

Table 5.4. Composition of potential feedstuffs of common carp (*Cyprinus carpio*)^{1,2}

Feed code and common name	As % of dry matter										Digestible energy (kcal/kg)
	DM	CP	EE	CF	ASH	NFE	Ca	P	Met plus Cys	Lys	
Legumes											
B.31 Red gram, dahl											
dried leaves, Malaysia	32.3	13	3.4	12.7	3.4	67.2					2 110
dried leaves, India		11	6.9	18.3	18.5	45.3					1 876
mill screenings, India		14.8	2.2	24.3	8.3	52.5			0.39	1.03	1 788
seed, India	91.8	20.2	1.9	6.2	4	67.7			0.54	1.41	2 273
seed, India	90.2	20.2	4.8	11.8	11.3	51.9			0.54	1.41	2 189
seed, Malaysia	89	23.4	0.9	10.6	4.3	60.8	0.14	0.45	0.62	1.63	2 177
flour, India	90.7	12.7	9.1	8.3	3.9	66			0.34	0.88	2 530
B.41 Chickpea, Bengal gram											
fresh aerial part, India		11.3	2.2	27.2	11.4	47.9	1.41	0.25			1 563
seeds, India		18.1	4.9	9.8	3.5	63.7	0.26	0.41	0.38	1.81	2 353
seeds, Malaysia	88.9	25.8	3.9	10.1	3.6	56.6			0.54	2.58	2 424
bran, Chile	88.4	15.7	4.2	24.3	7	48.8	1.56	0.31	0.33	1.57	1 908
screenings, India		14.5	4.2	23.8	10.3	47.1			0.3	1.45	1 829
seeds, black Pakistan	91.4	20.4	3.2	7.3	2.6	66.5	0.44	0.36			2 361
B. 49 Guar, Cluarwe bean											
meal, toasted, Pakistan	92.3	49.4	6.7	7.6	6.4	29.9	0.03	0.96			3 011
B.65 Lablab, Egyptian bean											
fresh aerial part, India		14.2	3.5	28.1	14.8	39.4	1.98	0.26	0.23	0.98	1 607
seeds, Uganda	89.3	24.2	0.8	8.5	4.4	62.1					2 225
seeds, Zimbabwe	92	28	1.2	8.6	4.2	58	0.99	0.36			2 320
B. 79 Lentil, red dahl											
seeds, India		24.8	0.8		4.6	69.8			0.17	1.98	2 402
seeds, Uganda	89.6	26.7	1.2	0.5	12	59.6			0.18	2.13	2 302
bran, Chile	87.6	26.7	1.1	8.4	2.8	61.3			0.18	2.13	2 328
B. 81 Ipil-ipil, Kathin											
fresh leaves, Thailand	31.6	27.8	3.2	10.4	3.5	55.1	0.54	0.29	1.3	1.86	2 414
fresh leaves, Phillipines	52.6	12.6	1.6	5.4	2.2	78.2	0.37	0.07			2 171
B. 84 Lupins											
fresh aerial parts, Thailand	11.7	26.6	2.6	19.1	13.9	37.8	1.28	0.25			1 975
seeds, Germany, Fed.Rep.	89.5	45	5	16.2	4.8	29	0.37	0.2	0.9	2.16	1 975
B. 88 Alfafa, lucerne											
fresh, 1 month, India		24.5	2.6	16.2	15.7	41	1.96	0.42	0.49	1.05	1 959
fresh, 2 months, India		20.3	3.1	25.7	14.8	36.1	2.24	0.35	0.4	0.87	1 741
fresh, 3 months, India		16	3.5	29.7	10.7	40.1	1.89	0.24	0.32	0.69	1 690
leaf meal, China	89	14.6	3.4	15.8	11.5	54.7			0.29	0.63	1 921
leaf meal, South Africa		21.7	2.4	20.1	17	38.8	1.44	0.2	0.43	0.93	1 792
B. 106 Velvet mesquite											
dry leaves, USA	90	8.3	5.4	32.1	9.6	44.6					1 639
Pods, USA	94.6	13.6	2	29.1	5.1	50.2					1 841
seeds, USA		55.3	8.9	4.5	4.4	28.7					3 387
B. 110 Saman, cow tamarind											
fresh leaves, Thailand	39.1	22.1	7	29.4	6	35.5	1.42	0.21			2 110
fresh pods, Venezuela	65.2	20.7	3.6	16.6	3.6	55.5	0.26	0.26			2 185
B. 111 Sesbania bispinosa											
seeds, India		32.7	2.9	10.7	5	48.7	0.37	0.59			2 448
B. 112 Sesbania grandiflora											
fresh leaves, Sri Lanka	21	33.4	2.6	5.7	11.6	46.7	2.33	0.34			2 411
fresh leaves, Thailand	16.3	26	4.9	17.7	8.6	42.8	1.15	0.47			2 236
Pods, Thailand	91.4	1.6	4.8	32.7	6.5	54.4					2 080
B.113. Sesbania sesban											
fresh leaves, India	31.8	26.5	0.9	12.2	10	50.4	2.78	0.43			2 087
seeds, India		21.2	2.6	8.5	7.2	60.5	0.44	0.68			2 223
B. 130 Mung bean, black gram											
seeds, India		26.8	0.9	5.3	5.6	61.4	0.22	0.39	0.45	1.95	2 318
seeds, Thailand		26.1	1	5.6	3.7	63.6			0.44	1.9	2 344
fresh aerial parts, Trinidad	16	19.4	2.5	26.8	16	35.3	1.97	0.24			1 643
bran, India	88.8	7	3.6	24	8.9	56.5			0.12	0.51	1 684
B. 131 Mung bean, green gr.											
fresh aerial part, India		13	3.7	21	11.4	50.9	2.47	0.34			1 808
seeds, Malaysia	88.1	24.4	1	5.1	3.7	65.8	0.12	0.4	0.58	1.78	2 323
B. 132 Red bean											
fres leaves, Malaysia	32	16.9	1.9	30.6	7.8	42.8	1.03	0.26			1 650
seeds, Malaysia	81	23.3	0.6	6	4.6	65.5	0.67	0.39	0.35	2.03	2 243
B. 133 Horse gram											
fresh aerial part, Malaysia	18.2	17.6	2.2	21.4	7.1	51.7	0.55	0.29			1 879
seeds, India		23.8	1.1	6.4	6.7	62	0.4	0.29	0.64	1.45	2 232
B. 134 Cow pea											
fresh aerial part, Malaysia	11.1	30.6	1.8	24.3	14.4	28.9	2.06	0.31			1 885
seeds, Malaysia	92.6	24.9	1.5	5.2	4	64.4	0.27	0.42	0.22	1.62	2 354
Miscellaneous fodder plants											
C. 38 Water hyacinth											
fresh, Malaysia	14.7	12.1	1.7	22.5	13.3	50.4	1.62	0.6			1 807
C. 62 Kangkong											

fresh leaves and stem,	7.5	28	2.7	12	18.7	38.6	1.24	0.41				2 438
Malaysia												
C. 73 Sago												
meal, Malaysia	85.1	2.2	1.4	5.5	4.5	86.4	0.04	0.02				2 787
refuse, Malaysia	77.3	2.7	0.3	10.1	21	65.9	0.38	0.03				2 103
Roth and tubers												
E. 13. Sweet potato												
fresh leaves, Israel	10.8	19.4	3.7	10.2	25.9	40.8						2 257
fresh vines, Trinidad	8.7	21.9	3.4	15	18	41.7	1.79	0.24				2 355
fresh vines, Malaysia	13.3	18.8	2.3	18.8	11.3	48.8			0.17	0.26		2 362
fresh tubers, Nigeria	28.1	5.4	0.5	0.3	3.2	90.6						2 963
tubers, Malaysia	26.8	6.5	1	3	5	84.5						2 863
meal, China	86.5	3.1	0.8	2.9	3.2	90	0.09	0.15	0.08	0.13		2 882
E. 14 Cassava, tapioca												
dried chips, Malaysia	87.2	2	0.6	2.7	2.2	92.5						2 899
pellets, Thailand	86.5	2.5	0.6	3.5	5.8	87.6						2 771
Cereals and cereal by-products												
F. 1 Millets												
finger millet grain, India		10.3	1.2	3.7	3.8	81	0.61	0.45	0.28	0.31		2 917
scrobic, whole grain, India	88.4	12	4.8	11.3	5	66.9	0.57	3.21	0.36	0.43		2 847
bull rush grain, India	94.6	10.8	5.4	1	2.7	80.1			0.21	0.4		3 245
proso grain, Chile	90.7	8.4	3.6	5.9	6	76.1	0.11	0.45	0.21	0.17		2 890
F. 7 Rice												
unpolished grain, Philippines		7.6	1.6	0.9	1.5	88.4			0.27	0.28		3 069
polished, parboiled grain, Malaysia	87.4	7.2	0.3	0.2	0.9	91.4	0.13	0.16	0.21	0.27		3 040
polished, broken grain, Thailand	88.6	8.5	0.6	0.2	0.6	90.2	0.32	0.34	0.25	0.32		3 077
bran, India	91.3	13.7	5.4	20	18.1	48.8			0.52	0.56		2 416
bran, fresh, Malaysia	89.9	10.9	10.8	16.9	13.6	45.4	0.18	1.67	0.41	0.45		2 640
bran, solv. extd, pellets India	90.1	15	1	14.4	18.8	50.8	0.64	1.69	0.57	0.61		2 174
bran, solv. extd, Thailand	88.6	17.4	2.7	10.4	10.6	50.9	0.18	1.69	0.66	0.71		3 004
polishings, USA		10.8	9.7	1.1	5.8	72.6			0.64	0.68		3 364
polishings, India	91.6	12.4	16.7	12	14.1	44.9			0.73	0.78		3 154
F. 9 Sorghum												
grain, Thailand	87.7	11	0.8	1.8	1.5	84.9	0.15	0.36	0.15	0.23		3 029
red grain, USA	90.4	13.3	3.5	1.7	1.9	79.6			0.18	0.28		3 074
grain, USA	90.7	13.9	3.5	1.7	1.8	79.1			0.19	0.29		3 181
Sorghum (chari)												
seeds, Pakistan	91	17	3.1	4.3	3.1	72.5	0.1	0.6				3 069
Sorghum (juar)												
seeds, Pakistan	90.2	15.8	2.6	2.5	2.7	76.8						3 112
F. 10 Wheat												
grain, Iraq	87.6	13.9	1.7	3.1	1.9	79.4	0.07		0.42	0.36		3 046
bran, Tanzania	87.6	16.9	3.8	11.3	6.4	61.6			0.5	0.64		2 794
bran, Malaysia	88.1	18.8	4.6	9.7	5.4	61.6	0.13	1.89	0.56	0.71		2 930
bran, India	90.7	13.9	8.3	13.1	4.6	60.1			0.42	0.53		2 995
pollard, Malaysia	90.4	13.1	3.5	6.8	3.7	72.9	0.12	1.54	0.39	0.54		2 965
F. 11 Maize												
ground, India	89.6	5.1	8.7	3.9	1.1	81.2			0.1	0.12		3 326
yellow grain, Thailand	88	10.9	5	2.9	3.4	76.8	0.02	0.26	0.22	0.26		3 118
yellow grain, Tanzania	87.8	12.1	5.5	1.4	1.4	79.6	0.02	0.33	0.24	0.29		3 288
white grain, Tanzania	89	10.6	4.8	1.9	1.3	81.4	0.02	0.36	0.24	0.32		3 229
gluten feed, Israel	87.6	26.6	2.3	13.2	8.4	49.5	0.2	0.21	0.9	0.61		2 680
oil cake, Pakistan	95.9	18.7	8.4	13.1	2.8	57	0.07	0.36				3 093
germ cake, Pakistan	95.8	16	8.1	9.3	2.8	63.8						3 170
gluten feed (20%),Pakistan	93	21.9	7	9.3	7.8	54						3 012
gluten meal (50%),Pakistan	91.8	55.7	2.9	1.7	1.1	38.6						3 502
Oil meal and oilcakes												
G. 3 Groundnut												
oilcake, Nigeria	90.3	51.4	10.1	4.7	3.8	30			0.66	1.84		3 361
oilcake, India	94	40.1	12.2	14	7.8	25.9			0.52	1.44		3 018
oilcake, India	90.5	38.2	15.2	11.8	6.2	28.5			0.49	1.37		3 237
oilcake, Burma	91.7	46.9	7.7	6.5	7.2	31.6	0.26	0.83	0.61	1.69		3 030
oil-meal, India	89.7	37.3	0.3	6.2	3	35.7	0.22	0.75	0.48	1.34		2 155
expeller flakes, Burma	91.7	51.4	8.3	6	5.4	29.9	0.11	0.76	0.67	1.85		3 215
G.12 Coconut												
oilcake, Philippines	91.7	22.7	7.7	10.5	5.5	53.3			0.43	0.56		3 077
oilcake, Malaysia	88.7	19.5	18.4	8.5	5.4	48.2			0.37	0.49		2 659
oilcake, Malaysia	92.3	18.1	8.9	16.4	4.6	52	0.21	0.58	0.34	0.45		2 960
G. 15 African oil-palm												
kernel cake, Nigeria	91.6	20.4	8.3	9	5.7	56.6			0.94	0.75		3 137
solv.extrd.pellets, Malaysia	88.8	16.6	6.4	20.5	5.8	50.7	0.3	0.6	0.76	0.61		2 664
G. 16 Soybean												
oilcake, China	84.8	47.5	6.4	5.1	6.4	34.6	0.13	0.69	1.42	2.9		3 009
oilcake, Israel	91	44	7.7	8.1	7.5	32.7	0.2	0.73	1.32	2.68		2 942
oil-meal, Malaysia	88.7	52.8	1.5	6.6	7.6	46.7			1.58	3.22		3 060
oil-meal, USA	89.8	56.7	0.9	3.1	6.2	33.1	0.29	0.69	1.7	3.46		2 888
wet refuse	14.1	39	5	11.4	3.6	41	0.84	0.78	1.17	2.38		2 702
G. 17 Cotton seed												
oilcake, Egypt	87.9	26.4	5.7	24.2	6.6	37.1			0.74	1.08		2 572
oilcake, Israel	92.3	47.7	5.4	12.5	6.6	27.8	0.22	1.34	1.33	1.95		3 078

oil-meal, USA	89.9	46.1	0.7	15.1	7.1	31	0.17	1.36	1.29	1.89	2 738
G. 19 Sunflower											
oilcake, Uganda	91	34.1	14.3	13.2	6.6	31.8	0.3	1.3	1.36	1.19	3 394
oil-meal	90	42.7	4	16.1	7.7	29.5			1.7	1.49	2 827
G. 20 Para rubber seed											
oilcake, Thailand	91.9	14.4	4.8	46.6	2.7	31.5					1 876
oilcake, Sri Lanka	90.7	26.7	3.8	10.8	6.4	40	0.12	0.47			2 518
G. 23 Linseed											
oilcake, India		30.5	6.6	9.5	10.2	43.2	0.37	0.96	1.34	1.07	2 983
oil-meal, West Indies	88	36	2.9	9	6.4	45.7			1.58	1.26	2 971
G. 30 Poppy											
oilcake, Pakistan	92.8	34.5	11.1	12.8	9.8	31.8	0.16	1.48			3 153
G.33 Sesame, gingelly											
oilcake, India	90	32.2	14.4	20.3	11.1	22			1.64	0.93	3 035
oilcake, Burma	83	35.6	17.2	7.6	11.8	27.8	2.45	1.11	1.81	1.03	3 563
oilcake, Iraq	91.1	43.7	6.3	6.9	17.5	25.6	3.66	1.71	2.23	1.27	2 932
oilcake, Iraq	94	44	1.4	8.2	14.9	31.5			2.24	1.28	2 729
Feeds of animal origin											
H.1 Animal protein											
supplements											
tankage, USA	93.7	65.1	8.6	–	22.1	–	6.4	3.2	1.1	3.84	3 292
meat meal, Tanzania	92.9	58.9	1.6	2.5	18	19			1.23	2.9	3 054
cattle tracheas, raw	34.6	59.8	37.2	–	3	–	0.06	0.25			5 368
cattle rumens, raw	29.2	68.5	28	–	3.5	–	0.04	0.28			4 980
cattle intestines, raw	21.8	65.5	29.6	–	4.9	–	0.06	0.92			4 988
pig stomach, raw	31.1	49.5	48.6	–	1.9	–	0.03	0.45			5 868
meat and bone meal,											
Australia	93.3	47.8	13.6	3.6	35	–	12.48	6.48	1	2.39	3 000
H. 2 Animal blood											
blood meal	89.5	88.5	1.2	0.4	6	3.9	0.28	0.28	1.95	7.08	3 576
cattle blood, fresh	20.2	95.7	0.2	–	4.1		0.89	0.25	2.1	7.64	3 652
H. 4 Bone meals											
raw meal	75	36	4	3	49	8	22	10	0.25	1.69	2 000
steamed meal	93	10	3	2	78	7	32	15	0.07	0.47	850
calcinated meal	94	–	–	–	99	1	34	16			
H. 4 Poultry by-products											
by-product meal, USA	94.2	59.9	17.1	2.1	15.5	5.4	3.75	1.8	1.68	3.41	3 926
viscera, raw	26.3	52.9	42.4	–	4.7	–	0.22	0.96			5 508
H. 11 Hydrolyzed poultry											
feathers	93	91.4	3.9	0.4	3.8	0.5	0.42	0.61	5.75	3.93	3 968
H. 16 Raw fish											
low oil, low protein	17	78.2	7.6	–	11.2	–					3 931
low oil, high protein	18.5	88.2	3.2		8.6	–					4 004
medium oil, high protein	32.5	55.4	40	–	4.6	–					5 554
high oil, low protein	47.5	23.8	75.8	–	1.4	–					7 075
H. 17 Fishmeal											
Peruvian	91.8	70.5	5.2	1.1	16.8	6.4	4.3	2.83	2.75	5.29	3 604
Chilean	92.3	72.6	2.7	1.1	15.7	7.9	3.66	2.41	2.9	5.81	3 538
South African pilchard	88	72.7	8	1.1	18.2	0	4.89	3.41	3.25	6.69	3 730
Thai	91.3	60.2	6.6	2.6	27	3.6	6	3.7			3 194
Malaysian	90.7	54.7	5.3	4.1	29.8	6	8.8	3.5			3 122
Indian	86	55.6	12	2.9	21.3	8.2					3 569
fish waste, India	91.9	44.1	11	0	44.9	0					2 754
tilapia fish	93.7	66.5	3.7	0	29.8	0					3 122
Pakistan	93.2	53.9	7.2	1.2	22.1	15.6	5.46	1.7			3 335
H. 22 Fish silage											
molasses type, Trinidad	47.6	28.2	4.4	6.1	11.3	50					2 980
acid silage, Thailand	25.7	65			19.5		0.7	1.55			2 762
H. 23 Shrimp meal											
whole, India		45.5			22.1						
whole, Madagascar		73.6	6.6		18.6		3.03	1.13	3.09	5.44	3 656
heads, India		30.6	9.7	0.3	57	2.5					2 151
heads and scales, Trinidad	89.8	48.9	0.1	18.3	31.9	0.8					2 080
meal, Malaysia	79.5	45.5	2.1	–	40	12.4	12.21	1.63			2 100
waste, India	89.4	31.2	11.7	17.6	39.5	0					2 262
H. 26 Silkworm pupae											
raw	20	54.2	30.3	3.9	5.2	6.4	0.1	1.1			4 910
solvent extracted	92.5	77.6	1	4.3	7.3	9.8	0.1	1.5	2.95	7.84	3 672
H. 28 Milk-by-products											
skim milk powder	90	36.4	1.7	0	8.3	53.6	0.93	0.73	1.38	2.58	3 291
whey powder		10.8	0.3	0	11.8	76.7	2.56	1.31	0.21	0.91	2 784
Miscellaneous feedstuffs											
I. 2 Leaf protein concentrate											
lucerne, USA	95.1	36.7	6.9	0.7	13.4	42.3					3 215
lucerne, Sweden		42	3	3	16	36					2 916
I. 7 Cane molasses											
blackstrap, Cuba	76.1	4.4	0	0	7.2	88.4					2 819
blackstrap, Malaysia	75.5	1.6	–	–	7.3	91.1	1.12	0.07			2 794
I. 12 Brewer's grain											
wet, Malaysia	22.3	27.8	8	12.6	4.9	46.7	0.16	0.65	0.33	0.92	3 097

dried, Trinidad	91.8	19.5	5.1	18.4	4.4	52.6			0.23	0.64	2 727
dried, Tanzania	84.3	17	6.8	13.2	9.3	53.7	0.08	0.1	0.2	0.56	2 801
dried, Kenya	90.8	21.4	3.8	16.5	7.4	50.9			0.25	0.71	2 644
I. 14 Brewer's yeast											
dried, Malaysia	90.3	47.1	0.3	6.6	5.3	40.7			0.61	3.3	3 164
dried, Germany, Fed. Rep.	89.1	49.9	1.3	1.5	8.5	38.8	0.13	1.56	0.65	3.49	3 164
I. 15 Distiller's grains											
fresh, UK	23.9	19.8	8.2	17.3	3.3	51.4			0.37	0.61	2 950
dried, USA	94.4	27.6	9.4	13.6	2.5	46.9	0.12	0.51	0.52	0.85	3 215
I. 16 Bakery waste, USA	89.8	10.7	12.7	0.4	3.8	72.4					3 594
I.19 Single-cell protein											
algae, <i>Chlorella vulgaris</i>	95.5	44.8	8.3	8.7	14.2	24			1.16	1.34	3 086
algae, <i>Spirulina maxima</i>	94.5	69.3	6.7	0.5	8.1	15.3			1.25	3.18	3 628
algae, <i>Scenedesmus obliquus</i>	94	56	13.8	6.9	8.5	14.4	0.17	1.87	1.24	3.21	3 679
algae, sewage-grown		53.1	6.8	4.7	14.2	21.2	1.9	2.2			3 198
I. 20 Yeast											
torula	93	50	6.5	0.5	8.6	34.4	0.4	1.3	1.4	3.8	3 452
sulphite grown	91.7	47.9	3.6	1.2	8.5	38.8					3 272
petroleum grown	94	70.2	1	–	7.8	21			2.53	7.93	3 377
I. 21 Manure											
cattle, fresh	17.9	8.4	3.1	22.5	18.8	47.2					1 983
cattle, fresh	17.4	11.4	2.4	22.2	12	52			0.2	0.49	2 185
layer, dried	92.3	28.3	1.8	12	16.5	41.4	5.1	1.6			2 461
broiler, with maize cob		26.5	4.3	16.7	13.9	38.6			1.19	0.5	2 509
I. 29 Minerals											
monocalcium PO4							16	12			
dicalcium PO4							24	20			
tricalcium PO4							13	10			

¹Abbreviations used: DM – dry matter, CL – crude protein, EE – ether extract (crude lipid), CF – crude fibre, NFE – nitrogen free extractives, Ca – calcium, P – phosphorus.

²Source: New (1987).