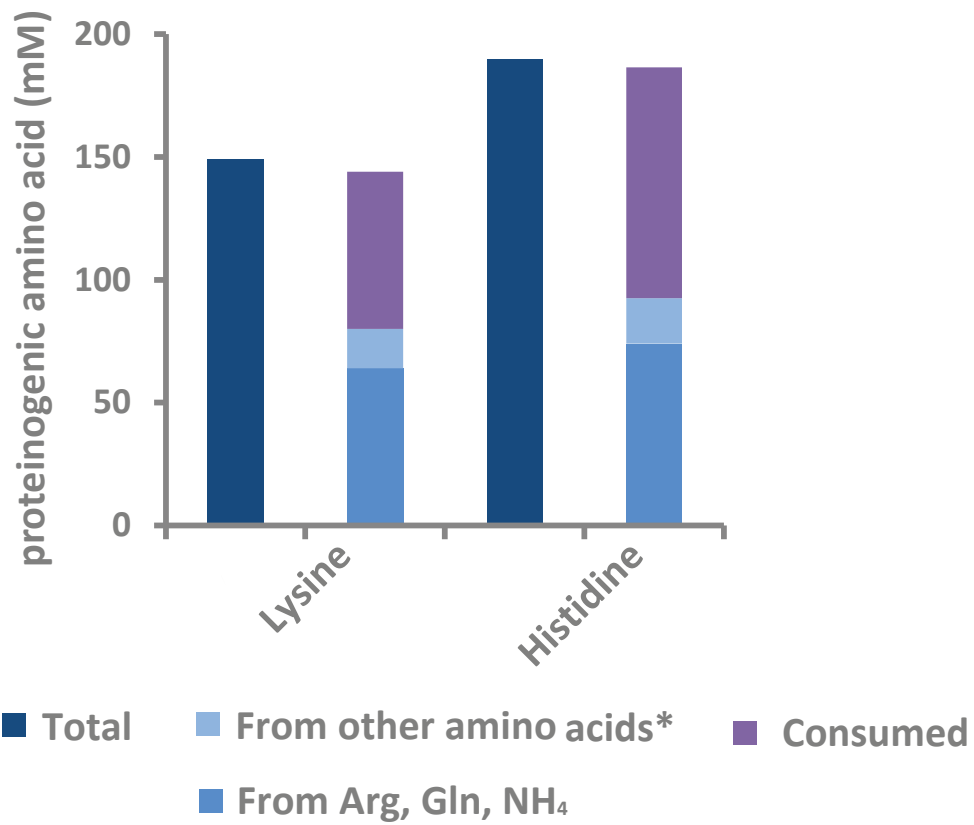


**Figure S1 – Reproducibility of biological parameters from a set of 14 independent fermentations.**

Fermentations were carried out using the same experimental conditions (medium composition, operating conditions, and yeast strain). Only one nitrogen source (Arg, Gln, NH<sub>4</sub>, Val, Leu, Ile, and Thr) was provided in labeled form for each fermentation, and fermentations were performed in duplicate.

- A CO<sub>2</sub> release measured by weight loss throughout the 14 independent fermentations.
- B-C Mean values and standard deviations of dry weight and protein content obtained from the 14 independent fermentations.
- D Within-subject variation coefficients (WSCV) calculated from residual (T<sub>0</sub>, N<sub>1/2</sub>) or consumed (N<sub>1/2</sub>, N<sub>3/4</sub>, EF) amino acid concentrations and volatile compound concentrations measured during the 14 independent fermentations.

T<sub>0</sub>, N<sub>1/2</sub>, N<sub>3/4</sub>, N<sub>T</sub> and EF: initial time, 1/2, 3/4, complete nitrogen consumption and end of fermentation, respectively.



**Figure S2 – Origin of proteinogenic histidine and lysine.**

The proteinogenic amino acids (dark blue) can originate from de novo synthesis using nitrogen provided by arginine, glutamine and ammonium (blue) or by other amino acids (light blue, calculated value considering that only 80 % of the intracellular nitrogen pool is provided by the 3 most abundant amino acids) or from direct incorporation of consumed compound (purple).

**Dataset S1: Raw data: residual amino acids (mM)**

Means, standard deviations and standard errors of the mean were calculated from 14 independent experiments.

	Ala	Arg	Asp	Cys	Gln	Glu	Gly	His	Ile	Leu	Lys	Met	NH <sub>4</sub>	Phe	Pro	Ser	Thr	Trp	Tyr	Val	NaN		
T <sub>0</sub>	0.0972	0.1747	0.1159	0.2282	1.3793	0.5355	0.1039	0.0969	0.1549	0.1653	0.0499	0.0892	0.0453	0.0799	0.2034	0.3020	0.2671	0.2426	0.1642	0.2642	0.5881		
	0.0603	0.1139	0.0119	0.0209	0.0880	0.1811	0.0209	0.0880	0.1132	0.0149	0.0448	0.0209	0.0149	0.0209	0.0209	0.0209	0.0209	0.0209	0.0209	0.0209	0.0209		
	0.7732	0.9580	0.1217	0.0219	1.3529	0.5354	0.1147	0.0944	0.1144	0.1680	0.0517	0.0874	0.3151	0.1021	0.2504	0.3425	0.3028	0.4570	0.0474	0.1774	0.5683		
	0.9599	0.9665	0.1347	0.0289	1.4526	0.4214	0.1165	0.0907	0.1134	0.1710	0.0509	0.0881	0.3875	0.1144	0.2492	0.3419	0.3064	0.4758	0.0509	0.1895	0.8556		
	0.7111	0.8406	0.1270	0.0219	1.3529	0.5354	0.1147	0.0944	0.1144	0.1680	0.0517	0.0874	0.3151	0.1021	0.2504	0.3425	0.3028	0.4570	0.0474	0.1774	0.5683		
	0.7233	0.8379	0.1263	0.0210	1.3714	0.5188	0.1080	0.0889	0.1124	0.1645	0.0444	0.0840	0.4548	0.1103	0.2262	0.3218	0.2895	0.3753	0.0537	0.1671	0.4830		
	0.9556	1.0393	0.1400	0.0216	1.4602	0.3767	0.1214	0.0980	0.1130	0.1970	0.0546	0.0882	0.4000	0.1144	0.2492	0.3789	0.3332	0.5029	0.0293	0.1317	10.019		
	0.7781	0.9622	0.1270	0.0219	1.3529	0.5354	0.1147	0.0944	0.1144	0.1680	0.0517	0.0874	0.3151	0.1021	0.2504	0.3425	0.3028	0.4570	0.0474	0.1774	0.5683		
	0.7340	0.8450	0.1217	0.0219	1.4266	0.3559	0.1103	0.0900	0.1140	0.1640	0.0441	0.0806	0.4043	0.1109	0.2298	0.3245	0.2921	0.4767	0.0460	0.1556	9.4778		
	0.7188	0.8110	0.1288	0.0269	1.3720	0.5622	0.1163	0.0944	0.1163	0.1640	0.0441	0.0806	0.4043	0.1109	0.2298	0.3245	0.2921	0.4767	0.0460	0.1556	9.4778		
	0.7633	0.9199	0.1217	0.0219	1.4266	0.3559	0.1103	0.0900	0.1140	0.1640	0.0441	0.0806	0.4043	0.1109	0.2298	0.3245	0.2921	0.4767	0.0460	0.1556	9.4778		
	0.7179	0.8250	0.1288	0.0269	1.3720	0.5622	0.1163	0.0944	0.1163	0.1640	0.0441	0.0806	0.4043	0.1109	0.2298	0.3245	0.2921	0.4767	0.0460	0.1556	9.4778		
	0.6949	0.4584	0.0203	0.0203	0.5394	0.2227	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	
	0.6500	0.5716	0.0206	0.0206	0.4031	0.0655	0.0158	0.0158	0.0158	0.0158	0.0158	0.0158	0.0158	0.0158	0.0158	0.0158	0.0158	0.0158	0.0158	0.0158	0.0158	0.0158	
0.6996	0.6468	0.0316	0.0316	0.2897	0.1862	0.0206	0.0206	0.0206	0.0206	0.0206	0.0206	0.0206	0.0206	0.0206	0.0206	0.0206	0.0206	0.0206	0.0206	0.0206	0.0206		
0.6114	0.7099	0.0338	0.0338	0.2926	0.1680	0.1992	0.0222	0.0225	0.0156	0.0000	0.0000	1.1325	0.0204	0.3123	0.1470	0.0782	0.3685	0.0385	0.1029	0.4267	0.5267		
0.6665	0.6794	0.0373	0.0373	0.2623	0.1828	0.1119	0.0194	0.0262	0.0173	0.0000	0.0000	1.3213	0.0211	0.3879	0.1356	0.0728	0.3925	0.0333	0.0338	0.4816	0.4816		
0.6358	0.7177	0.0351	0.0351	0.2429	0.1646	0.1699	0.0376	0.0207	0.0244	0.0154	0.0000	1.5308	0.0208	0.3767	0.1386	0.0776	0.3982	0.0326	0.0225	0.4748	0.4748		
0.6628	0.7026	0.0402	0.0393	0.2627	0.2201	0.1192	0.0192	0.0266	0.0000	0.0000	0.0000	1.7206	0.0210	0.2484	0.1225	0.0786	0.4801	0.0331	0.0956	0.5042	0.5042		
0.6911	0.6376	0.0394	0.0201	0.2176	0.1774	0.1029	0.0166	0.0136	0.0247	0.0000	0.0000	1.1325	0.0210	0.2484	0.1225	0.0786	0.4801	0.0331	0.0956	0.5042	0.5042		
0.7363	0.6882	0.0314	0.0289	0.2167	0.2276	0.1224	0.0224	0.0209	0.0217	0.0000	0.0000	1.5308	0.0211	0.2388	0.1398	0.0859	0.3043	0.0371	0.0867	0.4116	0.4116		
0.6750	0.7095	0.0474	0.0192	0.2640	0.2511	0.1196	0.0216	0.0234	0.0238	0.0000	0.0000	1.3213	0.0210	0.2484	0.1225	0.0786	0.4801	0.0331	0.0956	0.5042	0.5042		
0.6278	0.6018	0.0348	0.0256	0.2681	0.2161	0.1169	0.0244	0.0243	0.0233	0.0000	0.0000	1.3213	0.0210	0.2484	0.1225	0.0786	0.4801	0.0331	0.0956	0.5042	0.5042		
0.6262	0.6212	0.0351	0.0278	0.2688	0.2031	0.1169	0.0244	0.0243	0.0233	0.0000	0.0000	1.3213	0.0210	0.2484	0.1225	0.0786	0.4801	0.0331	0.0956	0.5042	0.5042		
0.6735	0.6996	0.0473	0.0168	0.2639	0.2471	0.1295	0.0289	0.0248	0.0333	0.0000	0.0000	1.7206	0.0246	0.2781	0.1652	0.0880	0.4662	0.0255	0.1297	0.5262	0.5262		
0.6070	0.6833	0.0460	0.0217	0.2678	0.2488	0.1174	0.0234	0.0243	0.0239	0.0000	0.0000	1.6936	0.0246	0.2782	0.1652	0.0882	0.4831	0.0211	0.1116	0.6029	0.6029		

**Amino acids consumption during fermentation**

Mean	N <sub>10</sub>	N <sub>14</sub>	N <sub>1</sub>	EF
Ala	1.22	4.41	10.89	0.58
Arg	9.66	18.53	37.05	0.50
Asp	1.24	1.64	1.77	1.75
Asn	0.06	0.07	0.17	0.28
Cys	21.91	29.27	39.11	0.25
Gln	2.28	3.78	5.25	5.25
Glu	n.d.	n.d.	1.59	1.43
Gly	n.d.	n.d.	1.22	1.82
His	0.99	1.82	1.82	0.00
Ile	1.28	1.60	1.63	1.63
Leu	2.10	2.37	2.42	2.41
Lys	1.85	1.85	1.85	0.00
Met	1.22	1.23	1.22	1.22
NH <sub>4</sub>	34.9	55.5	56.6	56.6
Pro	1.16	1.44	1.50	1.49
Ser	2.77	3.98	4.68	4.68
Thr	1.16	1.44	1.50	1.49
Trp	0.16	0.28	0.64	0.64
Tyr	1.12	1.84	2.50	2.50
Val	1.22	1.23	1.22	1.22
NaN	87.26	134.37	175.64	175.51

SEM	N <sub>10</sub>	N <sub>14</sub>	N <sub>1</sub>	EF
Ala	0.14	0.31	0.00	0.02
Arg	0.31	0.60	0.00	0.00
Asp	0.03	0.02	0.00	0.00
Asn	0.01	0.01	0.01	0.01
Cys	0.05	0.09	0.01	0.00
Gln	0.13	0.14	0.00	0.00
Glu	n.d.	n.d.	0.00	0.02
Gly	n.d.	n.d.	0.00	0.07
His	0.07	0.07	0.00	0.00
Ile	0.04	0.01	0.00	0.00
Leu	0.02	0.02	0.01	0.01
Lys	0.07	0.05	0.00	0.00
Met	0.00	0.00	0.01	0.00
NH <sub>4</sub>	1.0	0.6	0.0	0.0
Pro	0.03	0.02	0.00	0.00
Ser	0.07	0.08	0.00	0.00
Thr	0.03	0.04	0.00	0.00
Trp	0.01	0.01	0.00	0.00
Tyr	0.02	0.02	0.00	0.00
Val	0.07	0.05	0.00	0.00
NaN	3.01	3.42	0.04	0.08

\*Calculated by multiplying the millimolar concentration of a proteogenic amino acid by the number of nitrogen atoms that are provided through the catabolism of this molecule and by the atomic mass of nitrogen (14).

Mean	N <sub>10</sub>	N <sub>14</sub>	N <sub>1</sub>	EF
Ala	7.8	28.2	66.7	66.4
Arg	40.0	76.8	151.5	151.5
Asp	11.8	15.6	16.6	16.6
Cys	0.5	0.6	1.5	2.4
Gln	14.2	15.29	20.91	20.91
Glu	24.0	39.7	53.1	53.1
Gly	n.d.	n.d.	8.5	7.7
His	11.0	14.6	14.6	14.6
Ile	12.0	15.0	15.3	15.3
Leu	20.7	29.8	35.1	35.1
Lys	7.0	7.1	7.1	7.1
Met	13.0	13.0	13.0	13.0
NH <sub>4</sub>	34.9	55.5	56.6	56.6
Pro	11.7	17.0	17.0	17.0
Ser	20.7	29.8	35.1	35.1
Thr	26.1	32.6	35.5	35.5
Trp	11.7	26.7	90.6	90.7
Tyr	2.0	3.6	8.2	8.2
Val	9.4	16.2	20.9	20.9

SEM	N <sub>10</sub>	N <sub>14</sub>	N <sub>1</sub>	EF
Ala	0.9	2.0	0.0	0.1
Arg	3.7	5.8	0.0	0.0
Asp	0.3	0.2	0.0	0.0
Cys	0.1	0.1	0.1	0.1
Gln	1.3	2.5	0.0	0.0
Glu	1.4	1.5	0.0	0.0
Gly	0.2	0.1	0.0	0.0
His	0.2	0.0	0.0	0.0
Ile	0.0	0.0	0.0	0.0
Leu	0.0	0.0	0.0	0.0
Lys	0.0	0.0	0.0	0.0
Met	0.0	0.0	0.1	0.0
NH <sub>4</sub>	1.0	0.6	0.0	0.0
Pro	0.3	0.3	0.0	0.2
Ser	0.6	0.6	0.0	0.0
Thr	0.4	0.3	0.0	0.0
Trp	0.3	2.5	0.0	0.0
Tyr	0.0	0.3	0.0	0.0
Val	0.5	0.4	0.0	0.0

Mean	N <sub>10</sub>	N <sub>14</sub>	N <sub>1</sub>	EF
Ala	0.087	0.317	0.749	0.746
Arg	0			

**Dataset S2: Raw data : amino acids in biomass hydrolysate (mM)**

**Raw data : biomass production (g.L<sup>-1</sup>) and proteins content (g proteins/g DW)**

Means, standard deviations and standard errors of the mean were calculated from 8 independent experiments.

		nmol.mL <sup>-1</sup>																					
		Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Trp	Thr	Tyr	Val		
N <sub>1/2</sub>	N <sub>1/2</sub>	235.9	79.7	152.8	49.2	60.4	151.8	53.1	188.3	42.6	81.5	188.2	35.8	33.4	78.4	203.1	161.2	125.0	15.6	47.8	119.0	Total (mg.L <sup>-1</sup> )	259.2
	N <sub>1/4</sub>	216.8	73.2	140.4	45.2	55.5	139.5	48.8	173.1	39.1	74.9	173.0	32.9	30.7	72.0	186.6	148.2	114.9	14.3	43.9	109.4	Dry weight	0.8890
	N <sub>1</sub>	221.3	77.4	134.4	43.3	63.2	155.7	54.4	168.2	35.9	82.4	156.5	32.1	53.0	71.5	239.5	137.6	114.0	15.5	56.5	78.2	Proteins	0.8993
	EF	252.5	85.9	158.3	51.0	41.2	175.5	61.3	208.8	48.7	84.9	211.2	40.4	21.9	86.9	209.0	177.0	138.7	15.9	46.6	118.8		0.7735
		189.9	65.8	132.5	42.7	60.7	104.4	36.5	152.2	33.7	67.3	162.2	29.0	24.4	67.4	153.8	137.4	107.5	13.4	38.4	130.1		0.7933
		260.5	93.8	182.3	58.7	93.2	130.1	45.5	209.4	47.3	91.8	223.8	41.2	51.1	91.3	213.1	190.5	145.7	18.2	50.9	190.1		0.8527
		235.9	69.4	169.0	54.5	59.7	184.1	64.3	180.2	42.3	76.9	164.9	31.6	26.9	67.8	182.3	153.4	108.1	14.5	43.3	75.8		0.8033
		198.3	67.1	107.2	34.5	33.5	122.6	42.8	165.1	37.3	66.2	166.3	31.8	18.0	66.6	169.8	134.0	106.3	12.4	38.7	96.8		0.8333
N <sub>1/4</sub>	N <sub>1/4</sub>	295.8	98.2	169.5	54.6	89.0	157.1	54.9	237.5	52.6	99.6	258.3	43.4	46.7	98.8	246.9	213.3	158.3	20.4	62.6	135.9		3.1815
	N <sub>1/4</sub>	358.1	118.8	205.3	66.1	107.8	190.2	66.5	287.6	63.7	120.6	312.7	52.6	56.5	119.6	298.9	258.2	191.7	24.7	75.8	164.5		1.4941
	N <sub>1</sub>	316.8	109.3	150.9	48.6	101.6	196.4	68.6	252.5	54.3	121.6	274.0	44.7	67.6	111.8	264.4	212.4	179.2	23.1	83.7	104.9		1.3744
	EF	295.7	92.0	126.2	40.7	61.5	128.0	44.7	247.5	52.0	97.0	265.8	47.7	30.3	95.8	265.2	208.4	153.4	18.4	56.9	138.1		1.3719
		318.4	108.3	194.8	62.8	104.4	146.5	51.2	254.6	55.9	107.0	283.4	50.3	69.7	106.8	259.4	233.1	171.1	22.1	54.3	199.8		1.3732
		330.2	109.6	205.3	66.2	162.1	155.8	54.5	263.9	58.4	106.5	297.9	50.3	48.4	109.4	277.2	244.0	175.4	22.8	71.8	186.6		1.2936
		295.4	96.7	191.8	61.8	79.0	188.5	65.9	231.6	52.7	101.2	235.3	41.5	54.7	94.0	234.5	212.5	150.6	21.8	61.4	101.6		1.3894
		348.2	117.6	230.7	74.3	71.1	197.6	69.1	278.5	65.8	107.5	308.6	44.1	30.4	119.6	287.3	265.4	191.6	23.2	76.1	148.8		1.4068
N <sub>1</sub>	N <sub>1</sub>	1039.4	342.8	721.6	232.5	237.2	659.7	230.6	815.3	174.2	364.1	832.8	145.6	161.3	371.2	837.8	785.3	585.1	66.9	223.7	521.9		1153.3
	N <sub>1/4</sub>	922.5	304.3	640.4	206.3	210.5	585.5	204.7	723.6	154.6	323.1	739.2	129.3	143.1	329.4	743.6	697.0	519.3	59.4	198.5	463.2		1.1484
	N <sub>1</sub>	961.7	318.6	508.4	163.8	242.1	680.2	237.8	761.5	162.4	342.0	762.1	133.7	239.2	328.3	774.8	688.2	517.5	59.6	264.4	306.0		1.4603
	EF	1023.9	339.5	642.3	206.9	144.6	635.8	222.2	823.2	166.9	365.0	863.5	144.2	118.5	398.2	895.3	763.6	627.7	63.6	231.5	486.6		1.0249
		996.5	324.6	756.5	243.7	285.7	490.6	171.5	771.2	161.7	314.7	804.4	141.1	116.5	350.6	791.2	785.0	552.7	64.0	199.4	651.4		1.0995
		1136.2	365.7	783.7	252.5	195.5	486.9	163.9	867.4	184.5	362.1	915.2	160.6	78.0	370.4	887.1	889.4	583.8	72.1	198.4	836.3		1.1893
		1060.7	339.5	865.4	278.8	430.2	901.0	314.9	845.3	180.8	437.0	779.2	142.7	286.8	357.0	804.7	810.6	562.8	77.7	221.9	390.9		1.2554
		878.1	306.0	654.5	214.1	109.2	658.9	230.3	682.8	157.6	305.8	720.2	125.6	105.5	350.0	720.7	647.0	551.7	54.3	181.5	389.5		999.6
EF	N <sub>1/2</sub>	972.5	338.7	718.6	231.5	369.1	515.3	180.1	821.8	179.3	345.8	810.6	148.5	114.1	354.7	890.8	800.9	587.7	66.9	213.7	686.8		1145.6
	N <sub>1/4</sub>	998.7	347.9	738.0	237.8	379.1	529.2	185.0	844.0	184.1	355.1	832.5	152.6	117.2	364.3	914.8	822.5	603.6	68.7	219.4	705.3		1176.6
	N <sub>1</sub>	884.3	381.8	816.1	263.0	329.6	565.3	197.6	893.5	197.3	378.5	889.0	161.5	115.4	388.3	1123.1	906.7	643.3	74.7	266.5	722.9		1257.7
	EF	1040.4	340.1	715.1	230.4	302.5	539.6	188.6	796.2	190.9	369.1	825.5	152.1	124.6	403.2	807.6	772.6	668.0	63.9	204.7	787.1		1169.5
		1219.2	403.3	868.3	279.8	465.6	546.6	191.1	956.6	213.8	424.8	960.1	178.9	118.9	397.0	927.7	934.0	657.8	79.9	275.9	972.9		1358.5
		1078.6	346.4	745.4	240.2	668.9	484.8	169.4	850.2	177.5	375.7	845.8	152.8	109.8	347.1	838.3	838.0	575.1	71.5	176.0	751.9		1198.5
		952.5	371.6	834.4	268.8	394.8	526.2	183.9	932.6	199.6	365.2	891.3	164.6	120.0	389.2	930.2	644.8	608.8	237.1	175.1	757.1		1275.7
		1192.0	377.6	734.7	236.7	272.9	707.6	247.3	958.3	195.6	352.0	900.5	163.8	118.4	395.5	983.6	870.4	655.2	68.0	245.1	516.7		1248.1
Means from 8 replicates																							
		Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Trp	Thr	Tyr	Val		
N <sub>1/2</sub>	N <sub>1/2</sub>	226	77	147	47	58	145	51	181	41	78	181	34	32	75	195	155	120	15	46	115	N <sub>1/2</sub>	0.8336
N <sub>1/4</sub>	N <sub>1/4</sub>	320	106	184	59	97	170	59	257	57	108	279	47	51	107	267	231	171	22	68	148	N <sub>1/4</sub>	1.3869
N <sub>1</sub>	N <sub>1</sub>	1002	330	698	225	232	635	222	786	168	352	802	140	156	357	807	758	563	65	215	506	N <sub>1</sub>	3.3610
EF	EF	1042	363	771	249	395	552	193	882	192	371	869	150	128	380	956	859	629	72	230	738	EF	3.3937
Standard deviations																							
		Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Trp	Thr	Tyr	Val		
N <sub>1/2</sub>	N <sub>1/2</sub>	24.7	9.7	23.6	7.6	17.6	26.8	9.4	20.5	5.3	8.7	24.5	4.4	13.0	9.4	27.1	20.3	15.0	1.8	6.1	36.2	N <sub>1/2</sub>	0.0447
N <sub>1/4</sub>	N <sub>1/4</sub>	24.3	9.8	33.6	10.8	31.1	26.4	9.2	19.2	5.3	9.1	26.5	3.9	14.9	10.1	20.9	22.7	16.1	1.9	10.5	35.3	N <sub>1/4</sub>	0.0550
N <sub>1</sub>	N <sub>1</sub>	81.7	20.8	108.8	35.0	97.7	133.6	46.7	62.9	10.9	41.6	65.8	11.0	17.5	23.2	63.2	77.9	36.5	7.5	26.1	168.8	N <sub>1</sub>	0.1043
EF	EF	116.4	23.5	59.1	19.0	123.2	67.2	23.5	62.7	12.0	24.7	49.8	10.0	16.4	21.3	127.8	60.6	35.2	6.2	33.0	125.9	EF	0.1020
Standard errors of the mean																							
		Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Trp	Thr	Tyr	Val		
N <sub>1/2</sub>	N <sub>1/2</sub>	8.7	3.4	8.3	2.7	6.2	9.5	3.3	7.2	1.9	3.1	8.7	1.6	4.6	3.3	9.6	7.2	5.3	0.6	2.2	12.8	N <sub>1/2</sub>	0.0158
N <sub>1/4</sub>	N <sub>1/4</sub>	8.6	3.5	11.9	3.8	11.0	9.3	3.3	6.8	1.9	3.2	9.4	1.4	5.3	3.6	7.4	8.0	5.7	0.7	3.7	12.5	N <sub>1/4</sub>	0.0195
N <sub>1</sub>	N <sub>1</sub>	28.9	7.3	38.5	12.4	34.5	47.2	16.5	22.3	3.9	14.7	23.3	3.9	25.3	8.2	22.3	27.5	12.9	2.6	9.2	59.7	N <sub>1</sub>	0.0369
EF	EF	41.1	8.3	20.9	6.7	43.6	23.8	8.3	22.2	4.2	8.7	17.6	3.5	5.8	7.5	45.2	21.4	12.5	2.2	11.7	44.5	EF	0.0361
Molecular weight																							
		Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Trp	Thr	Tyr	Val		
		89	174	133	132	121	147	146	75	155	131	131	146	149	165	115	105	119	204	181	117		

**Raw data : % amino acids in proteins**

The mass percentage of each amino acid in proteins was calculated dividing its amount in mg.L<sup>-1</sup> in the hydrolysate by the total amount of amino acids (sum in mg.L<sup>-1</sup>). Means, standard deviations and standard errors of the mean were calculated from 8 independent experiments.

		Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Trp	Thr	Tyr	Val		
N <sub>1/2</sub>	N <sub>1/2</sub>	0.0810	0.0535	0.0784	0.0251	0.0282	0.0861	0.0299	0.0545	0.0255	0.0412	0.0951	0.0202	0.0192	0.0499	0.0901	0.0653	0.0574	0.0123	0.0334	0.0537	Total (%)	100
	N <sub>1/4</sub>	0.0812	0.0535	0.0784	0.0251	0.0282	0.0861	0.0299	0.0545	0.0255	0.0412	0.0951	0.0202	0.0192	0.0499	0.0901	0.0653	0.0574	0.0123	0.0334	0.0537	Dry weight	0.8336
	N <sub>1</sub>	0.0797	0.0545	0.0723	0.0231	0.0309	0.0926	0.0321															

**Dataset S3: Proteinogenic amino acids (mg.L<sup>-1</sup>)**

For each amino acid, the proteinogenic concentration (mg.L<sup>-1</sup>) was calculated by multiplying the % of this amino acid in proteins (mg aa.g proteins<sup>-1</sup>) by the proteins fraction in biomass (g proteins.g DW<sup>-1</sup>) and the dry weight content (biomass production) in the medium (g DW.L<sup>-1</sup>). Means, standard deviations and standard errors of the mean were calculated from 8 independent experiments.

	Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Trp	Thr	Tyr	Val
<b>N<sub>1/2</sub></b>	36.1	23.9	34.9	11.2	12.6	38.4	13.3	24.3	11.4	18.4	42.4	9.0	8.6	22.3	40.2	29.1	25.6	5.5	14.9	23.9
	37.1	24.5	35.9	11.5	12.9	39.4	13.7	24.9	11.7	18.9	43.5	9.2	8.8	22.8	41.2	29.9	26.3	5.6	15.3	24.6
	30.0	20.5	27.2	8.7	11.7	34.9	12.1	19.2	8.5	16.5	31.3	7.1	12.0	18.0	42.0	22.0	20.7	4.8	15.6	13.9
	33.1	22.0	31.0	9.9	7.3	38.0	13.2	23.1	11.1	16.4	40.8	8.7	4.8	21.2	35.4	27.4	24.3	4.8	12.4	20.5
	35.0	23.7	36.5	11.7	15.2	31.8	11.0	23.7	10.8	18.3	44.0	8.8	7.5	23.1	36.7	29.9	26.5	5.7	14.4	31.5
	29.6	20.9	31.0	9.9	14.4	24.4	8.5	20.1	9.4	15.4	37.3	7.7	9.7	19.3	31.3	25.6	22.2	4.7	11.8	28.4
	34.8	20.0	37.3	11.9	12.0	44.9	15.6	22.4	10.9	16.7	35.9	7.7	6.6	18.6	34.8	26.7	21.3	4.9	13.0	14.7
	36.2	23.9	29.2	9.3	8.3	36.9	12.8	25.4	11.9	17.8	44.6	9.5	5.5	22.5	40.0	28.8	25.9	5.2	14.4	23.2
<b>N<sub>3/4</sub></b>	57.9	37.6	49.6	15.9	23.7	50.8	17.6	39.2	17.9	28.7	74.5	13.9	15.3	35.9	62.5	49.3	41.5	9.1	24.9	35.0
	60.9	39.5	52.2	16.7	24.9	53.4	18.6	41.2	18.9	30.2	78.3	14.7	16.1	37.7	65.7	51.8	43.6	9.6	26.2	36.8
	54.5	36.7	38.8	12.4	23.8	55.8	19.4	36.6	16.3	30.8	69.4	12.6	19.5	35.7	58.8	43.1	41.2	9.1	29.3	23.7
	61.1	37.1	38.9	12.5	17.3	43.7	15.2	43.1	18.7	29.5	80.8	16.2	10.5	36.7	70.8	50.8	42.4	8.7	23.9	37.5
	53.2	35.4	48.7	15.6	23.7	40.4	14.0	35.9	16.3	26.3	69.7	13.8	19.5	33.1	56.0	46.0	38.2	8.5	18.4	43.9
	48.6	31.5	45.1	14.4	32.4	37.8	13.1	32.7	15.0	23.1	64.5	12.1	11.9	29.8	52.7	42.3	34.5	7.7	21.5	36.1
	60.0	38.4	58.2	18.6	21.8	63.2	21.9	39.6	18.6	30.2	70.3	13.8	18.6	35.4	61.5	50.9	40.9	10.2	25.4	27.1
	61.2	40.4	60.6	19.4	17.0	57.3	19.9	41.2	20.1	27.8	79.8	12.7	8.9	38.9	65.2	55.0	45.0	9.3	27.2	34.4
<b>N<sub>T</sub></b>	87.5	56.5	90.8	29.0	27.2	91.8	31.9	57.9	25.6	45.1	103.3	20.1	22.7	58.0	91.2	78.0	65.9	12.9	38.3	57.8
	96.4	62.2	100.0	32.0	29.9	101.1	35.1	63.7	28.1	49.7	113.7	22.2	25.0	63.8	100.4	85.9	72.6	14.2	42.2	63.6
	95.9	62.1	75.8	24.2	32.8	112.1	38.9	64.0	28.2	50.2	111.9	21.9	39.9	60.7	99.9	81.0	69.0	13.6	53.6	40.1
	98.4	63.8	92.2	29.5	18.9	100.9	35.0	66.6	27.9	51.6	122.1	22.7	19.1	70.9	111.1	86.5	80.6	14.0	45.2	61.5
	93.9	59.8	106.5	34.1	36.6	76.3	26.5	61.2	26.5	43.6	111.5	18.8	18.4	61.2	96.3	87.3	69.6	13.8	38.2	80.7
	103.4	65.1	106.6	34.1	24.2	70.5	24.5	66.5	29.2	48.5	122.6	24.0	11.9	62.5	104.3	95.5	71.0	15.0	36.7	100.0
	90.0	56.3	109.7	35.1	49.6	126.3	43.8	60.4	26.7	54.6	97.3	19.9	40.7	56.2	88.2	81.1	63.9	15.1	38.3	43.6
	92.2	62.8	104.3	33.3	15.6	114.3	39.7	60.4	28.8	47.3	111.3	21.6	18.5	68.1	97.8	80.1	77.5	13.1	38.7	53.8
<b>Means from 8 replicates</b>																				
	Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Trp	Thr	Tyr	Val
N <sub>1/2</sub>	34.0	22.4	32.9	10.5	11.8	36.1	12.5	22.9	10.7	17.3	40.0	8.5	7.9	21.0	37.7	27.4	24.1	5.2	14.0	22.6
N <sub>3/4</sub>	57.2	37.1	49.0	15.7	23.1	50.3	17.5	38.7	17.7	28.3	73.4	13.7	15.0	35.4	61.6	48.6	40.9	9.0	24.6	34.3
N <sub>T</sub>	94.7	61.1	98.2	31.4	29.3	99.1	34.4	62.6	27.6	48.8	111.7	21.8	24.5	62.7	98.7	84.4	71.3	14.0	41.4	62.6
EF	89.5	61.1	99.1	31.7	46.2	78.3	27.2	63.8	28.8	47.0	110.0	22.5	17.6	60.7	106.3	87.1	72.5	14.1	40.1	83.5
<b>Standard deviations</b>																				
	Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Trp	Thr	Tyr	Val
N <sub>1/2</sub>	2.8	1.8	3.7	1.2	2.7	6.0	2.1	2.2	1.2	1.2	4.7	0.9	2.3	2.1	3.7	2.7	2.4	0.4	1.4	6.1
N <sub>3/4</sub>	4.6	2.7	8.0	2.6	4.8	8.9	3.1	3.4	1.7	2.6	5.8	1.3	4.2	2.8	5.8	4.4	3.3	0.8	3.4	6.3
N <sub>T</sub>	5.0	3.3	11.4	3.6	10.7	19.0	6.6	3.1	1.3	3.5	8.5	1.3	10.5	4.9	7.2	5.6	5.6	0.8	5.7	19.6
EF	8.0	2.9	7.0	2.3	13.8	8.3	2.9	3.1	1.9	3.2	5.1	1.2	1.9	5.4	14.3	5.2	6.4	1.1	4.5	13.8
<b>Standard errors of the mean</b>																				
	Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Trp	Thr	Tyr	Val
N <sub>1/2</sub>	1.0	0.6	1.3	0.4	1.0	2.1	0.7	0.8	0.4	0.4	1.7	0.3	0.8	0.7	1.3	0.9	0.8	0.1	0.5	2.2
N <sub>3/4</sub>	1.6	1.0	2.8	0.9	1.7	3.1	1.1	1.2	0.6	0.9	2.1	0.5	1.5	1.0	2.0	1.6	1.2	0.3	1.2	2.2
N <sub>T</sub>	1.8	1.2	4.0	1.3	3.8	6.7	2.3	1.1	0.4	1.2	3.0	0.5	3.7	1.7	2.5	2.0	2.0	0.3	2.0	6.9
EF	2.8	1.0	2.5	0.8	4.9	2.9	1.0	1.1	0.7	1.1	1.8	0.4	0.7	1.9	5.1	1.8	2.3	0.4	1.6	4.9
<b>Molecular weight</b>																				
	Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Trp	Thr	Tyr	Val
	89	174	133	132	121	147	146	75	155	131	146	149	165	115	105	119	204	181	117	
<b>Nitrogen atoms required for the synthesis of 1 mole of amino acid</b>																				
	Ala	Arg	Asp	Asn	Cys	Glu	Gln	Gly	His	Ile	Leu	Lys	Met	Phe	Pro	Ser	Trp	Thr	Tyr	Val
	1	4	1	2	1	1	2	1	3	1	1	2	1	1	1	1	2	1	1	1

**Amino acids content in biomass throughout fermentation**

		N <sub>1/2</sub>	N <sub>3/4</sub>	N <sub>T</sub>	EF
<b>Mean</b>	Ala	34.0	57.2	94.7	89.5
	Arg	22.4	37.1	61.1	61.1
	Asp	32.9	49.0	98.2	99.1
	Asn	10.5	15.7	31.4	31.7
	Cys	11.8	23.1	29.3	46.2
	Glu	36.1	50.3	99.1	78.3
	Gln	12.5	17.5	34.4	27.2
	Gly	22.9	38.7	62.6	63.8
	His	10.7	17.7	27.6	28.8
	Ile	17.3	28.3	48.8	47.0
	Leu	40.0	73.4	111.7	110.0
	Lys	8.5	13.7	21.8	22.5
	Met	7.9	15.0	24.5	17.6
	Phe	21.0	35.4	62.7	60.7
	Pro	37.7	61.6	98.7	106.3
	Ser	27.4	48.6	84.4	87.1
Trp	24.1	40.9	71.3	72.5	
Thr	5.2	9.0	14.0	14.1	
Tyr	14.0	24.6	41.4	40.1	
Val	22.6	34.3	62.6	83.5	
<b>SEM</b>	Ala	1.00	1.64	1.76	2.81
	Arg	0.63	0.97	1.15	1.02
	Asp	1.32	2.83	4.02	2.49
	Asn	0.42	0.91	1.29	0.80
	Cys	0.97	1.71	3.80	4.88
	Glu	2.13	3.14	6.73	2.92
	Gln	1.74	1.09	2.34	1.01
	Gly	0.78	1.21	1.11	1.10
	His	0.41	0.61	0.44	0.68
	Ile	0.43	0.91	1.24	1.12
	Leu	1.68	2.07	3.01	1.81
	Lys	0.30	0.46	0.47	0.41
	Met	0.83	1.47	3.70	0.68
	Phe	0.73	1.00	1.74	1.89
	Pro	1.32	2.04	2.55	5.06
	Ser	0.95	1.57	1.98	1.84
Trp	0.84	1.16	1.98	2.26	
Thr	0.14	0.27	0.29	0.40	
Tyr	0.49	1.19	2.00	1.60	
Val	2.16	2.22	6.94	4.89	
<b>Mean</b>	Ala	0.38	0.64	1.06	1.01
	Arg	0.13	0.21	0.35	0.35
	Asp	0.25	0.37	0.74	0.75
	Asn	0.08	0.12	0.24	0.24
	Cys	0.10	0.19	0.24	0.38
	Glu	0.25	0.34	0.67	0.53
	Gln	0.09	0.12	0.24	0.19
	Gly	0.31	0.52	0.83	0.85
	His	0.07	0.11	0.18	0.19
	Ile	0.13	0.22	0.37	0.36
	Leu	0.31	0.56	0.85	0.84
	Lys	0.06	0.09	0.15	0.15
	Met	0.05	0.10	0.16	0.12
	Phe	0.13	0.21	0.38	0.37
	Pro	0.33	0.54	0.86	0.92
	Ser	0.26	0.46	0.80	0.83
Trp	0.20	0.34	0.60	0.61	
Thr	0.03	0.04	0.07	0.07	
Tyr	0.08	0.14	0.23	0.22	
Val	0.19	0.29	0.54	0.71	
<b>SEM</b>	Ala	0.011	0.018	0.020	0.032
	Arg	0.004	0.006	0.007	0.006
	Asp	0.010	0.021	0.030	0.019
	Asn	0.003	0.007	0.010	0.006
	Cys	0.008	0.014	0.031	0.040
	Glu	0.014	0.021	0.046	0.020
	Gln	0.005	0.007	0.016	0.007
	Gly	0.010	0.016	0.015	0.015
	His	0.003	0.004	0.003	0.004
	Ile	0.003	0.007	0.009	0.009

**Dataset S4**

**Raw data: Volatile compounds (mg.L<sup>-1</sup>)**

Means, standard deviations and standard errors of the mean were calculated from 8 independent experiments.

	Isobutanol	Isoamyl alcohol	Propanol
<b>N<sub>1/2</sub></b>	5,4	19,1	4,3
	5,2	18,6	4,6
	4,9	17,2	4,9
	5,5	14,1	5,0
	5,3	18,2	4,6
	5,5	15,7	5,1
	5,7	18,1	5,2
	5,1	15,9	5,4
<b>N<sub>3/4</sub></b>	10,9	49,8	19,2
	11,3	43,1	22,1
	10,2	43,1	20,2
	11,0	42,1	17,2
	10,1	46,1	16,2
	9,9	47,3	17,2
	10,9	47,0	20,2
	10,8	48,0	19,7
<b>N<sub>T</sub></b>	67,2	135,6	20,0
	62,2	136,2	23,1
	61,2	133,6	23,9
	68,3	142,1	19,2
	61,1	141,3	20,0
	69,6	140,0	20,0
	60,9	139,5	19,1
	61,3	142,2	20,6
<b>EF</b>	116,2	195,1	20,3
	112,2	198,2	21,5
	102,2	207,2	19,5
	102,1	204,2	19,5
	104,1	205,1	22,5
	110,2	201,1	21,2
	109,3	205,6	19,5
	111,1	207,8	19,0

**Means from 8 replicates**

	Isobutanol	Isoamyl alcohol	Propanol
N <sub>1/2</sub>	5,3	17,1	4,9
N <sub>3/4</sub>	10,6	45,8	19,0
N <sub>T</sub>	63,9	138,8	20,7
EF	108,4	203,0	20,4

**Standard deviations**

	Isobutanol	Isoamyl alcohol	Propanol
N <sub>1/2</sub>	0,2	1,7	0,4
N <sub>3/4</sub>	0,5	2,7	2,0
N <sub>T</sub>	3,7	3,2	1,8
EF	5,1	4,5	1,3

**Standard errors of the mean**

	Isobutanol	Isoamyl alcohol	Propanol
N <sub>1/2</sub>	0,1	0,6	0,1
N <sub>3/4</sub>	0,2	1,0	0,7
N <sub>T</sub>	1,3	1,1	0,6
EF	1,8	1,6	0,4

**Molecular weight**

	Isobutanol	Isoamyl alcohol	Propanol
	74	88	60

**Raw data: Volatile compounds (μM)**

	Isobutanol	Isoamyl alcohol	Propanol
<b>N<sub>1/2</sub></b>	73	217	71
	70	211	77
	67	195	82
	75	160	84
	72	206	76
	74	178	85
	77	206	86
	70	181	89
<b>N<sub>3/4</sub></b>	147	565	319
	153	490	369
	137	490	336
	148	479	286
	136	524	269
	133	538	286
	147	534	336
	146	545	328
<b>N<sub>T</sub></b>	908	1541	333
	840	1547	386
	827	1519	398
	923	1615	319
	825	1605	334
	940	1590	333
	823	1585	318
	828	1615	343
<b>EF</b>	1571	2217	338
	1516	2252	359
	1382	2354	325
	1380	2320	324
	1407	2331	375
	1490	2286	353
	1477	2337	326
	1502	2361	316

**Means from 8 replicates**

	Isobutanol	Isoamyl alcohol	Propanol
N <sub>1/2</sub>	72	194	81
N <sub>3/4</sub>	144	521	316
N <sub>T</sub>	864	1577	345
EF	1466	2307	339

**Standard deviations**

	Isobutanol	Isoamyl alcohol	Propanol
N <sub>1/2</sub>	3	20	6
N <sub>3/4</sub>	7	31	33
N <sub>T</sub>	50	37	30
EF	69	51	21

**Standard errors of the mean**

	Isobutanol	Isoamyl alcohol	Propanol
N <sub>1/2</sub>	1	7	2
N <sub>3/4</sub>	3	11	12
N <sub>T</sub>	18	13	11
EF	24	18	7

**Dataset S5: Raw data: Isotopic enrichment during <sup>15</sup>N-labeling experiments (2 independent experiments)**

Isotopic enrichments that correspond to the labeled fraction of an amino acid with respect to its total amount in proteins were assessed after correction for the natural labeling of raw data (intensities of ions clusters provided by GC-MS analyses) using the IsoCor software.

Raw data		Ala	Gly	Val	Asp	Phe	Leu	Ile	Thr	Ser	Pro	Lys	His	Glu	Arg
<sup>4-<sup>15</sup>N</sup> Arg	N <sub>1/2</sub>	2.0%	2.9%	2.2%	1.7%	1.9%	1.9%	0.2%	0.7%	2.3%	6.1%	1.8%	7.7%	1.0%	98.7%
	N <sub>3/4</sub>	2.0%	3.8%	2.2%	1.8%	2.2%	1.9%	0.2%	0.5%	0.7%	5.9%	1.8%	7.6%	1.0%	97.6%
	N <sub>1</sub>	3.1%	2.7%	2.6%	2.2%	2.2%	2.5%	1.0%	0.5%	0.2%	8.7%	1.8%	1.9%	21.6%	96.6%
	N <sub>3/4</sub>	3.4%	2.2%	2.6%	2.6%	2.5%	2.5%	0.4%	0.6%	1.2%	8.7%	2.1%	2.6%	21.5%	98.3%
	EF	14.9%	11.8%	14.2%	16.5%	19.4%	15.5%	14.4%	12.9%	15.0%	16.1%	6.6%	5.1%	16.4%	97.4%
<sup>2-<sup>15</sup>N</sup> Gln	N <sub>1/2</sub>	24.8%	23.3%	25.7%	31.8%	26.9%	22.7%	23.8%	15.1%	18.4%	21.9%	15.9%	12.5%	40.8%	n.d.
	N <sub>3/4</sub>	24.6%	23.5%	25.5%	32.1%	26.8%	22.4%	23.5%	16.1%	19.9%	22.7%	15.2%	11.2%	41.2%	n.d.
	N <sub>1</sub>	23.9%	23.4%	24.8%	31.3%	27.0%	23.1%	22.9%	17.2%	18.4%	17.4%	15.6%	8.2%	38.6%	n.d.
	N <sub>3/4</sub>	23.3%	23.3%	24.2%	30.6%	26.3%	22.5%	21.9%	18.3%	18.5%	17.1%	15.1%	9.6%	38.8%	n.d.
	EF	21.3%	24.2%	24.3%	28.7%	25.3%	24.0%	23.4%	22.7%	28.7%	8.4%	15.9%	19.0%	33.4%	n.d.
<sup>15</sup> N NH <sub>4</sub> <sup>+</sup>	N <sub>1/2</sub>	21.2%	23.4%	23.8%	28.8%	25.2%	24.2%	23.4%	22.1%	23.6%	8.5%	16.2%	16.0%	33.3%	n.d.
	N <sub>3/4</sub>	22.5%	23.3%	24.4%	29.3%	25.7%	24.4%	24.1%	22.3%	21.6%	7.8%	16.3%	14.9%	32.3%	n.d.
	N <sub>1</sub>	22.1%	23.4%	24.4%	29.4%	25.6%	24.4%	24.2%	22.0%	25.8%	7.8%	15.9%	15.6%	33.3%	n.d.
	N <sub>3/4</sub>	35.1%	31.1%	37.0%	47.9%	38.7%	30.7%	34.2%	16.6%	36.8%	31.6%	22.1%	16.7%	45.3%	n.d.
	EF	33.1%	31.4%	36.2%	47.6%	37.1%	29.5%	34.8%	18.7%	21.4%	30.8%	20.0%	19.0%	43.5%	n.d.
Means from 2 replicates															
Mean	N <sub>1/2</sub>	2.0%	3.3%	2.2%	1.7%	1.9%	1.9%	0.2%	0.6%	1.5%	6.0%	1.8%	7.6%	1.0%	98.2%
	N <sub>3/4</sub>	3.3%	2.4%	2.6%	2.4%	2.4%	2.5%	0.7%	0.5%	0.7%	8.7%	2.0%	2.2%	21.6%	97.4%
	N <sub>1</sub>	14.7%	10.9%	14.1%	16.5%	19.5%	15.6%	14.5%	12.6%	14.6%	16.4%	6.4%	4.2%	16.7%	98.1%
	N <sub>3/4</sub>	15.1%	16.2%	14.1%	16.4%	18.1%	15.3%	14.1%	13.2%	12.6%	16.4%	6.2%	3.3%	17.1%	97.0%
	EF	24.7%	23.4%	25.6%	32.0%	26.9%	22.5%	23.6%	15.6%	19.2%	22.3%	15.5%	11.9%	41.0%	n.d.
<sup>2-<sup>15</sup>N</sup> Gln	N <sub>1/2</sub>	23.6%	23.3%	24.5%	30.9%	26.7%	22.8%	22.4%	17.8%	18.4%	17.3%	15.4%	8.9%	38.7%	n.d.
	N <sub>3/4</sub>	21.3%	23.8%	24.1%	28.7%	25.3%	24.1%	23.4%	22.4%	26.2%	8.4%	16.1%	17.5%	33.4%	n.d.
	N <sub>1</sub>	22.3%	23.3%	24.4%	29.3%	25.6%	24.4%	24.2%	22.1%	23.7%	7.8%	16.1%	15.2%	32.8%	n.d.
	N <sub>3/4</sub>	34.1%	31.2%	36.6%	47.8%	37.9%	30.1%	34.5%	17.7%	29.1%	31.2%	21.1%	17.8%	44.4%	n.d.
	EF	33.5%	37.4%	37.6%	50.9%	41.5%	36.8%	32.7%	31.6%	39.3%	20.9%	24.3%	9.0%	46.2%	n.d.
<sup>15</sup> N NH <sub>4</sub> <sup>+</sup>	N <sub>1/2</sub>	25.3%	28.2%	27.7%	34.4%	28.9%	27.2%	27.7%	22.5%	25.7%	12.0%	19.9%	16.7%	30.6%	n.d.
	N <sub>3/4</sub>	25.6%	28.7%	27.8%	33.5%	27.1%	26.3%	25.7%	21.2%	23.7%	9.9%	17.6%	17.9%	29.9%	n.d.
	N <sub>1</sub>	25.6%	28.7%	27.8%	33.5%	27.1%	26.3%	25.7%	21.2%	23.7%	9.9%	17.6%	17.9%	29.9%	n.d.
	N <sub>3/4</sub>	35.1%	31.1%	37.0%	47.9%	38.7%	30.7%	34.2%	16.6%	36.8%	31.6%	22.1%	16.7%	45.3%	n.d.
	EF	33.1%	31.4%	36.2%	47.6%	37.1%	29.5%	34.8%	18.7%	21.4%	30.8%	20.0%	19.0%	43.5%	n.d.
Standard deviations															
SD	N <sub>1/2</sub>	0.051%	0.583%	0.004%	0.060%	0.207%	0.035%	0.049%	0.161%	1.103%	0.124%	0.032%	0.007%	0.005%	0.895%
	N <sub>3/4</sub>	0.212%	0.316%	0.011%	0.253%	0.200%	0.025%	0.371%	0.120%	0.734%	0.035%	0.205%	0.460%	0.072%	1.211%
	N <sub>1</sub>	0.244%	1.287%	0.064%	0.067%	0.157%	0.046%	0.138%	0.410%	0.643%	0.202%	0.247%	1.213%	0.412%	1.007%
	N <sub>3/4</sub>	0.394%	0.760%	0.042%	0.148%	0.507%	0.099%	0.184%	1.442%	1.893%	0.421%	0.163%	1.379%	0.663%	0.846%
	EF	0.123%	0.090%	0.192%	0.216%	0.113%	0.212%	0.276%	0.689%	1.029%	0.569%	0.481%	0.933%	0.302%	n.d.
<sup>2-<sup>15</sup>N</sup> Gln	N <sub>1/2</sub>	0.417%	0.077%	0.430%	0.491%	0.488%	0.403%	0.704%	0.785%	0.071%	0.240%	0.293%	0.933%	0.173%	n.d.
	N <sub>3/4</sub>	0.086%	0.523%	0.341%	0.088%	0.055%	0.156%	0.011%	0.463%	3.592%	0.081%	0.258%	2.132%	0.124%	n.d.
	N <sub>1</sub>	0.325%	0.101%	0.021%	0.067%	0.039%	0.018%	0.078%	0.237%	3.016%	0.011%	0.318%	0.507%	0.744%	n.d.
	N <sub>3/4</sub>	1.428%	0.202%	0.622%	0.205%	1.071%	0.861%	0.392%	1.485%	10.901%	0.525%	1.510%	1.591%	1.232%	n.d.
	EF	1.657%	0.456%	1.161%	1.299%	1.821%	1.442%	0.207%	0.859%	1.120%	0.527%	1.582%	0.820%	0.605%	n.d.
<sup>15</sup> N NH <sub>4</sub> <sup>+</sup>	N <sub>1/2</sub>	0.772%	0.043%	0.973%	0.123%	0.514%	0.555%	0.661%	1.144%	1.805%	1.342%	1.209%	0.148%	0.039%	n.d.
	N <sub>3/4</sub>	0.421%	0.048%	0.069%	0.334%	0.509%	0.573%	0.394%	0.474%	2.219%	0.481%	0.488%	1.167%	0.279%	n.d.
	N <sub>1</sub>	0.421%	0.048%	0.069%	0.334%	0.509%	0.573%	0.394%	0.474%	2.219%	0.481%	0.488%	1.167%	0.279%	n.d.
	N <sub>3/4</sub>	1.428%	0.202%	0.622%	0.205%	1.071%	0.861%	0.392%	1.485%	10.901%	0.525%	1.510%	1.591%	1.232%	n.d.
	EF	1.657%	0.456%	1.161%	1.299%	1.821%	1.442%	0.207%	0.859%	1.120%	0.527%	1.582%	0.820%	0.605%	n.d.
Standard errors of the mean															
SEM	N <sub>1/2</sub>	0.04%	0.41%	0.00%	0.04%	0.15%	0.03%	0.04%	0.11%	0.78%	0.09%	0.02%	0.01%	0.00%	0.57%
	N <sub>3/4</sub>	0.15%	0.22%	0.01%	0.18%	0.14%	0.02%	0.26%	0.09%	0.52%	0.03%	0.15%	0.33%	0.05%	0.86%
	N <sub>1</sub>	0.17%	0.91%	0.04%	0.05%	0.11%	0.03%	0.10%	0.29%	0.46%	0.14%	0.18%	0.86%	0.29%	0.71%
	N <sub>3/4</sub>	0.28%	0.54%	0.03%	0.11%	0.36%	0.07%	0.13%	1.02%	1.34%	0.30%	0.12%	0.97%	0.47%	0.60%
	EF	0.09%	0.06%	0.14%	0.15%	0.08%	0.15%	0.20%	0.49%	0.73%	0.40%	0.34%	0.66%	0.21%	n.d.
<sup>2-<sup>15</sup>N</sup> Gln	N <sub>1/2</sub>	0.29%	0.05%	0.30%	0.35%	0.35%	0.29%	0.50%	0.55%	0.05%	0.17%	0.21%	0.66%	0.12%	n.d.
	N <sub>3/4</sub>	0.06%	0.37%	0.24%	0.06%	0.04%	0.11%	0.01%	0.33%	2.54%	0.06%	0.18%	1.51%	0.09%	n.d.
	N <sub>1</sub>	0.23%	0.07%	0.01%	0.05%	0.03%	0.01%	0.06%	0.17%	2.13%	0.01%	0.23%	0.36%	0.53%	n.d.
	N <sub>3/4</sub>	1.01%	0.14%	0.44%	0.15%	0.76%	0.61%	0.28%	1.05%	7.71%	0.37%	1.07%	1.13%	0.87%	n.d.
	EF	1.17%	0.32%	0.82%	0.92%	1.29%	1.02%	0.15%	0.61%	0.79%	0.37%	1.12%	0.58%	0.43%	n.d.
<sup>15</sup> N NH <sub>4</sub> <sup>+</sup>	N <sub>1/2</sub>	0.55%	0.03%	0.69%	0.09%	0.36%	0.39%	0.47%	0.81%	1.28%	0.95%	0.86%	0.11%	0.03%	n.d.
	N <sub>3/4</sub>	0.30%	0.03%	0.05%	0.24%	0.36%	0.41%	0.28%	0.33%	1.57%	0.34%	0.35%	0.82%	0.20%	n.d.
	N <sub>1</sub>	0.30%	0.03%	0.05%	0.24%	0.36%	0.41%	0.28%	0.33%	1.57%	0.34%	0.35%	0.82%	0.20%	n.d.
	N <sub>3/4</sub>	1.01%	0.14%	0.44%	0.15%	0.76%	0.61%	0.28%	1.05%	7.71%	0.37%	1.07%	1.13%	0.87%	n.d.
	EF	1.17%	0.32%	0.82%	0.92%	1.29%	1.02%	0.15%	0.61%	0.79%	0.37%	1.12%	0.58%	0.43%	n.d.

Dataset S6: Raw data: Isotopic enrichment during <sup>13</sup>C-labeling experiments

Isotopic enrichment

Isotopic enrichments that correspond to the labeled fraction of a molecule with respect to its total amount in proteins or in the medium were assessed after correction for the natural labeling of raw data (intensities of ions clusters provided by GC-MS analyses) using the IsoCor software.

Proteogenic amino acids (4 independent experiments)

Raw data		Gly	Val	Leu	Ile	Thr
<sup>13</sup> C-Valine	N <sub>1/2</sub>	2.8%	25.5%	4.5%	0.3%	n.d.
		2.6%	23.6%	4.2%	0.2%	n.d.
		2.8%	24.0%	4.3%	0.2%	n.d.
		2.5%	23.5%	4.1%	0.2%	n.d.
	N <sub>3/4</sub>	2.9%	22.4%	5.6%	0.3%	n.d.
		2.7%	22.1%	5.4%	0.2%	n.d.
		2.8%	22.8%	5.4%	0.3%	n.d.
		2.6%	22.2%	5.2%	0.2%	n.d.
	N <sub>T</sub>	2.6%	14.2%	4.2%	0.3%	n.d.
		2.6%	14.1%	4.1%	0.2%	n.d.
		2.6%	14.3%	4.2%	0.3%	n.d.
		3.1%	14.2%	4.1%	0.2%	n.d.
	EF	2.2%	12.6%	3.8%	0.3%	n.d.
		2.6%	12.3%	3.7%	0.2%	n.d.
		2.7%	12.8%	3.8%	0.3%	n.d.
		2.5%	12.6%	3.7%	0.2%	n.d.
<sup>13</sup> C-Leucine	N <sub>1/2</sub>	n.d.	0.3%	50.1%	0.2%	n.d.
		n.d.	0.2%	50.0%	0.1%	n.d.
		n.d.	0.3%	49.4%	0.1%	n.d.
		n.d.	0.3%	49.3%	0.1%	n.d.
	N <sub>3/4</sub>	n.d.	0.3%	33.9%	0.2%	n.d.
		n.d.	0.3%	33.8%	0.2%	n.d.
		n.d.	0.3%	33.1%	0.2%	n.d.
		n.d.	n.d.	32.7%	0.2%	n.d.
	N <sub>T</sub>	n.d.	0.3%	19.1%	0.2%	n.d.
		n.d.	0.3%	19.1%	0.2%	n.d.
		n.d.	0.3%	19.3%	0.2%	n.d.
		n.d.	n.d.	19.0%	0.2%	n.d.
	EF	n.d.	0.2%	16.4%	0.1%	n.d.
		n.d.	0.2%	16.4%	0.1%	n.d.
		n.d.	0.2%	16.9%	0.1%	n.d.
		n.d.	0.2%	16.9%	0.1%	n.d.
<sup>13</sup> C-Isoleucine	N <sub>1/2</sub>	0.2%	0.1%	0.1%	29.4%	0.3%
		0.1%	0.2%	0.3%	33.4%	0.2%
		0.1%	0.3%	0.3%	34.5%	n.d.
		n.d.	0.3%	0.3%	35.5%	n.d.
	N <sub>3/4</sub>	0.0%	0.4%	0.5%	26.9%	0.2%
		0.0%	0.4%	0.4%	26.4%	0.2%
		0.1%	0.4%	0.4%	28.1%	0.2%
		0.2%	0.4%	0.4%	28.4%	n.d.
	N <sub>T</sub>	0.0%	0.5%	0.5%	17.9%	0.2%
		0.3%	0.4%	0.4%	17.7%	0.2%
		0.1%	0.5%	0.5%	18.1%	0.2%
		0.1%	0.4%	0.5%	17.4%	0.2%
	EF	0.1%	0.4%	0.5%	16.5%	0.2%
		0.1%	0.4%	0.4%	16.5%	0.2%
		0.1%	0.4%	0.5%	16.6%	0.2%
		0.1%	0.4%	0.4%	16.1%	0.2%
<sup>13</sup> C-Threonine	N <sub>1/2</sub>	9.5%	0.4%	0.5%	16.1%	45.2%
		9.3%	0.4%	0.4%	15.5%	45.0%
		9.2%	0.1%	0.1%	13.1%	n.d.
		n.d.	0.2%	0.3%	14.6%	n.d.
	N <sub>3/4</sub>	7.6%	0.5%	0.5%	13.0%	33.0%
		6.5%	0.3%	0.3%	12.3%	33.4%
		7.2%	0.5%	0.5%	12.7%	30.8%
		7.4%	0.4%	0.4%	12.7%	32.6%
	N <sub>T</sub>	5.6%	0.4%	0.4%	9.2%	19.0%
		5.7%	0.4%	0.5%	9.6%	20.6%
		5.7%	0.5%	0.5%	9.5%	20.3%
		5.7%	0.5%	0.5%	9.6%	20.0%
	EF	5.4%	0.4%	0.4%	8.9%	18.7%
		5.5%	0.4%	0.5%	8.9%	20.5%
		5.5%	0.4%	0.4%	8.7%	18.4%
		5.5%	0.3%	0.4%	8.5%	18.4%
Means from 4 replicates						
Mean		Gly	Val	Leu	Ile	Thr
<sup>13</sup> C-Valine	N <sub>1/2</sub>	2.7%	24.1%	4.3%	0.2%	n.d.
	N <sub>3/4</sub>	2.8%	22.4%	5.4%	0.3%	n.d.
	N <sub>T</sub>	2.7%	14.2%	4.2%	0.2%	n.d.
	EF	2.5%	12.6%	3.8%	0.2%	n.d.
<sup>13</sup> C-Leucine	N <sub>1/2</sub>	n.d.	0.2%	49.7%	0.1%	n.d.
	N <sub>3/4</sub>	n.d.	0.3%	33.4%	0.2%	n.d.
	N <sub>T</sub>	n.d.	0.3%	19.1%	0.2%	n.d.
	EF	n.d.	0.2%	16.6%	0.1%	n.d.
<sup>13</sup> C-Isoleucine	N <sub>1/2</sub>	0.1%	0.3%	0.3%	33.2%	0.3%
	N <sub>3/4</sub>	0.1%	0.4%	0.4%	27.5%	0.2%
	N <sub>T</sub>	0.1%	0.4%	0.5%	17.8%	0.2%
	EF	0.1%	0.4%	0.4%	16.4%	0.2%
<sup>13</sup> C-Threonine	N <sub>1/2</sub>	9.3%	0.3%	0.3%	14.8%	45.1%
	N <sub>3/4</sub>	7.2%	0.4%	0.4%	12.7%	32.4%
	N <sub>T</sub>	5.7%	0.4%	0.5%	9.5%	20.0%
	EF	5.5%	0.4%	0.4%	8.7%	19.0%
Standard deviations of the mean						
SEM		Gly	Val	Leu	Ile	Thr
<sup>13</sup> C-Valine	N <sub>1/2</sub>	0.069%	0.465%	0.073%	0.024%	n.d.
	N <sub>3/4</sub>	0.069%	0.143%	0.074%	0.019%	n.d.
	N <sub>T</sub>	0.112%	0.051%	0.024%	0.013%	n.d.
	EF	0.114%	0.094%	0.031%	0.016%	n.d.
<sup>13</sup> C-Leucine	N <sub>1/2</sub>	n.d.	0.015%	0.208%	0.009%	n.d.
	N <sub>3/4</sub>	n.d.	0.008%	0.285%	0.008%	n.d.
	N <sub>T</sub>	n.d.	0.018%	0.049%	0.013%	n.d.
	EF	n.d.	0.021%	0.145%	0.014%	n.d.
<sup>13</sup> C-Isoleucine	N <sub>1/2</sub>	0.026%	0.050%	0.053%	1.339%	0.060%
	N <sub>3/4</sub>	0.048%	0.008%	0.019%	0.486%	0.010%
	N <sub>T</sub>	0.072%	0.019%	0.025%	0.146%	0.019%
	EF	0.011%	0.016%	0.010%	0.105%	0.006%
<sup>13</sup> C-Threonine	N <sub>1/2</sub>	0.084%	0.059%	0.072%	0.647%	0.074%
	N <sub>3/4</sub>	0.239%	0.032%	0.031%	0.147%	0.568%
	N <sub>T</sub>	0.014%	0.020%	0.020%	0.079%	0.340%
	EF	0.030%	0.019%	0.024%	0.093%	0.489%

Volatile compounds (2 independent experiments)

Raw data		Isoamyl alcohol	Isobutanol	Propanol
<sup>13</sup> C-Valine	N <sub>1/2</sub>	6.5%	13.7%	0.3%
	N <sub>3/4</sub>	6.4%	13.2%	0.3%
	N <sub>T</sub>	6.5%	14.3%	0.3%
	EF	2.6%	3.3%	0.2%
<sup>13</sup> C-Leucine	N <sub>1/2</sub>	10.5%	0.2%	0.0%
	N <sub>3/4</sub>	10.1%	0.3%	0.1%
	N <sub>T</sub>	5.3%	0.4%	0.5%
	EF	2.4%	0.0%	0.0%
<sup>13</sup> C-Isoleucine	N <sub>1/2</sub>	1.8%	0.0%	0.1%
	N <sub>3/4</sub>	1.7%	0.0%	0.1%
	N <sub>T</sub>	n.d.	n.d.	0.0%
	EF	n.d.	n.d.	0.0%
<sup>13</sup> C-Threonine	N <sub>1/2</sub>	n.d.	n.d.	0.4%
	N <sub>3/4</sub>	n.d.	n.d.	0.4%
	N <sub>T</sub>	n.d.	n.d.	0.8%
	EF	n.d.	n.d.	0.4%
Means from 2 replicates				
Mean		Isoamyl alcohol	Isobutanol	Propanol
<sup>13</sup> C-Valine	N <sub>1/2</sub>	6.5%	13.4%	0.3%
	N <sub>3/4</sub>	6.4%	13.9%	0.2%
	N <sub>T</sub>	2.7%	3.3%	0.2%
	EF	1.8%	1.9%	0.3%
<sup>13</sup> C-Leucine	N <sub>1/2</sub>	10.3%	0.2%	0.1%
	N <sub>3/4</sub>	5.3%	0.3%	0.3%
	N <sub>T</sub>	2.3%	0.0%	0.2%
	EF	1.7%	0.0%	0.1%
<sup>13</sup> C-Isoleucine	N <sub>1/2</sub>	n.d.	n.d.	0.0%
	N <sub>3/4</sub>	n.d.	n.d.	0.7%
	N <sub>T</sub>	n.d.	n.d.	0.5%
	EF	n.d.	n.d.	0.4%
<sup>13</sup> C-Threonine	N <sub>1/2</sub>	n.d.	n.d.	38.1%
	N <sub>3/4</sub>	n.d.	n.d.	19.5%
	N <sub>T</sub>	n.d.	n.d.	19.1%
	EF	n.d.	n.d.	16.7%
Standard deviations of the mean				
SEM		Isoamyl alcohol	Isobutanol	Propanol
<sup>13</sup> C-Valine	N <sub>1/2</sub>	0.060%	0.255%	0.015%
	N <sub>3/4</sub>	0.095%	0.345%	0.015%
	N <sub>T</sub>	0.030%	0.030%	0.000%
	EF	0.030%	0.025%	0.000%
<sup>13</sup> C-Leucine	N <sub>1/2</sub>	0.088%	0.025%	0.015%
	N <sub>3/4</sub>	0.085%	0.075%	0.260%
	N <sub>T</sub>	0.115%	0.005%	0.205%
	EF	0.010%	0.000%	0.015%
<sup>13</sup> C-Isoleucine	N <sub>1/2</sub>	n.d.	n.d.	0.001%
	N <sub>3/4</sub>	n.d.	n.d.	0.315%
	N <sub>T</sub>	n.d.	n.d.	0.245%
	EF	n.d.	n.d.	0.010%
<sup>13</sup> C-Threonine	N <sub>1/2</sub>	n.d.	n.d.	0.850%
	N <sub>3/4</sub>	n.d.	n.d.	0.250%
	N <sub>T</sub>	n.d.	n.d.	0.330%
	EF	n.d.	n.d.	0.455%



**Table S1: Analytical parameters used for the determination of isotopic enrichments of amino acids and volatile compounds using selected ion monitoring (SIM) mode.**

Amino acids	Derivatizing reagent	RT (min)	Ion clusters (m/z)
Alanine	ECF <sup>a</sup>	3,86	116, 117, 118, 119
	DMFDMA <sup>b</sup>	6,37	99, 100, 101, 102
	DMFDMA <sup>b</sup>	6,37	158, 159, 160, 161
Glycine	ECF <sup>a</sup>	4,19	102, 103, 104
	ECF <sup>a</sup>	4,19	175, 176, 177
	DMFDMA <sup>b</sup>	6,61	85, 86, 87
	DMFDMA <sup>b</sup>	6,61	144, 145, 146
Valine	ECF <sup>a</sup>	4,97	144, 145, 146, 147, 148, 149
	DMFDMA <sup>b</sup>	7,37	127, 128, 129, 130, 131, 132
	DMFDMA <sup>b</sup>	7,37	143, 144, 145, 146, 147, 148
	DMFDMA <sup>b</sup>	7,37	186, 187, 188, 189, 190, 191
Leucine	ECF <sup>a</sup>	5,67	158, 159, 160, 161, 162, 163, 164
Isoleucine	ECF <sup>a</sup>	5,85	158, 159, 160, 161, 162, 163, 165
Threonine	ECF <sup>a</sup>	6,48	146, 147, 148, 149, 150
	ECF <sup>a</sup>	6,48	175, 176, 177, 178, 179
Serine	ECF <sup>a</sup>	6,53	132, 133, 134, 135
	ECF <sup>a</sup>	6,53	175, 176, 177, 178
Proline	ECF <sup>a</sup>	6,83	142, 143, 144, 145, 146, 147
Aspartate	ECF <sup>a</sup>	7,89	188, 189, 190, 191, 192
	DMFDMA <sup>b</sup>	11,77	115, 116, 117, 118, 119
	DMFDMA <sup>b</sup>	11,77	216, 217, 218, 219, 220
Glutamate	ECF <sup>a</sup>	8,81	202, 203, 204, 205, 206, 207
	DMFDMA <sup>b</sup>	12,75	111, 112, 113, 114, 115, 116
	DMFDMA <sup>b</sup>	12,75	143, 144, 145, 146, 147, 148
	DMFDMA <sup>b</sup>	12,75	230, 231, 232, 233, 234, 235
Phenylalanine	ECF <sup>a</sup>	9,53	192, 193, 194, 195, 196, 197, 198, 199, 200, 201
	DMFDMA <sup>b</sup>	13,67	143, 144, 145, 146, 147, 148, 149, 150, 151, 152
Lysine	ECF <sup>a</sup>	11,95	156, 157, 158, 159, 160, 161, 162
Histidine	ECF <sup>a</sup>	12,54	327, 328, 329, 330, 331, 332, 333
Arginine	BSTFA <sup>c</sup>	18,8	174, 175, 176, 177, 178, 179

<sup>a</sup>ECF, ethyl chloroformate ; <sup>b</sup>DMFDMA, (N,N)-dimethylformamide dibutyl acetal ; <sup>c</sup>BSTFA, (N,O-bis(trimethylsilyl)trifluoroacetamide).

Volatile compounds	RT (min)	Ion clusters (m/z)
Propanol	5,48	42, 43, 44, 45
	5,48	60, 61, 62, 63
Isobutanol	6,86	43, 44, 45, 46, 47
	6,86	74, 75, 76, 77, 78
Isoamyl alcohol	10,52	55, 56, 57, 58, 59
	10,52	70, 71, 72, 73, 74, 75
Phenylethanol	31,16	65, 66, 67, 68, 69, 70, 71, 72, 73
	31,16	122, 123, 124, 125, 126, 127, 128, 129, 130
Isoamyl acetate	7,69	70, 71, 72, 73, 74, 75
Isobutyl acetate	4,83	56, 57, 58, 59, 60
Phenylethyl acetate	28,6	91, 92, 93, 94, 95, 96, 97, 98
Ethyl isobutyrate	3,95	116, 117, 118, 119, 120, 121
Ethyl isovalerate	6,2	88, 89, 90, 91, 92, 93
Isobutyric acid	21,95	73, 74, 75, 76, 77, 78
Isovaleric acid	24,93	60, 61, 62, 63, 64, 65

**Table S2 : <sup>15</sup>N isotopic tracer experiments**

Isotopic enrichment of proteogenic amino acids and volatile compounds.

Mean		Ala	Gly	Val	Asp	Phe	Leu	Ile	Thr	Ser	Pro	Lys	His	Glu	Arg
<sup>4-<sup>15</sup>N</sup> Arg	N <sub>1/2</sub>	2.0%	3.3%	2.2%	1.7%	1.7%	1.9%	0.2%	0.6%	1.5%	6.0%	1.8%	7.6%	1.0%	98.2%
	N <sub>1/4</sub>	3.3%	2.4%	2.6%	2.4%	2.4%	2.5%	0.7%	0.7%	8.7%	2.0%	2.2%	22.8%	97.4%	
	N <sub>1</sub>	14.7%	10.9%	14.1%	16.0%	19.0%	16.0%	14.0%	12.6%	14.6%	16.9%	6.4%	4.2%	16.7%	98.1%
	EF	16.1%	16.2%	14.1%	16.4%	18.1%	16.3%	14.1%	13.2%	12.6%	16.4%	6.2%	3.3%	17.1%	97.0%
<sup>2-<sup>15</sup>N</sup> Gln	N <sub>1/2</sub>	24.7%	23.4%	25.6%	32.0%	26.9%	22.5%	16.6%	19.2%	22.3%	15.9%	11.9%	41.0%	n.d.	
	N <sub>1/4</sub>	23.6%	23.3%	24.5%	30.9%	26.7%	22.8%	22.4%	17.8%	18.4%	17.3%	15.4%	8.9%	38.7%	n.d.
	N <sub>1</sub>	21.3%	23.8%	24.1%	29.7%	25.3%	24.1%	23.4%	22.4%	28.2%	8.4%	16.1%	17.5%	33.4%	n.d.
	EF	22.3%	23.3%	24.4%	29.3%	25.6%	24.4%	24.2%	22.1%	23.7%	7.8%	16.1%	15.2%	32.8%	n.d.
<sup>15</sup> N NH <sub>4</sub> <sup>+</sup>	N <sub>1/2</sub>	34.1%	31.2%	36.6%	47.8%	37.9%	30.1%	34.0%	17.7%	29.1%	31.2%	21.1%	17.8%	44.4%	n.d.
	N <sub>1/4</sub>	33.5%	37.4%	37.6%	50.9%	41.5%	36.8%	32.7%	31.6%	39.3%	20.9%	24.3%	9.0%	47.6%	n.d.
	N <sub>1</sub>	25.3%	28.2%	27.7%	34.4%	28.9%	27.2%	27.7%	22.5%	25.7%	12.0%	19.9%	16.7%	30.6%	n.d.
	EF	25.6%	28.7%	27.8%	33.5%	27.1%	26.3%	25.7%	21.2%	23.7%	9.9%	17.6%	17.9%	29.9%	n.d.

Experimental data  
n.d.: not determined

Part of total nitrogen in proteins (in mg N.L<sup>-1</sup>)  
contained in the proteogenic amino acids  
quantified in the study.

Proteogenic amino acids concentration (mgN.L<sup>-1</sup>).

Mean	Ala	Gly	Val	Asp	Phe	Leu	Ile	Thr	Ser	Pro	Lys	His	Glu	Arg
N <sub>1/2</sub>	5.35	4.27	2.71	3.46	1.78	4.27	1.85	2.84	3.66	4.59	1.62	2.90	3.44	5.35
N <sub>1/4</sub>	8.99	7.22	4.10	5.16	3.00	7.84	3.03	4.81	6.49	7.50	2.63	4.80	4.79	8.99
N <sub>1</sub>	14.90	11.69	7.50	10.34	5.32	11.94	5.22	8.38	11.26	12.01	4.18	7.49	9.44	14.90
EF	14.08	11.91	9.99	10.43	5.15	11.76	5.02	8.53	11.62	12.94	4.31	7.81	7.46	14.08

total nitrogen in proteins (mg N.L <sup>-1</sup> )	% of nitrogen in proteins found in quantified proteogenic amino acids
58	82.2%
96	82.5%
163	82.3%
165	82.0%

Labeling recovered in proteogenic amino acids. Labeled and unlabeled fractions of nitrogen included in proteogenic amino acids are calculated from their concentrations expressed in mg N.L<sup>-1</sup> and their isotopic enrichments. Data are expressed in mg N.L<sup>-1</sup>.

Mean		Ala		Gly		Val		Asp		Phe		Leu		Ile		Thr		Ser		Pro		Lys		His		Glu		Arg		Total															
		Labeled	Unlabeled	Labeled	Unlabeled	Labeled	Unlabeled	Labeled	Unlabeled	Labeled	Unlabeled	Labeled	Unlabeled	Labeled	Unlabeled	Labeled	Unlabeled	Labeled	Unlabeled	Labeled	Unlabeled	Labeled	Unlabeled	Labeled	Unlabeled	Labeled	Unlabeled	Labeled*	Unlabeled*																
<sup>4-<sup>15</sup>N</sup> Arg	N <sub>1/2</sub>	0.11	5.24		0.14	4.13		0.08	2.65		0.06	3.40		0.03	1.75		0.08	4.19		0.00	1.84		0.02	2.82		0.06	3.80		0.28	4.31		0.03	1.59		0.22	2.68		0.03	3.40		5.25	0.10	6.37	41.70	
	N <sub>1/4</sub>	0.29	8.70		0.18	7.04		0.11	4.00		0.07	2.93		0.07	2.93		0.20	7.65		0.02	3.01		0.06	6.44		0.05	6.85		0.05	2.58		0.11	4.70		1.09	3.70		8.76	0.23	11.73	67.65				
	N <sub>1</sub>	2.19	12.71		1.27	10.42		1.06	6.44		1.04	4.28		1.04	4.28		1.86	10.08		0.76	4.46		1.64	9.62		1.91	10.10		0.27	3.91		0.32	7.17		1.57	7.87		14.62	0.28	31.27	103.29				
	EF	2.12	11.96		1.89	9.98		1.41	8.58		1.72	8.72		0.93	4.22		1.80	9.95		0.71	4.31		1.47	10.15		2.12	10.62		0.27	4.04		0.25	7.95		1.28	6.18		13.65	0.43	30.79	104.30				
<sup>2-<sup>15</sup>N</sup> Gln	N <sub>1/2</sub>	1.30	4.93		1.00	3.27		0.69	2.01		1.11	2.36		0.48	1.30		0.96	3.31		0.44	1.41		0.44	2.39		0.70	2.96		1.02	3.57		0.25	1.37		0.34	2.95		1.41	2.03		n.d.	3.35		16.17	37.90
	N <sub>1/4</sub>	2.13	6.87		1.88	5.44		1.60	3.65		0.80	2.20		0.86	2.38		0.86	3.06		1.20	4.29		1.30	6.21		0.40	2.23		0.40	2.23		0.43	4.38		1.85	2.94		n.d.	8.99		15.71	63.66			
	N <sub>1</sub>	3.17	11.73		2.78	8.91		1.81	5.69		2.97	7.37		1.34	3.98		2.87	9.05		1.20	4.50		1.88	6.51		1.01	11.00		0.67	3.50		1.31	6.18		3.15	6.29		n.d.	14.90		27.13	107.43			
	EF	3.14	10.94		2.78	8.13		2.44	7.56		3.06	7.37		1.32	3.83		2.87	8.89		1.21	3.80		1.89	6.64		1.01	11.93		0.69	3.62		1.19	6.62		2.44	5.01		n.d.	14.08		26.80	108.29			
<sup>15</sup> N NH <sub>4</sub> <sup>+</sup>	N <sub>1/2</sub>	1.83	3.52		1.33	2.84		0.99	1.72		1.65	1.81		0.87	1.10		1.29	2.99		0.64	1.21		0.90	2.33		1.06	2.59		1.43	3.16		0.34	1.28		0.52	2.38		1.53	1.91		n.d.	5.35		13.78	34.29
	N <sub>1/4</sub>	3.01	5.98		2.70	4.52		1.54	2.56		2.62	2.53		1.25	1.76		2.89	4.96		0.99	2.04		1.52	3.29		2.55	3.93		1.57	5.94		0.43	4.37		2.28	2.51		n.d.	8.99		23.99	55.38			
	N <sub>1</sub>	3.76	11.14		3.29	8.39		2.08	5.42		3.56	6.78		1.54	3.78		3.24	8.70		1.44	3.78		1.89	6.50		2.90	8.36		1.44	10.57		0.83	3.35		1.25	6.24		2.89	6.55		n.d.	14.90		30.11	104.45
	EF	3.61	10.47		3.42	8.49		2.77	7.22		3.49	6.94		1.40	3.75		3.09	8.66		1.21	3.73		1.81	6.72		2.76	8.86		1.28	11.66		0.78	3.55		1.40	6.41		2.23	6.23		n.d.	14.08		29.30	105.78

\* Nitrogen from arginine is included only for labeled arginine experiments.

Nitrogen provided by arginine, glutamine or ammonium recovered in the proteogenic acids quantified in this study throughout the fermentation.

Experiment	in % of total nitrogen**		
	in mg N.L <sup>-1</sup> **	in % of total nitrogen**	
<sup>4-<sup>15</sup>N</sup> Arg	N <sub>1/2</sub>	1.12	2.3%
	N <sub>1/4</sub>	2.97	3.7%
	N <sub>1</sub>	16.65	12.4%
	EF	17.14	12.7%
<sup>2-<sup>15</sup>N</sup> Gln	N <sub>1/2</sub>	9.80	20.4%
	N <sub>1/4</sub>	15.23	19.2%
	N <sub>1</sub>	26.31	19.6%
	EF	26.16	19.4%
<sup>15</sup> N NH <sub>4</sub> <sup>+</sup>	N <sub>1/2</sub>	13.78	28.7%
	N <sub>1/4</sub>	23.99	30.2%
	N <sub>1</sub>	30.11	22.4%
	EF	29.30	21.7%

\* Sum of the labeled fraction (in mg N.L<sup>-1</sup>) of proteogenic amino acids quantified in the study (Ala, Gly, Val, Asp, Phe, Leu, Ile, Thr, Ser, Pro, Lys, His, Glu, Arg) during experiments in presence of <sup>15</sup>N-labeled arginine, glutamine or ammonium.

\*\* Ratio between the labeled nitrogen fraction and the total nitrogen amount of proteogenic amino acids quantified in the study.

Mass and isotopic balance of arginine consumption and use.

Mean (mM)	Consumed arginine	Proteogenic arginine	Isotopic enrichment	Labeled proteogenic arginine*	Arginine assimilated to other amino acids**
	<sup>4-<sup>15</sup>N</sup> Arg				
N <sub>1/2</sub>	0.232	0.129	98%	0.127	0.023
N <sub>1/4</sub>	0.442	0.213	97%	0.208	0.068
N <sub>1</sub>	0.881	0.351	98%	0.344	0.388
EF	0.881	0.351	97%	0.340	0.390

\* Calculated multiplying the arginine content in proteins (in mM) by the isotopic enrichment of proteogenic arginine.

\*\* Sum of the labeled fraction (in mM) of proteogenic amino acids quantified in the study except Arg (Ala, Gly, Val, Asp, Phe, Leu, Ile, Thr, Ser, Pro, Lys, His, Glu) during experiments in presence of <sup>15</sup>N-labeled arginine divided by 3 (number of nitrogen atoms from arginine available for de novo synthesis).

**Table S3: <sup>13</sup>C isotopic tracer experiments**

Isotopic enrichment of proteino-genic amino acids and volatile compounds

Experimental data  
n.d.: not determined

	Mean	Gly	Val	Leu	Ile	Thr	Isobutanol	isoamyl alcoho	Propanol
<sup>13</sup> C-Valine	N <sub>1/2</sub>	n.d.	24.1%	4.3%	0.2%	n.d.	13.4%	6.5%	0.3%
	N <sub>3/4</sub>	n.d.	22.4%	5.4%	0.3%	n.d.	13.9%	6.4%	0.2%
	N <sub>T</sub>	n.d.	14.2%	4.2%	0.2%	n.d.	3.3%	2.7%	0.2%
	EF	n.d.	12.6%	3.8%	0.2%	n.d.	1.9%	1.8%	0.3%
<sup>13</sup> C-Leucine	N <sub>1/2</sub>	n.d.	0.2%	49.7%	0.1%	n.d.	0.2%	10.3%	0.1%
	N <sub>3/4</sub>	n.d.	0.3%	33.4%	0.2%	n.d.	0.3%	5.3%	0.3%
	N <sub>T</sub>	n.d.	0.3%	19.1%	0.2%	n.d.	0.0%	2.3%	0.2%
	EF	n.d.	0.2%	16.6%	0.1%	n.d.	0.0%	1.7%	0.1%
<sup>13</sup> C-Isoleucine	N <sub>1/2</sub>	0.1%	0.3%	0.3%	33.2%	0.3%	n.d.	n.d.	0.0%
	N <sub>3/4</sub>	0.1%	0.4%	0.4%	27.5%	0.2%	n.d.	n.d.	0.7%
	N <sub>T</sub>	0.1%	0.4%	0.5%	17.8%	0.2%	n.d.	n.d.	0.5%
	EF	0.1%	0.4%	0.4%	16.4%	0.2%	n.d.	n.d.	0.4%
<sup>13</sup> C-Threonine	N <sub>1/2</sub>	9.3%	0.3%	0.3%	14.8%	45.1%	n.d.	n.d.	38.1%
	N <sub>3/4</sub>	7.2%	0.4%	0.4%	12.7%	32.4%	n.d.	n.d.	19.5%
	N <sub>T</sub>	5.7%	0.4%	0.5%	9.5%	20.0%	n.d.	n.d.	19.1%
	EF	5.5%	0.4%	0.4%	8.7%	19.0%	n.d.	n.d.	16.7%

Labeling recovered in proteino-genic amino acids. Labeled and unlabeled fractions of proteino-genic amino acids were calculated from concentrations expressed in mM and isotopic enrichments of proteino-genic amino acids.

	Mean	Gly			Val			Leu			Ile			Thr		
		Total	Labeled	Unlabeled	Total	Labeled	Unlabeled	Total	Labeled	Unlabeled	Total	Labeled	Unlabeled	Total	Labeled	Unlabeled
<sup>13</sup> C-Valine	N <sub>1/2</sub>	n.d.	n.d.	n.d.	194	47	147	260	11	249	132	0	131	n.d.	n.d.	n.d.
	N <sub>3/4</sub>	n.d.	n.d.	n.d.	281	63	218	408	22	386	193	0	193	n.d.	n.d.	n.d.
	N <sub>T</sub>	n.d.	n.d.	n.d.	506	72	434	698	29	669	349	1	348	n.d.	n.d.	n.d.
	EF	n.d.	n.d.	n.d.	705	89	617	679	26	653	326	1	325	n.d.	n.d.	n.d.
<sup>13</sup> C-Leucine	N <sub>1/2</sub>	n.d.	n.d.	n.d.	194	0	193	260	129	131	132	0	131	n.d.	n.d.	n.d.
	N <sub>3/4</sub>	n.d.	n.d.	n.d.	281	1	280	408	136	272	193	0	193	n.d.	n.d.	n.d.
	N <sub>T</sub>	n.d.	n.d.	n.d.	506	2	505	698	134	565	349	1	348	n.d.	n.d.	n.d.
	EF	n.d.	n.d.	n.d.	705	1	704	679	113	566	326	0	326	n.d.	n.d.	n.d.
<sup>13</sup> C-Isoleucine	N <sub>1/2</sub>	138	0	138	194	0	193	260	1	259	132	44	88	194	0	194
	N <sub>3/4</sub>	217	0	217	281	1	280	408	2	406	193	53	140	330	1	330
	N <sub>T</sub>	376	0	376	506	2	504	698	3	695	349	62	287	596	1	595
	EF	359	0	359	705	3	703	679	3	676	326	53	273	613	1	611
<sup>13</sup> C-Threonine	N <sub>1/2</sub>	138	13	125	194	1	193	260	1	259	132	19	112	194	87	107
	N <sub>3/4</sub>	217	16	201	281	1	280	408	2	406	193	25	169	330	107	223
	N <sub>T</sub>	376	21	355	506	2	504	698	3	695	349	33	315	596	119	477
	EF	359	20	340	705	3	703	679	3	676	326	29	298	613	116	496

Labeling recovered in volatile compounds. Labeled and unlabeled fractions of volatile compounds were calculated from their concentrations expressed in mM and their isotopic enrichments.

	Isobutanol			isoamyl alcohol			Propanol		
	Total	Labeled	Unlabeled	Total	Labeled	Unlabeled	Total	Labeled	Unlabeled
<sup>13</sup> C-Valine	72	10	62	194	13	181	81	0	81
	144	20	124	521	33	488	316	1	315
	864	28	836	1577	42	1535	345	1	344
	1466	28	1438	2307	42	2265	339	1	338
<sup>13</sup> C-Leucine	72	0.151	72	194	20	174	81	0	81
	144	0.425	144	521	28	493	316	1	315
	864	0.130	864	1577	37	1540	345	1	344
	1466	0.147	1466	2307	40	2267	339	0	339
<sup>13</sup> C-Isoleucine	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	81	0	81
	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	316	2	314
	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	345	2	343
	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	339	1	338
<sup>13</sup> C-Threonine	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	81	31	50
	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	316	62	254
	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	345	66	279
	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	339	57	283

**Table S4 : Contribution of arginine, glutamine and ammonium to the intracellular nitrogen pool**

Nitrogen provided by arginine, glutamine or ammonium recovered in the proteinogenic acids quantified in this study throughout the fermentation.

Experiment	in mg N.L-1*		in % of total nitrogen**
4-15N Arg	N 1/2	6,37	13,2%
	N3/4	11,73	14,8%
	NT	31,27	23,2%
	EF	30,79	22,8%
2-15N Gln	N 1/2	10,17	21,2%
	N3/4	15,71	19,8%
	NT	27,13	20,2%
	EF	26,80	19,8%
15N NH4+	N 1/2	13,78	28,7%
	N3/4	23,99	30,2%
	NT	30,11	22,4%
	EF	29,30	21,7%

Experimental data  
n.d.: not determined

Origin of proteinogenic amino acid.

		total	direct incorporation	de novo synthesized from		Arg, NH <sub>4</sub> , Gln contribution
				de novo synthesized from		
				Arg, Gln, NH <sub>4</sub>	others aa	
Valine	N 1/2	194	47	122	25	83%
	N3/4	281	63	182	36	83%
	NT	506	72	333	101	77%
	EF	705	89	465	152	75%
Leucine	N 1/2	260	129	164		97%
	N3/4	408	136	264	7	81%
	NT	698	134	459	105	77%
	EF	679	113	437	129	77%
Isoleucine	N 1/2	132	44	83	5	94%
	N3/4	193	53	125	15	89%
	NT	349	62	229	57	80%
	EF	326	53	210	63	77%
Threonine	N 1/2	194	87	122		96%
	N3/4	330	107	214	9	82%
	NT	596	119	392	85	79%
	EF	613	116	394	102	79%

Combining <sup>13</sup>C and <sup>15</sup>N isotope tracer experiments, we can differentiate proteinogenic leucine, valine, isoleucine and threonine originated from direct incorporation of consumed amino acid, *de novo* synthesis using nitrogen from arginine, glutamine and ammonium or from other amino acids. This allowed to assess the contribution of the 3 most abundant amino acids to the intracellular pool of nitrogen used for *de novo* biosynthesis.