

Figure S1. Total nutrient intake (mg/bee) for (A) EAA:C and (B) L:C of honeybees confined to one EAA:L treatment diet (experiment 1). Error bars represent s.e.m. N=10 cohorts of 30 bees per treatment.

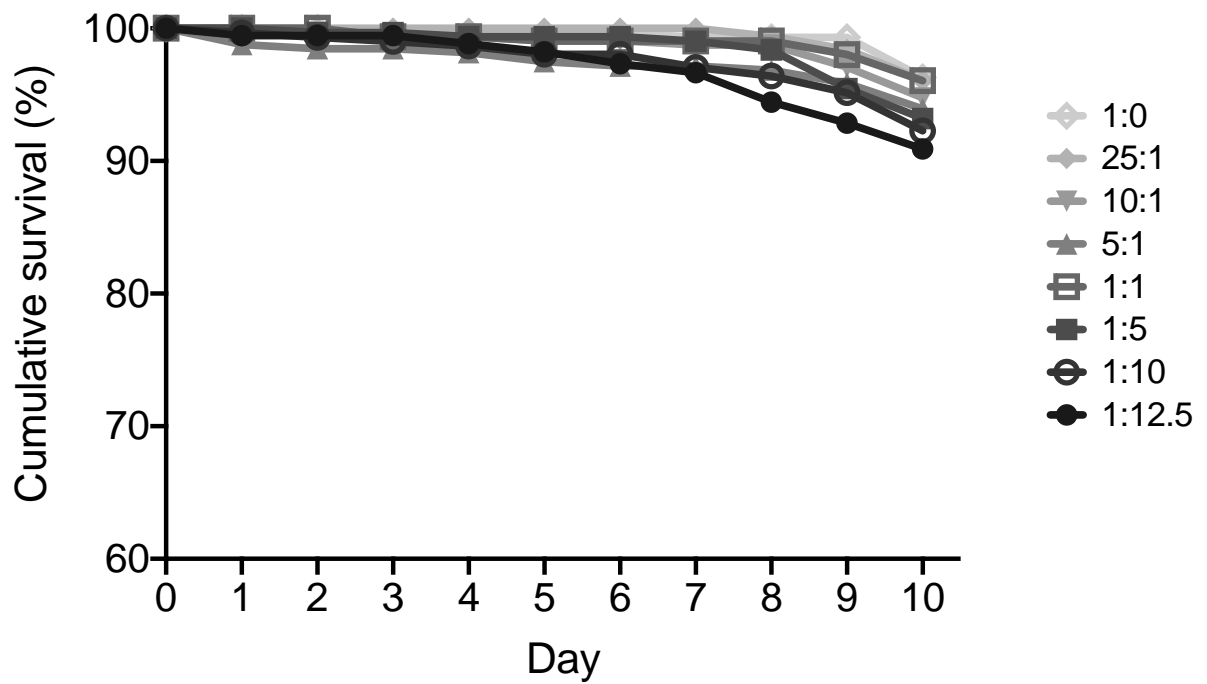


Figure S2. Survival curve of honeybees confined to one EAA:L diet (Experiment 1) over the 10 days of the experiment. N=10 cohorts of 30 bees per treatment.

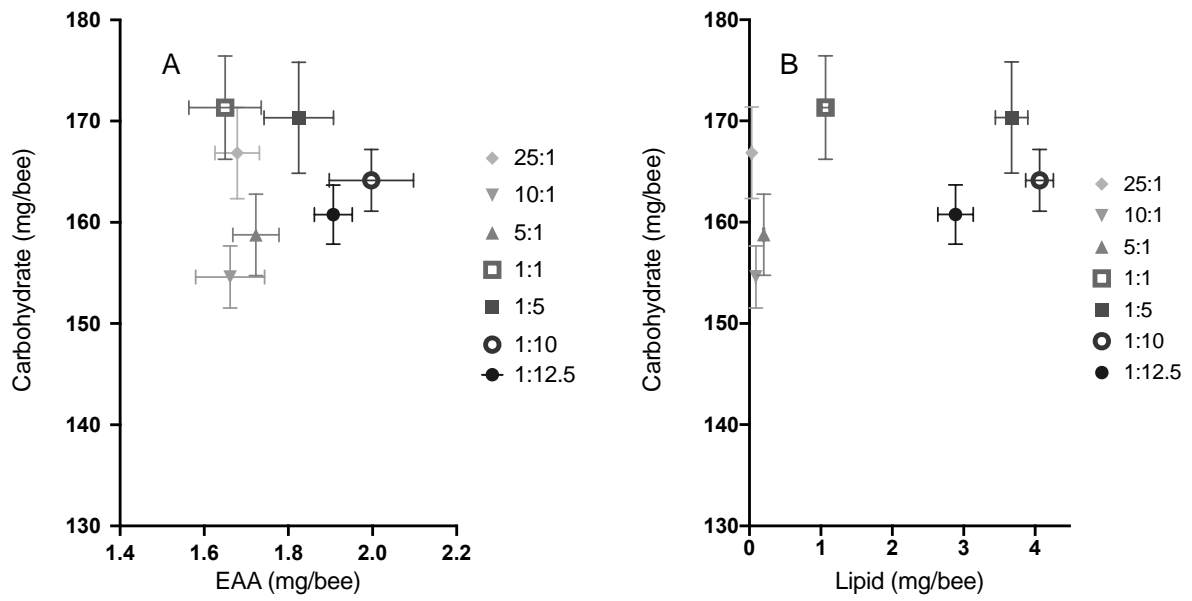


Figure S3. Total nutrient intake (mg/bee) for (A) EAA:C and (B) L:C of honeybees in the amino acid choice experiment (Experiment 2). Error bars represent s.e.m. N=10 cohorts of 30 bees per treatment.

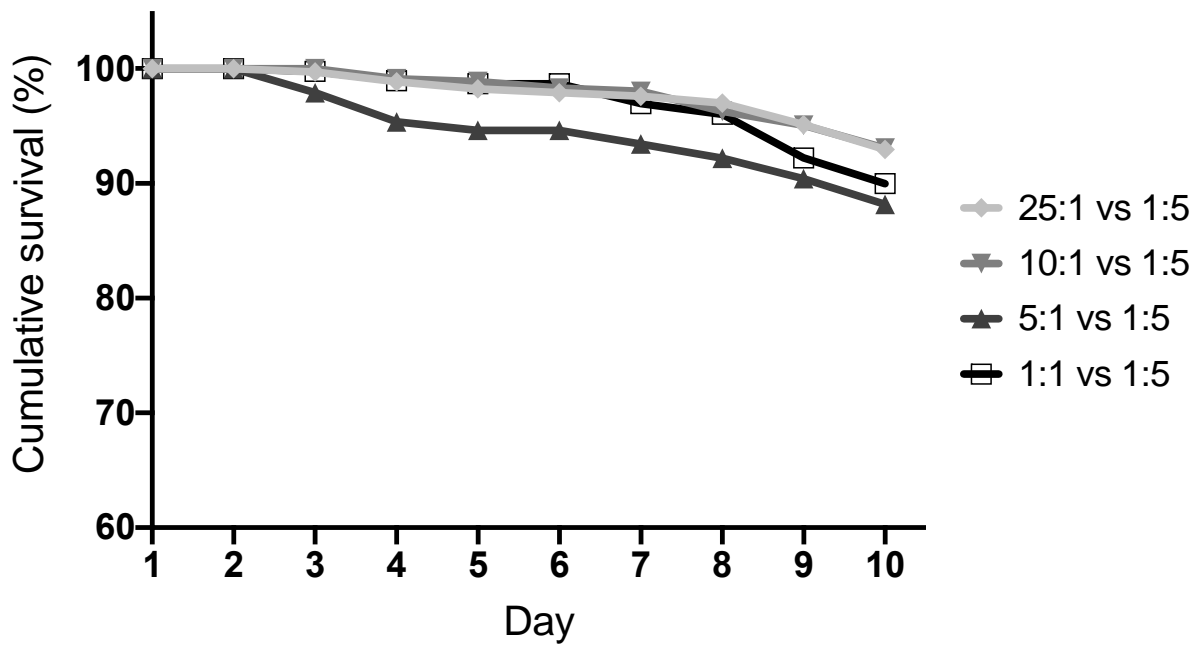


Figure S4. Survival curve of honeybees from the lipid-paired experiment (Experiment 3) over the 10 days of the experiment. N=10 cohorts of 30 bees per treatment.

Table S1. Amino acid and sucrose composition of the EAA:C base diet and macronutrient composition of EAA:L treatment diets used in experiments 1, 2 and 3

Sucrose concentration (M)	1		
Total EAA concentration (M)	0.04		
EAA : Sucrose ratio	1:25		
Amino acids	MW	Target contribution (M)	g/L
Arginine	174.2	0.004	0.697
Histidine	155.15	0.004	0.621
Isoleucine	131.18	0.004	0.525
Leucine	131.17	0.004	0.525
Lysine	182.65	0.004	0.731
Methionine	148.21	0.004	0.593
Phenylalanine	165.19	0.004	0.661
Threonine	119.12	0.004	0.476
Tryptophan	204.23	0.004	0.817
Valine	117.15	0.004	0.469
Total		0.04	6.113
Diet macronutrient composition			
EAA:L treatment	EAA (g/L)	Sucrose (g/L)	Lecithin (g/L)
1:0	6.1	342.0	0.0
25:1	6.1	342.0	0.2
10:1	6.1	342.0	0.6
5:1	6.1	342.0	1.2
1:1	6.1	342.0	6.1
1:5	6.1	342.0	30.6
1:10	6.1	342.0	61.1
1:12.5	6.1	342.0	76.4
Sucrose	0.0	342.0	0.0

Table S2. Amino acid composition of the treatment diets for estimating conversion of amino acid to protein value and the average consumption of treatment diets by 10-day old honeybees

%	Casein AAs	Equimolar
Alanine	2.92	
Arginine	3.40	10
Aspartic acid	6.41	
Cysteine	0.29	
Glutamic acid	21.2	
Glycine	1.75	
Histidine	3.01	10
Iso-leucine	4.37	10
Leucine	9.04	10
Lysine	7.48	10
Methionine	2.72	10
Phenylalanine	4.96	10
Proline	10.4	
Serine	5.15	
Threonine	3.98	10
Tyrosine	5.25	
Valine	6.32	10
Tryptophan	1.36	10
Total	100	100
Total AA consumption (mg/bee)		
Casein AAs	4.83 ± 0.09	
Equimolar AAs	1.23 ± 0.07	
Factor difference	3.93	