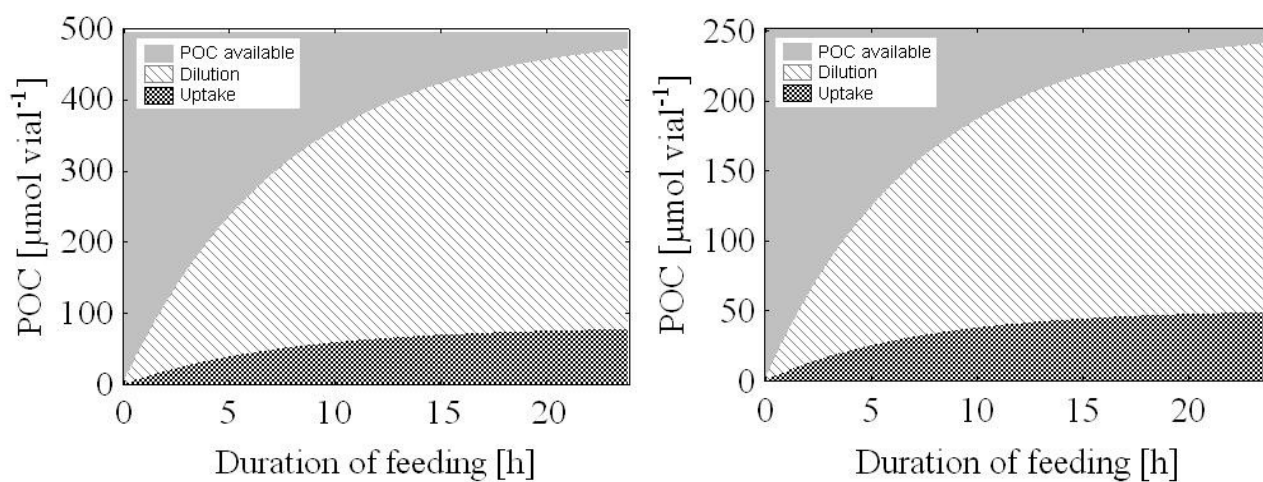


**Figure S1** Food uptake (*Artemia salina*) as POC determined five times during duration of experiment without dilution by flow through for high (HF) and low (LF) feeding regime; **a** absolute uptake after 18 hours as function of prey (POC) available and **b** relative uptake as function of food available. Linear regressions were POC uptake: LF =  $-15.828 + 0.502 \times \text{POC added}$ ,  $r = 0.974$ ,  $p = 0.005$ ; HF =  $-51.325 + 0.46 \times \text{POC added}$ ,  $r = 0.996$ ,  $r < 0.001$ .



**Figure S2** Modelled cumulative changes of POC concentration in vials (“POC available”), POC lost due to overflow of seawater (“Dilution”) and POC taken up by the coral (“Uptake”) during 24-hour feeding under experimental (flow-through) conditions.

**Table S1** Analyses to determine food uptake rates over the duration of the pCO<sub>2</sub> experiment in 2010 were conducted five times (FT1: Oct 29, FT2: Nov 12, FT3: Nov 26, FT4: Dec 10 and FT5: Dec 21). *Artemia salina* nauplii were added to a fixed volume (250 ml) to each of the coral vials and corals were left to feed for 21±2 h, mean±s.d. The number of *A. salina* nauplii added (n=5), particulate organic carbon (POC) and nitrogen (n = 10). The high feeding (HF) regime received twice the amount of *A. salina* nauplii, POC and PON than the low feeding (LF) regime. Mean values of POC or PON added were used to subtract from POC or PON remaining after feeding and normalized to average food uptake per skeletal dry weight (g<sup>-1</sup>) or per polyp (polyp<sup>-1</sup>) and hour (h<sup>-1</sup>) from data extrapolated to food received and taken up per week, because LF was only fed twice, but HF were fed five times a week. The number of *A. salina* nauplii taken up was calculated from the relation between *A. salina* and POC concentration of food added (*A. salina* nauplii  $\cong$  6.65±0.76  $\mu$ mol POC, mean±s.d., n=10).

Feeding regime	FT	<i>A. salina</i>			POC			PON			<i>A. salina</i>		
		n	mean ± s.e.m	n	mean ± s.e.m	mean ± s.e.m	mean ± s.e.m	n	mean ± s.e.m	mean ± s.e.m	mean ± s.e.m	mean ± s.e.m	mean ± s.e.m
HF	FT1	5	3254 ± 178	10	462.7 ± 14.9	74.9 ± 11.9	8	2.28 ± 0.68	0.17 ± 0.04	0.288 ± 0.123	0.023 ± 0.007	20.28	1.55
HF	FT2	5	3848 ± 247	10	647.8 ± 20.6	103.3 ± 16.4	9	3.25 ± 0.68	0.27 ± 0.05	0.519 ± 0.116	0.044 ± 0.008	28.94	2.42
HF	FT3	5	1662 ± 96	10	261.7 ± 8.0	42.8 ± 6.4	8	1.02 ± 0.25	0.08 ± 0.01	0.154 ± 0.041	0.013 ± 0.002	9.13	0.73
HF	FT4	5	2745 ± 184	10	349.1 ± 15.3	59.1 ± 12.3	10	1.57 ± 0.21	0.12 ± 0.02	0.283 ± 0.042	0.022 ± 0.004	14.02	1.10
HF	FT5	5	4579 ± 431	10	758.5 ± 35.9	128.7 ± 28.8	11	5.17 ± 0.86	0.35 ± 0.03	0.875 ± 0.145	0.059 ± 0.005	46.07	3.12
<b>HF</b>	<b>mean</b>	<b>25</b>	<b>3218 ± 207</b>	<b>50</b>	<b>495.8 ± 17.3</b>	<b>81.8 ± 13.8</b>	<b>12</b>	<b>2.99 ± 0.39</b>	<b>0.22 ± 0.02</b>	<b>0.490 ± 0.066</b>	<b>0.036 ± 0.003</b>	<b>23.69</b>	<b>1.78</b>
LF	FT1	5	1627 ± 89	10	231.4 ± 14.1	37.4 ± 2.3	10	0.71 ± 0.18	0.04 ± 0.01	0.114 ± 0.030	0.007 ± 0.001	6.30	0.39
LF	FT2	5	1924 ± 123	10	323.9 ± 24.5	51.7 ± 3.9	9	1.07 ± 0.25	0.07 ± 0.01	0.169 ± 0.040	0.011 ± 0.001	9.51	0.62
LF	FT3	5	831 ± 48	10	130.8 ± 10.0	21.4 ± 1.5	9	0.31 ± 0.11	0.02 ± 0.00	0.050 ± 0.018	0.003 ± 0.001	2.78	0.17
LF	FT4	5	1372 ± 92	10	174.5 ± 19.0	29.6 ± 3.1	7	0.29 ± 0.09	0.02 ± 0.01	0.050 ± 0.015	0.004 ± 0.001	2.61	0.19
LF	FT5	5	2290 ± 216	10	379.2 ± 28.5	64.4 ± 4.4	8	1.02 ± 0.32	0.06 ± 0.01	0.163 ± 0.057	0.009 ± 0.002	9.11	0.52
<b>LF</b>	<b>mean</b>	<b>25</b>	<b>1609 ± 104</b>	<b>50</b>	<b>247.9 ± 13.5</b>	<b>40.9 ± 2.2</b>	<b>10</b>	<b>0.73 ± 0.19</b>	<b>0.04 ± 0.01</b>	<b>0.116 ± 0.032</b>	<b>0.007 ± 0.001</b>	<b>6.06</b>	<b>0.38</b>

**Table S2** LSD Posthoc comparison (*P*-values) of calcification rates between high and low feeding regimes and repeated measures T<sub>1</sub>-T<sub>5</sub> at consecutively changing pCO<sub>2</sub> levels (in brackets, pCO<sub>2</sub> level [μatm]).

Feeding regime		HF				
	R1	T <sub>1</sub> (438)	T <sub>2</sub> (1638)	T <sub>3</sub> (805)	T <sub>4</sub> (1725)	T <sub>5</sub> (453)
HF	T <sub>1</sub> (438)		<b>0.004</b>	0.373	<b>0.001</b>	0.560
	T <sub>2</sub> (1638)			<b>0.044</b>	0.709	<b>0.021</b>
	T <sub>3</sub> (805)				<b>0.018</b>	0.758
	T <sub>4</sub> (1725)					<b>0.008</b>
	T <sub>5</sub> (453)					
Feeding regime		LF				
	R1	T <sub>1</sub> (438)	T <sub>2</sub> (1638)	T <sub>3</sub> (805)	T <sub>4</sub> (1725)	T <sub>5</sub> (453)
LF	T <sub>1</sub> (438)		0.169	0.255	0.413	0.471
	T <sub>2</sub> (1638)			<b>0.013</b>	0.575	<b>0.038</b>
	T <sub>3</sub> (805)				0.052	0.674
	T <sub>4</sub> (1725)					0.126
	T <sub>5</sub> (453)					
Feeding regime		HF				
	R1	T <sub>1</sub> (438)	T <sub>2</sub> (1638)	T <sub>3</sub> (805)	T <sub>4</sub> (1725)	T <sub>5</sub> (453)
LF	T <sub>1</sub> (438)	<b>0.024</b>	<b>0.000</b>	0.180	<b>0.001</b>	0.080
	T <sub>2</sub> (1638)	0.666	0.364	0.119	0.700	0.251
	T <sub>3</sub> (805)	0.112	<b>0.004</b>	0.657	<b>0.017</b>	0.381
	T <sub>4</sub> (1725)	0.422	0.567	0.054	0.989	0.130
	T <sub>5</sub> (453)	0.059	<b>0.001</b>	0.445	<b>0.008</b>	0.258

Colors mark significant differences according to feeding regime and/or pCO<sub>2</sub>:

- > different feeding regimes (same pCO<sub>2</sub> level)
- > different pCO<sub>2</sub> levels (same feeding regime)
- > different feeding regime and different pCO<sub>2</sub> levels

**Table S3** Nonparametric statistics to test the effect of feeding on respiration, total organic carbon (TOC) dynamics, respiratory quotient (RQ) and the relative carbon demand determined from CO<sub>2</sub> respired to POC taken up (C<sub>R</sub>/POC<sub>uptake</sub>). Mann-Whitney-U-Test (MWU) was conducted to test the effect of feeding regime (FR) on independent samples (pooled for pCO<sub>2</sub>). The Friedman (FM) test was conducted for dependent, repeated measures to test the effect of pCO<sub>2</sub> (independent of feeding regime), and a Kruskal-Wallis (KW) Anova was conducted between the different groups of treatments (pCO<sub>2</sub> and/or feeding). For multiple comparisons p was adjusted using the Bonferroni correction to avoid the type-I error.

Factor tested Test used	FR MWU						FM	pCO <sub>2</sub>		pCO <sub>2</sub> and/or FR KW
	pooled	T <sub>1</sub> (438)	T <sub>2</sub> (1638)	T <sub>3</sub> (805)	T <sub>4</sub> (1725)	T <sub>5</sub> (453)		FM (LF)	FM (HF)	
Respiration	Z=-1.061 P=0.288	Z=-1.306 P=0.955	Z=-0.082 P=1	Z=-2.368 P=0.051	Z=-1.061 P=0.864	Z=-1.388 P=0.495	$\chi^2_{(N=19, df=4)} = 7.667$ P=0.105	$\chi^2_{(N=9, df=4)} = 4.533$ P=0.678	$\chi^2_{(N=10, df=4)} = 5.920$ P=0.410	$\chi^2_{(df=9)} = 11.829$ P=0.223
TOC	Z=-0.192 P=0.847	Z=-0.923 P=1	Z=-0.630 P=1	Z=-1.291 P=0.985	Z=-1.701 P=0.445	Z=-0.337 P=1	$\chi^2_{(N=9, df=4)} = 0.444$ P=0.978	$\chi^2_{(N=6, df=4)} = 0.267$ P=1	$\chi^2_{(N=3, df=4)} = 1.600$ P=1	$\chi^2_{(df=9)} = 12.455$ P=0.189
RQ	Z=0.529 P=0.597	Z=-0.158 P=1	Z=0.943 P=1	Z=0.900 P=1			$\chi^2_{(N=15, df=2)} = 0.933$ P=0.627	$\chi^2_{(N=9, df=2)} = 0.667$ P=0.717	$\chi^2_{(N=6, df=2)} = 0.333$ P=0.845	$\chi^2_{(df=5)} = 0.924$ P=0.968
C <sub>R</sub> /POC <sub>uptake</sub>	Z=-2.874 P=0.004*	Z=-2.491 P=0.036*	Z=-2.691 P=0.027*	Z=-2.691 P=0.027*			$\chi^2_{(N=11, df=2)} = 1.000$ P=0.607	$\chi^2_{(N=7, df=2)} = 2.000$ P=0.736	$\chi^2_{(N=4, df=2)} = 4.500$ P=0.210	$\chi^2_{(df=4)} = 8.857$ P=0.065