Nilai Viabilitas

Duncan

Jenis Probiotik	N	Subset	
		1	
<i>B. bifidum</i>	4		5,6732
<i>B. bifidum + L. acidophilus</i>	4		6,1135
<i>L. acidophilus</i>	4		6,2358
Sig.			,078

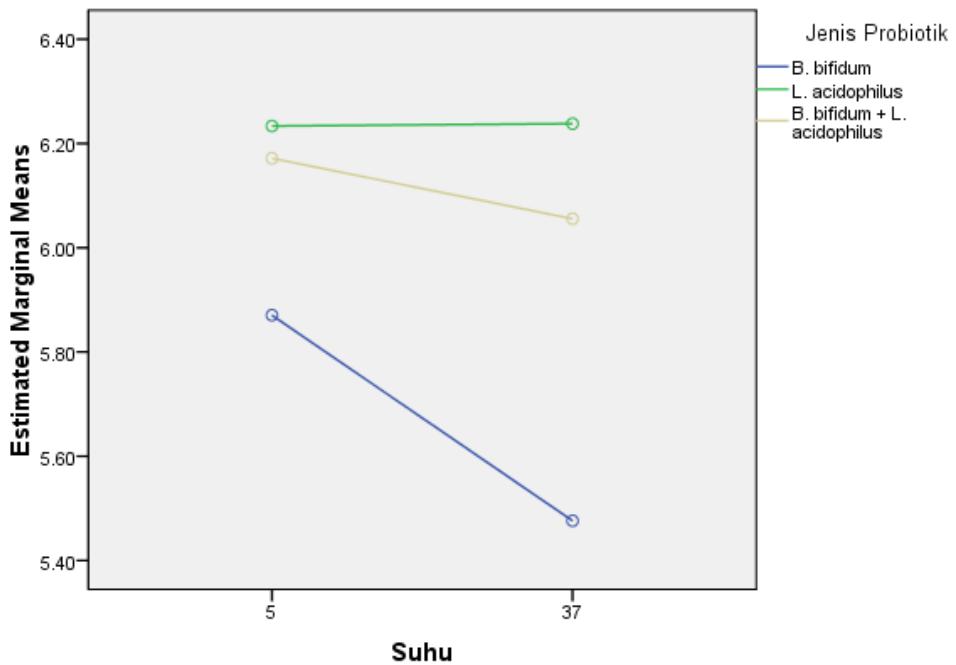
Means for groups in homogeneous subsets are displayed.

Based on observed means.

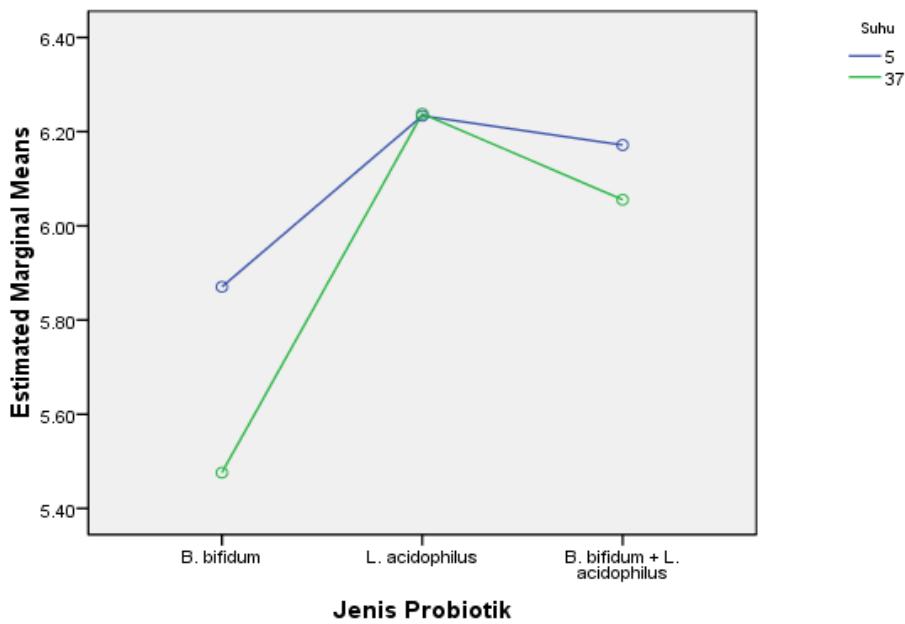
The error term is Mean Square(Error) = .122.

Profile Plots

Estimated Marginal Means of Nilai Viabilitas



Estimated Marginal Means of Nilai Viabilitas



12. Data dan analisa data *shelf life* mikrokapsul probiotik

- Data pengamatan viabilitas mikrokapsul pada 0 hari suhu 5°C

Total plate count viabilitas mikrokapsul probiotik (log cfu/mL)

Jenis Probiotik	Masa Simpan	
	0	14
<i>B. bifidum</i>	6.259	5.482
<i>L. acidophilus</i>	6.378	6.098
<i>L. acidophilus + B. bifidum</i>	6.341	6.002

- Data pengamatan viabilitas mikrokapsul pada 0 hari suhu 37°C

Total plate count viabilitas mikrokapsul probiotik (log cfu/mL)

Jenis Probiotik	Masa Simpan	
	0	14
<i>B. bifidum</i>	6.259	4.693
<i>L. acidophilus</i>	6.378	6.368
<i>L. acidophilus + B. bifidum</i>	6.341	5.770

Shelf Life Mikrokapsul pada suhu 5°C

$$B. bifidum = \frac{8 \times 6.259}{6.259 - 5.482}$$

$$= 64,48 \text{ Tahun}$$

$$L. acidophilus = \frac{8 \times 6.378}{6.378 - 6.098}$$

$$= 182,49 \text{ Tahun}$$

$$L. acidophilus + B. bifidum = \frac{8 \times 6.341}{6.341 - 6.002}$$

$$= 149,88 \text{ Tahun}$$

Shelf Life Mikrokapsul pada suhu 37°C

$$B. bifidum = \frac{8 \times 6.259}{6.259 - 4.693}$$

$$= 31,96 \text{ Tahun}$$

$$L. acidophilus = \frac{8 \times 6.378}{6.378 - 6.368}$$

$$= 52,08 \text{ Tahun}$$

$$L. acidophilus + B. bifidum = \frac{8 \times 6.341}{6.341 - 5.770}$$

$$= 88,82 \text{ Tahun}$$