

VI. KESIMPULAN DAN SARAN

A. Kesimpulan

Berdasarkan tujuan dan hipotesis dari penelitian ini terdapat 3 poin kesimpulan yang didapatkan yakni :

1. Semakin tinggi pemberian dosis SCP dapat meningkatkan retensi kandungan protein terlarut dan lemak pada *A. salina*.
2. Bioenkapsulasi dengan pemberian dosis SCP terhadap *A. salina* tidak menunjukkan adanya hasil yang terbaik pada dosis perlakuan yang diberikan.
3. Bioenkapsulasi dengan pemberian dosis SCP terhadap larva ikan kakap putih menunjukkan yang hasil terbaik pada dosis 100 mg/L dengan peningkatan kelangsungan hidup larva ikan kakap putih sebesar 80 % serta menurunkan resiko kematian larva.

B. Saran

Saran yang dapat diberikan berdasarkan penelitian ini adalah sebagai berikut :

1. Pengelolaan ekstrak *C. vulgaris* disarankan menggunakan metode *freeze dry* untuk menghasilkan SCP dengan potensi kualitas nutrisi yang lebih optimal.
2. Aplikasi SCP dalam *A. salina* yang diberikan pada larva ikan kakap putih dapat dikombinasikan dengan pakan buatan atau bahan suplemen lain untuk mendapatkan hasil kelangsungan hidup dan pertumbuhan yang lebih optimal.

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LAMPIRAN

Lampiran 1. Hasi uji analisis kimia *A. salina* hasil bioenkapsulasi



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HASIL ANALISIS BAHAN

No	Kode Sampel	KOMPOSISI		
		Protein Terlarut (%)	Lemak Kasar (%)	Energi (cal/gr)
1	Awal	80.01	-	502
2	A1	85.08	0.22	685
3	A2	84.43	0.22	518
4	A3	80.46	0.14	629
5	B1	80.33	0.12	702
6	B2	86.02	0.14	619
7	B3	85.23	0.19	601
8	C1	83.08	0.14	582
9	C2	87.43	0.26	566
10	C3	83.04	0.18	683
11	D1	85.98	0.10	599
12	D2	86.10	0.45	638
13	D3	83.91	0.27	701
14	Awal	84.44	0.13	785
15	A1	86.44	0.29	821
16	A2	85.24	0.32	801
17	A3	82.94	0.69	798
18	B1	85.99	0.65	825
19	B2	84.58	0.51	797
20	B3	85.41	0.81	889
21	C1	86.52	0.26	837
22	C2	84.39	0.38	797
23	C3	83.15	0.25	861
24	D1	87.17	0.19	814
25	D2	86.36	0.14	799
26	D3	85.32	0.29	808

Keterangan : 1. Hasil Analisis Di Hitung Berdasarkan Sampel Asli
2. Nomor 1- 13 Kode ATR
3. Nomor 14 - 26 Kode LKP



Keterangan : analisis *A. salina* terdapat pada nomor urut 1 -13 dengan kode ATR

Lampiran 2. Hasil analisis ragam kandungan protein terlarut *A. salina*.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.(*)
Corrected Model	6,701 ^a	3	2,234	0,378	0,771
Intercept	85188,545	1	85188,545	14423.213	0,000
Perlakuan	6,701	3	2,234	0,378	0,771
Error	47,251	8	5,906		
Total	85242,498	12			
Corrected Total	53,952	11			

R Squared = 0,124 (Adjusted R Squared = -0,204)

Keterangan :(*) tidak berbeda nyata antar perlakuan (P<0,05)

Lampiran 3. Hasil analisis ragam Kandungan Lemak *A. salina*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.(*)
Corrected Model	0,024 ^a	3	0,008	0,840	0,509
Intercept	0,492	1	0,492	52,071	0,000
Perlakuan	0,024	3	0,008	0,840	0,509
Error	0,076	8	0,009		
Total	0,591	12			
Corrected Total	0,099	11			

R Squared = 0,240 (Adjusted R Squared = -0,046)

Keterangan :(*) tidak berbeda nyata antar perlakuan (P<0,05)

Lampiran 4. Hasil analisis ragam retensi protein terlarut pada *A. salina*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.(*)
Corrected Model	916,725 ^a	3	305,575	0,378	0,771
Intercept	29592,040	1	29592,040	36,626	0,000
perlakuan	916,725	3	305,575	0,378	0,771
Error	6463,637	8	807,955		
Total	36972,402	12			
Corrected Total	7380,362	11			

R Squared = 0,124 (Adjusted R Squared = -0,204)

Keterangan :(*) tidak berbeda nyata antar perlakuan (P<0,05)

Lampiran 5. Hasil analisis ragam retensi lemak pada energi *A. salina*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.(*)
Corrected Model	314,771 ^a	3	104,924	0,840	0,509
Intercept	6501,189	1	6501,189	52,071	0,000
perlakuan	314,771	3	104,924	0,840	0,509
Error	998,811	8	124,851		
Total	7814,771	12			
Corrected Total	1313,582	11			

R Squared = 0,240 (Adjusted R Squared = -0,046)

Keterangan :(*) tidak berbeda nyata antar perlakuan ($P < 0,05$)


Lampiran 6. Hasil analisis ragam retensi protein terlarut dan lemak pada energi *A. salina*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.(*)
Corrected Model	2058,384 ^a	3	686,128	0,589	0,639
Intercept	63834,171	1	63834,171	54,809	0,000
Perlakuan	2058,384	3	686,128	0,589	0,639
Error	9317,349	8	1164,669		
Total	75209,903	12			
Corrected Total	11375,733	11			

R Squared = 0,181 (Adjusted R Squared = -0,126)

Keterangan :(*) tidak berbeda nyata antar perlakuan ($P < 0,05$)

Lampiran 7. Analisis proksimat SCP (single cell protein) *C. vulgaris*



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JURUSAN NUTRISI DAN MAKANAN TERNAK
FAKULTAS PETERNAKAN
UNIVERSITAS HASANUDDIN**

HASIL ANALISIS BAHAN

No	Kode Sampel	KOMPOSISI (%)					Abu
		Air	Protein Kasar	Lemak Kasar	Serat kasar	BETN	
1	Mikro Alga	20,86	8,55	0,87	0,86	12,82	76,91

Keterangan : 1. Kecuali Air, Semua Fraksi Dinyatakan Dalam Bahan Kering
2. BETN = Bahan Ekstrak Tanpa Nitrogen

Makassar, 23 Juli 2020



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Lampiran 8. Hasil uji kimia tubuh larva ikan kakap putih

14	Awal	84,44	0,13	785
15	A1	85,44	0,29	821
16	A2	85,24	0,32	801
17	A3	82,94	0,09	798
18	B1	85,99	0,65	825
19	B2	84,50	0,51	797
20	B3	85,41	0,51	809
21	C1	86,52	0,26	837
22	C2	84,39	0,39	797
23	C3	83,15	0,25	861
24	D1	87,17	0,19	814
25	D2	85,36	0,14	799
26	D3	85,32	0,29	808

Keterangan : 1. Hasil Analisis Di Hitung Berdasarkan Sampel Asli
2. Nomor 1- 13 Kode ATR
3. Nomor 14 - 26 Kode LKP



Lampiran 9. Hasil analisis ragam retensi protein terlarut tubuh ikan larva ikan kakap putih

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.(*)
Corrected Model	5,221 ^a	3	1,740	0,410	0,751
Intercept	17,135	1	17,135	4,031	0,080
Perlakuan	5,221	3	1,740	0,410	0,751
Error	34,002	8	4,250		
Total	56,358	12			
Corrected Total	39,224	11			

R Squared = 0,133 (Adjusted R Squared = -0,192)

Keterangan :(*) tidak berbeda nyata antar perlakuan (P<0,05)

Lampiran 10. Hasil analisis ragam retensi lemak tubuh ikan larva ikan kakap putih

Source	Type III Sum of Squares	df	Mean Square	F	Sig.(**)
Corrected Model	17,435 ^a	3	5,812	5,509	0,024
Intercept	33,297	1	33,297	31,561	0,000
Perlakuan	17,435	3	5,812	5,509	0,024
Error	8,440	8	1,055		
Total	59,172	12			
Corrected Total	25,875	11			

R Squared = 0,674 (Adjusted R Squared = 0,551)

Keterangan :(**) berbeda nyata antar perlakuan (P<0,05)

Perlakuan	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
A	1,864	0,593	0,496	30,231
B	3,542	0,593	2,175	4,910
C	0,852	0,593	-0,515	2,220
D	0,405	0,593	-0,963	1,772

Lampiran 11. Uji lanjut w-tuckey retensi lemak tubuh ikan larva ikan kakap putih

(I) Perlakuan	(J) Perlakuan	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
A	B	-1,6786	0,83865	0,264	-4,3642	1,0071
	C	1,0114	0,83865	0,640	-1,6743	3,6970
	D	1,4587	0,83865	0,366	-1,2270	4,1443
B	A	1,6786	0,83865	0,264	-1,0071	4,3642
	C	2,6899*	0,83865	0,050	0,0043	5,3756
	D	3,1373*	0,83865	0,024	0,4516	5,8229
C	A	-1,0114	0,83865	0,640	-3,6970	1,6743
	B	-2,6899*	0,83865	0,050	-5,3756	-0,0043
	D	0,4473	0,83865	0,948	-2,2383	3,1330
D	A	-1,4587	0,83865	0,366	-4,1443	1,2270
	B	-3,1373*	0,83865	0,024	-5,8229	-0,4516
	C	-0,4473	0,83865	0,948	-3,1330	20,2383

Lampiran 12. Hasil uji lanjut w-tuckey retensi lemak tubuh ikan larva ikan kakap putih

Perlakuan	N	Subset	
		1	2
D	3	0,4049	
C	3	0,8523	
A	3	1,8636	1,8636
B	3		3,5422
Sig.		0,366	0,264

Lampiran 13. Hasil analisis ragam retensi energi tubuh ikan larva ikan kakap putih

Source	Type III Sum of Squares	df	Mean Square	F	Sig.(*)
Corrected Model	44,406 ^a	3	14,802	0,919	0,474
Intercept	347,010	1	347,010	21,541	0,002
Perlakuan	44,406	3	14,802	0,919	0,474
Error	128,874	8	16,109		
Total	520,291	12			
Corrected Total	173,281	11			

R Squared = 0,256 (Adjusted R Squared = -0,023)

Keterangan :(*) tidak berbeda nyata antar perlakuan (P<0,05)

Lampiran 14. Data perhitungan kelangsungan hidup larva ikan kakap putih

Kode Pengacakan	Kelangsungan Hidup		Hasil
	Data awal	Data akhir	
A1	50	24	48
A2	50	19	38
A3	50	28	56
B1	50	37	74
B2	50	43	86
B3	50	40	80
C1	50	35	70
C2	50	32	64
C3	50	34	68
D1	50	41	82
D2	50	31	62
D3	50	30	60

Lampiran 15. Hasil analisis ragam kelangsungan hidup larva ikan kakap putih

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.(**)
Corrected Model	1649,333 ^a	3	549,778	8,006	0,009
Intercept	51,745,333	1	51,745,333	753,573	0,000
Perlakuan	1,649,333	3	549,778	8,006	0,009
Error	549,333	8	68,667		
Total	53,944,000	12			
Corrected Total	2,198,667	11			

R Squared = .750 (Adjusted R Squared = .656)

Keterangan :(**) berbeda nyata antar perlakuan (P<0,05)

Perlakuan	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
A	47,333	4,784	36,301	58,366
B	80,000	4,784	68,968	91,032
C	67,333	4,784	56,301	78,366
D	68,000	4,784	56,968	79,032

Lampiran 16. Uji lanjut w-tuckey kelangsungan hidup larva ikan kakap putih

(I) Perlakuan	(J) Perlakuan	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
A	B	-32,6667*	676,593	0,006	-543,335	-109,998
	C	-200,000	676,593	0,071	-416,669	16,669
	D	-206,667	676,593	0,062	-423,335	10,002
B	A	32,6667*	676,593	0,006	109,998	543,335
	C	126,667	676,593	0,311	-90,002	343,335
	D	120,000	676,593	0,351	-96,669	336,669
C	A	200,000	676,593	0,071	-16,669	416,669
	B	-126,667	676,593	0,311	-343,335	90,002
	D	-0,6667	676,593	1,000	-223,335	210,002
D	A	206,667	676,593	0,062	-10,002	423,335
	B	-120,000	676,593	0,351	-336,669	96,669
	C	0,6667	676,593	1,000	-210,002	223,335

Lampiran 17. Hasil uji lanjut w-tuckey kelangsungan hidup larva ikan kakap putih

Perlakuan	N	Subset	
		1	2
A	3	473,333	
C	3	673,333	673,333
D	3	680,000	680,000
B	3		800,000
Sig.		0,062	0,311

Lampiran 18. Data perhitungan mortalitas larva ikan kakap putih

Kode pengacakan	Data awal	Mortalitas					
		D-4	Hasil perhitungan	D-7	Hasil perhitungan	D-10	Hasil perhitungan
A1	50	5,3	16	13	8,7	5	3,3
A2	50	5,3	16	13	8,7	10	6,7
A3	50	4,7	14	6	4,0	9	6,0
B1	50	4,7	14	4	2,7	2	1,3
B2	50	3,3	10	2	1,3	0	0,0
B3	50	2,7	8	3	2,0	3	2,0
C1	50	4,7	14	6	4,0	2	1,3
C2	50	4,7	14	10	6,7	1	0,7
C3	50	4,7	14	6	4,0	3	2,0
D1	50	3,3	10	2	1,3	2	1,3
D2	50	4,0	12	10	6,7	3	2,0
D3	50	3,3	10	9	6,0	6	4,0

Lampiran 19. Data perhitungan pertumbuhan mutlak larva ikan kakap putih

kode pengacakan	Hasil Perhitungan	
	Panjang Total (PT)	Panjang standar(PS)
A1	3,71	3,13
A2	5,3	4,01
A3	4,6	3,84
B1	4,84	3,89
B2	3,76	3,1
B3	5,55	4,59
C1	4,67	3,9
C2	6,43	5,28
C3	4,61	3,49
D1	5,0	3,68
D2	5,57	4,6
D3	5,29	4,32

Lampiran 20. Hasil analisis ragam pertumbuhan mutlak larva (panjang total)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.(*)
Corrected Model	1,262 ^a	3	0,421	0,648	0,606
Intercept	293,337	1	293,337	451,699	0,000
Perlakuan	1,262	3	0,421	0,648	0,606
Error	5,195	8	0,649		
Total	299,795	12			
Corrected Total	6,457	11			

R Squared = 0,195 (Adjusted R Squared = -0,106)

Keterangan :(*) tidak berbeda nyata antar perlakuan (P<0,05)

Lampiran 21. Hasil analisis ragam pertumbuhan mutlak larva (panjang standar)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.(*)
Corrected Model	0,673 ^a	3	0,224	0,478	0,706
Intercept	190,642	1	190,642	406,610	0,000
Perlakuan	0,673	3	0,224	0,478	0,706
Error	3,751	8	0,469		
Total	195,066	12			
Corrected Total	4,424	11			

R Squared = .152 (Adjusted R Squared = -.166)

Keterangan :(*) tidak berbeda nyata antar perlakuan (P<0,05)

Lampiran 22. Data perhitungan pertumbuhan spesifik larva ikan kakap putih

kode pengacakan	Hasil Perhitungan	
	Panjang Total (PT)	Panjang standar(PS)
A1	37,1	31,3
A2	53	40,1
A3	46	38,4
B1	48,4	38,9
B2	37,6	31
B3	55,5	45,9
C1	46,7	39
C2	64,3	52,8
C3	46,1	34,9
D1	50	36,8
D2	55,7	46
D3	52,9	43,2

Lampiran 23. Hasil analisis ragam pertumbuhan spesifik larva (panjang total)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.(*)
Corrected Model	126,202 ^a	3	42,067	0,648	0,606
Intercept	29333,741	1	29333,741	451,699	0,000
Perlakuan	126,203	3	42,068	0,648	0,606
Error	519,527	8	64,941		
Total	29979,470	12			
Corrected Total	645,729	11			

R Squared = 0,195 (Adjusted R Squared = -0,106)

Keterangan :(*) tidak berbeda nyata antar perlakuan (P<0,05)

Lampiran 24. Hasil analisis ragam pertumbuhan spesifik larva (panjang standar)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.(*)
Corrected Model	67,282 ^a	3	22,427	0,478	0,706
Intercept	19064,241	1	19064,241	406,610	0,000
Perlakuan	67,282	3	22,427	0,478	0,706
Error	375,087	8	46,886		
Total	19506,610	12			
Corrected Total	442,369	11			

R Squared = 0,152 (Adjusted R Squared = -0,166)

Keterangan :(*) tidak berbeda nyata antar perlakuan (P<0,05)