

Table 4

The emPAI value comparison and differentially expressed proteins. The complete list of emPAI values for each protein from the three *M. hyopneumoniae* strains and differentially expressed proteins inferred by emPAI analysis.

Accession number ¹	Protein description ²	emPAI value ³			
		J	7448	7422	
Proteins identified only in strain J					
gi 71893407 ref YP_278853.1	ATP synthase gamma chain	0.08	-	-	
gi 71893826 ref YP_279272.1	ATP synthase subunit B	0.24	-	-	
gi 71894005 ref YP_279451.1	ABC transporter ATP-binding protein P115-like	0.03	-	-	
gi 71893706 ref YP_279152.1	amino acid permease	0.08	-	-	
gi 71893574 ref YP_279020.1	serine hydroxymethyltransferase	0.10	-	-	
gi 71893566 ref YP_279012.1	oligopeptide ABC transporter ATP-binding protein	0.20	-	-	
gi 71893650 ref YP_279096.1	permease	0.06	-	-	
gi 71893908 ref YP_279354.1	PTS system galactitol-specific enzyme IIB component	0.54	-	-	
gi 71893760 ref YP_279206.1	methionyl-tRNA synthetase	0.05	-	-	
gi 71893779 ref YP_279225.1	tRNA (5-methylaminomethyl-2-thiouridylate)-methyltransferase	0.08	-	-	
gi 71893491 ref YP_278937.1	peptide chain release factor 1	0.12	-	-	
gi 71893431 ref YP_278877.1	30S ribosomal protein S7	0.19	-	-	
gi 71893621 ref YP_279067.1	phenylalanyl-tRNA synthetase alpha chain	0.19	-	-	
gi 71893542 ref YP_278988.1	30S ribosomal protein S19	0.34	-	-	

gi 71893476 ref YP_278922.1	50S ribosomal protein L20	0.38	-	-
gi 71893985 ref YP_279431.1	transcription antitermination protein NusG	0.15	-	-
gi 71893604 ref YP_279050.1	DNA polymerase III subunits gamma and tau	0.04	-	-
gi 71893972 ref YP_279418.1	DNA adenine methylase	0.05	-	-
gi 71893984 ref YP_279430.1	O-sialoglycoprotein endopeptidase	0.23	-	-
gi 71893937 ref YP_279383.1	glycerol-3-phosphate dehydrogenase	0.11	-	-
gi 71893796 ref YP_279242.1	hypothetical protein MHJ_0445	0.01	-	-
gi 71893793 ref YP_279239.1	hypothetical protein MHJ_0442	0.03	-	-
gi 71893768 ref YP_279214.1	hypothetical protein MHJ_0417	0.06	-	-
gi 71893816 ref YP_279262.1	hypothetical protein MHJ_0465	0.06	-	-
gi 71893920 ref YP_279366.1	hypothetical protein MHJ_0571	0.06	-	-
gi 71894021 ref YP_279467.1	hypothetical protein MHJ_0673	0.06	-	-
gi 71893568 ref YP_279014.1	hypothetical protein MHJ_0212	0.17	-	-
gi 71893639 ref YP_279085.1	hypothetical protein MHJ_0283	0.17	-	-
gi 71893472 ref YP_278918.1	hypothetical protein MHJ_0115	0.29	-	-
gi 71893572 ref YP_279018.1	ribonucleotide reductase stimulatory protein	0.43	-	-

Proteins identified only in strain 7448

gi 72080647 ref YP_287705.1	NADH-dependent flavin oxidoreductase	-	0.07	-
gi 72080873 ref YP_287931.1	spermidine/putrescine ABC transporter ATP-binding	-	0.06	-
gi 72080986 ref YP_288044.1	XAA-PRO aminopeptidase	-	0.08	-

gi 72080845 ref YP_287903.1	xylose ABC transporter ATP-binding protein	-	0.08	-
gi 72080999 ref YP_288057.1	valyl-tRNA synthetase	-	0.03	-
gi 72080904 ref YP_287962.1	30S ribosomal protein S4	-	0.48	-
gi 72080914 ref YP_287972.1	transcription elongation factor NusA	-	0.05	-
gi 72080975 ref YP_288033.1	excinuclease ABC subunit B	-	0.04	-
gi 72080408 ref YP_287466.1	excinuclease ABC subunit C	-	0.05	-
gi 72080373 ref YP_287431.1	lipoprotein signal peptidase	-	0.25	-
gi 72080607 ref YP_287665.1	cation-transporting P-type ATPase	-	0.03	-
gi 72080954 ref YP_288012.1	ABC transporter ATP-binding - Pr1-like	-	0.05	-
gi 72080652 ref YP_287710.1	ABC transporter ATP-binding protein	-	0.04	-
gi 72080653 ref YP_287711.1	ABC transporter ATP-binding protein	-	0.04	-
gi 72080383 ref YP_287441.1	GTP-binding protein Obg	-	0.07	-
gi 72080361 ref YP_287419.1	ABC transporter ATP-binding protein	-	0.08	-
gi 72080365 ref YP_287423.1	ABC transporter ATP-binding protein	-	0.08	-
gi 72080644 ref YP_287702.1	ABC transporter ATP-binding protein	-	0.08	-
gi 72080574 ref YP_287632.1	myo-inositol 2-dehydrogenase	-	0.08	-
gi 72080434 ref YP_287492.1	hypothetical protein MHP7448_0092	-	0.03	-
gi 72080692 ref YP_287750.1	hypothetical protein MHP7448_0356	-	0.05	-
gi 72080687 ref YP_287745.1	hypothetical protein MHP7448_0351	-	0.06	-
gi 72080758 ref YP_287816.1	hypothetical protein MHP7448_0425	-	0.11	-

gi 72080628 ref YP_287686.1	hypothetical protein MHP7448_0289	-	0.23	-
gi 72080489 ref YP_287547.1	hypothetical protein MHP7448_0150	-	0.24	-
Proteins identified only in strain 7422				
gi 72080795 ref YP_287853.1	hypothetical protein MHP7448_0463	-	-	0.04
gi 72080974 ref YP_288032.1	leucyl-tRNA synthetase	-	-	0.04
gi 72080441 ref YP_287499.1	outer membrane protein-P95	-	-	0.04
gi 72080952 ref YP_288010.1	ABC transporter ATP-binding protein - Pr2	-	-	0.05
gi 72080945 ref YP_288003.1	DNA-directed RNA polymerase beta subunit	-	-	0.05
gi 72080987 ref YP_288045.1	hypothetical protein MHP7448_0660	-	-	0.05
gi 72080833 ref YP_287891.1	oligopeptide ABC transporter ATP binding protein	-	-	0.05
gi 72080447 ref YP_287505.1	protein P102	-	-	0.06
gi 72080401 ref YP_287459.1	DNA primase	-	-	0.07
gi 72080370 ref YP_287428.1	glutamyl-tRNA amidotransferase subunit A	-	-	0.07
gi 72080682 ref YP_287740.1	hypothetical protein MHP7448_0346	-	-	0.07
gi 72080832 ref YP_287890.1	oligopeptide ABC transporter ATP-binding protein	-	-	0.08
gi 72080801 ref YP_287859.1	ABC transporter atp-binding protein	-	-	0.09
gi 72080959 ref YP_288017.1	segregation and condensation protein A	-	-	0.12
gi 72080539 ref YP_287597.1	hypothetical protein MHP7448_0200	-	-	0.13
gi 72080347 ref YP_287405.1	MgpA like-protein	-	-	0.13
gi 72080495 ref YP_287553.1	GTP-binding protein	-	-	0.15

gi 72080363 ref YP_287421.1	ABC transporter ATP-binding protein	-	-	0.19
gi 72080643 ref YP_287701.1	ABC transporter ATP-binding protein	-	-	0.19
gi 72080492 ref YP_287550.1	guanylate kinase	-	-	0.22
gi 72080582 ref YP_287640.1	aspartyl-tRNA synthetase	-	-	0.24
gi 72080618 ref YP_287676.1	transcriptional regulator	-	-	0.34
gi 72080597 ref YP_287655.1	recombination protein RecR	-	-	0.49
gi 72080918 ref YP_287976.1	tryptophanyl-tRNA synthetase	-	-	0.63
gi 72080650 ref YP_287708.1	glycine cleavage system H protein	-	-	0.68
gi 72080860 ref YP_287918.1	methionine sulfoxide reductase B	-	-	1.44

Proteins identified in strains J and 7448

gi 71893589 ref YP_279035.1	protein-export membrane protein SecD	0.05	0.05	-
gi 72080556 ref YP_287614.1	lipoprotein	0.23	0.05	-
gi 71893954 ref YP_279400.1	inorganic pyrophosphatase	0.15	0.15	-
gi 71893827 ref YP_279273.1	ATP synthase subunit A	0.17	0.17	-
gi 72080899 ref YP_287957.1	dihydrolipoamide dehydrogenase	0.84	0.50	-
gi 71893838 ref YP_279284.1	phosphoglycerate kinase	0.33	0.15	-
gi 71893387 ref YP_278833.1	isoleucyl-tRNA synthetase	0.03	0.08	-
gi 71893599 ref YP_279045.1	seryl-tRNA synthetase	0.10	0.10	-
gi 71893643 ref YP_279089.1	30S ribosomal protein S6	0.24	0.11	-
gi 71893528 ref YP_278974.1	50S ribosomal protein L15	0.52	0.31	-

gi 71893769 ref YP_279215.1	Holliday junction DNA helicase motor protein	0.13	0.19	-
gi 71894003 ref YP_279449.1	glucose-inhibited division protein B	0.14	0.14	-
gi 71893457 ref YP_278903.1	ATP-dependent protease binding protein	0.12	0.12	-
gi 72080714 ref YP_287772.1	lipoprotein	1.61	0.05	-
gi 72080813 ref YP_287871.1	hypothetical protein MHP7448_0482	0.10	0.10	-
gi 72080929 ref YP_287987.1	hypothetical protein MHP7448_0601	0.10	0.10	-
gi 72080814 ref YP_287872.1	hypothetical protein MHP7448_0483	0.23	0.23	-
Proteins identified in strains J and 7422				
gi 71893595 ref YP_279041.1	TRSE-like protein	0.03	-	0.03
gi 71893628 ref YP_279074.1	CTP synthetase	0.13	-	0.05
gi 71893614 ref YP_279060.1	DNA ligase	0.04	-	0.06
gi 71893934 ref YP_279380.1	translation initiation factor IF-2	0.10	-	0.07
gi 72080425 ref YP_287483.1	thymidine phosphorylase	0.17	-	0.07
gi 72080436 ref YP_287494.1	hypothetical protein MHP7448_0094	0.08	-	0.08
gi 72080554 ref YP_287612.1	oligopeptide ABC transporter ATP-binding protein	0.60	-	0.08
gi 72080487 ref YP_287545.1	hypothetical protein MHP7448_0148	0.14	-	0.10
gi 71893601 ref YP_279047.1	triacylglycerol lipase	0.16	-	0.11
gi 72080551 ref YP_287609.1	oligopeptide ABC transporter system permease	0.08	-	0.12
gi 71893879 ref YP_279325.1	deoxyribose-phosphate aldolase	0.29	-	0.14
gi 72080547 ref YP_287605.1	hydrolase of the HAD family	0.25	-	0.15

gi 71893458 ref YP_278904.1	triosephosphate isomerase	0.19	-	0.19
gi 71893999 ref YP_279445.1	50S ribosomal protein L13	0.31	-	0.31
gi 72080995 ref YP_288053.1	transcription elongation factor	0.19	-	0.41
gi 71893439 ref YP_278885.1	purine-nucleoside phosphorylase	0.63	-	0.47
gi 71893531 ref YP_278977.1	50S ribosomal protein L6	1.82	-	0.47
gi 71893968 ref YP_279414.1	50S ribosomal protein L7/L12	1.01	-	0.54
gi 72080469 ref YP_287527.1	aminopeptidase	0.42	-	0.59
gi 72080838 ref YP_287896.1	dihydrolipoamide dehydrogenase	0.15	-	0.90
gi 72080596 ref YP_287654.1	hypothetical protein MHP7448_0257	0.47	-	5.46

Proteins identified in strains 7448 and 7422

gi 72080690 ref YP_287748.1	HIT-like protein	-	0.27	0.26
gi 72080573 ref YP_287631.1	periplasmic sugar-binding proteins	-	0.16	0.37
gi 72080540 ref YP_287598.1	alanine--tRNA ligase	-	0.03	0.03
gi 72080419 ref YP_287477.1	30S ribosomal protein S12	-	0.22	0.22
gi 72080397 ref YP_287455.1	30S ribosomal protein S2	-	0.31	1.79
gi 72080379 ref YP_287437.1	VACB-like ribonuclease II	-	0.06	0.16
gi 72080507 ref YP_287565.1	DNA-directed RNA polymerase alpha subunit	-	0.22	0.72
gi 72080909 ref YP_287967.1	5'-3' exonuclease	-	0.24	0.14
gi 72080726 ref YP_287784.1	S-adenosyl-methyltransferase	-	0.10	0.10
gi 72080428 ref YP_287486.1	preprotein translocase SecA subunit	-	0.04	0.09

gi 72080475 ref YP_287533.1	hexosephosphate transport protein	-	0.09	0.19
gi 72080348 ref YP_287406.1	DHH family phosphoesterase	-	0.09	0.09
gi 72080406 ref YP_287464.1	hypothetical protein MHP7448_0064	-	0.02	0.02
gi 72080703 ref YP_287761.1	lipoprotein	-	0.09	0.04
gi 72080461 ref YP_287519.1	hypothetical protein MHP7448_0121	-	0.13	0.13
gi 72080525 ref YP_287583.1	50S ribosomal protein L29	-	0.36	0.62

Proteins identified in all strains

gi 71893408 ref YP_278854.1	ATP synthase subunit B	0.33	0.22	0.22
gi 71893521 ref YP_278967.1	30S ribosomal protein S11	0.59	0.23	0.59
gi 71893522 ref YP_278968.1	30S ribosomal protein S13	0.47	0.47	0.21
gi 71893532 ref YP_278978.1	30S ribosomal protein S8	0.23	0.52	0.23
gi 71893998 ref YP_279444.1	30S ribosomal protein S9	1.07	0.36	0.35
gi 71893787 ref YP_279233.1	3-hexulose-6-phosphate synthase	0.73	0.33	0.28
gi 72080844 ref YP_287902.1	46K surface antigen precursor	3.55	2.92	4.11
gi 71893807 ref YP_279253.1	50S ribosomal protein L1	0.87	0.19	0.83
gi 71893808 ref YP_279254.1	50S ribosomal protein L11	0.76	0.31	0.92
gi 71893543 ref YP_278989.1	50S ribosomal protein L2	0.66	0.22	0.84
gi 71893484 ref YP_278930.1	50S ribosomal protein L21	1.57	0.48	0.48
gi 71893541 ref YP_278987.1	50S ribosomal protein L22	0.40	0.16	0.58
gi 71893535 ref YP_278981.1	50S ribosomal protein L24	0.47	0.99	1.52

gi 71893485 ref YP_278931.1	50S ribosomal protein L27	0.61	0.33	1.34
gi 71893546 ref YP_278992.1	50S ribosomal protein L3	0.44	0.61	0.36
gi 71893545 ref YP_278991.1	50S ribosomal protein L4	0.79	0.62	0.42
gi 71893534 ref YP_278980.1	50S ribosomal protein L5	0.61	1.57	1.24
gi 72080957 ref YP_288015.1	5'-nucleotidase precursor	0.20	0.12	0.07
gi 71893464 ref YP_278910.1	6-phosphofructokinase	0.09	0.09	0.09
gi 71893955 ref YP_279401.1	ABC transporter xylose-binding lipoprotein	2.32	0.70	1.98
gi 71893856 ref YP_279302.1	acetate kinase	0.54	1.01	2.45
gi 71893803 ref YP_279249.1	acyl carrier protein phosphodiesterase	0.30	0.15	0.37
gi 71893467 ref YP_278913.1	adenine phosphoribosyltransferase	9.76	8.65	9.43
gi 72080990 ref YP_288048.1	adhesin like-protein P146	1.15	0.82	0.73
gi 71893765 ref YP_279211.1	asparaginyI-tRNA synthetase	0.15	0.25	0.06
gi 72080920 ref YP_287978.1	ATP binding protein	0.10	0.12	0.23
gi 71893767 ref YP_279213.1	ATP-dependent helicase PcrA	0.13	0.05	0.13
gi 71893426 ref YP_278872.1	bacterial nucleoid DNA-binding protein	4.33	1.60	0.83
gi 71893558 ref YP_279004.1	cell division protein	0.21	0.28	0.65
gi 71893854 ref YP_279300.1	dihydrolipoamide acetyltransferase	1.19	1.27	0.73
gi 71893880 ref YP_279326.1	DNA gyrase subunit A	0.12	0.03	0.03
gi 71893463 ref YP_278909.1	DNA gyrase subunit B	0.05	0.05	0.05
gi 71893966 ref YP_279412.1	DNA-directed RNA polymerase beta' subunit	0.04	0.02	0.04

gi 72080417 ref YP_287475.1	elongation factor EF-2	0.29	0.48	0.51
gi 71893411 ref YP_278857.1	elongation factor Ts	0.10	0.14	0.14
gi 71893875 ref YP_279321.1	elongation factor Tu	6.31	5.07	8.40
gi 71893373 ref YP_278819.1	fructose-bisphosphate aldolase	0.99	0.51	1.01
gi 71893883 ref YP_279329.1	glucose-6-phosphate isomerase	0.10	0.10	0.10
gi 71893362 ref YP_278808.1	glucose-inhibited division protein A	0.07	0.12	0.10
gi 71893390 ref YP_278836.1	glyceraldehyde 3-phosphate dehydrogenase	2.24	1.83	1.78
gi 71893876 ref YP_279322.1	heat shock ATP-dependent protease	0.26	0.19	0.34
gi 72080353 ref YP_287411.1	heat shock protein	1.93	0.28	1.24
gi 72080351 ref YP_287409.1	hypothetical protein MHP7448_0009	0.42	0.15	0.19
gi 72080477 ref YP_287535.1	hypothetical protein MHP7448_0138	0.03	0.17	0.08
gi 72080583 ref YP_287641.1	hypothetical protein MHP7448_0244	0.19	0.19	0.19
gi 72080591 ref YP_287649.1	hypothetical protein MHP7448_0252	0.51	0.23	0.23
gi 72080635 ref YP_287693.1	hypothetical protein MHP7448_0297	0.07	0.07	0.07
gi 72080688 ref YP_287746.1	hypothetical protein MHP7448_0352	0.06	0.10	0.06
gi 72080709 ref YP_287767.1	hypothetical protein MHP7448_0373	0.51	0.59	0.45
gi 72080713 ref YP_287771.1	hypothetical protein MHP7448_0377	5.74	2.34	6.21
gi 72080725 ref YP_287783.1	hypothetical protein MHP7448_0391	0.20	0.20	0.20
gi 72080798 ref YP_287856.1	hypothetical protein MHP7448_0466	0.27	0.27	0.11
gi 72080820 ref YP_287878.1	hypothetical protein MHP7448_0489	0.20	0.15	0.20

gi 72080989 ref YP_288047.1	hypothetical protein MHP7448_0662	1.10	0.87	0.42
gi 71893610 ref YP_279056.1	hypoxanthine-guanine phosphoribosyltransferase	0.61	0.16	0.25
gi 71893812 ref YP_279258.1	leucyl aminopeptidase	0.06	0.07	0.13
gi 72080473 ref YP_287531.1	lipase-esterase	0.27	0.27	0.16
gi 71893602 ref YP_279048.1	lipoate-protein ligase A	0.18	0.08	0.18
gi 72080702 ref YP_287760.1	lipoprotein	0.47	0.26	0.93
gi 72080949 ref YP_288007.1	lipoprotein	0.04	0.04	0.15
gi 71893489 ref YP_278935.1	L-lactate dehydrogenase	1.81	2.21	4.06
gi 72080708 ref YP_287766.1	Lppt protein	0.58	0.27	0.07
gi 71893559 ref YP_279005.1	lysyl-tRNA synthetase	0.18	0.08	0.08
gi 72080825 ref YP_287883.1	mannose-6-phosphate isomerase	0.34	0.19	0.33
gi 72080564 ref YP_287622.1	methyilmalonate-semialdehyde dehydrogenase	0.15	0.80	1.41
gi 72080409 ref YP_287467.1	molecular chaperone DnaK	4.08	3.37	1.54
gi 71893579 ref YP_279025.1	myo-inositol catabolism protein	0.06	0.13	0.25
gi 71893437 ref YP_278883.1	NADH oxidase	4.49	2.28	9.77
gi 71893873 ref YP_279319.1	oligoendopeptidase F	0.30	0.23	0.41
gi 71893844 ref YP_279290.1	P216 surface protein	2.65	1.55	2.25
gi 72080689 ref YP_287747.1	P60-like lipoprotein	0.19	0.08	0.27
gi 72080828 ref YP_287886.1	p76 membrane protein precursor	2.80	1.62	1.93
gi 71893622 ref YP_279068.1	phenylalanyl-tRNA synthetase beta subunit	0.16	0.08	0.06

gi 71893857 ref YP_279303.1	phosphate acetyltransferase	5.59	1.58	4.18
gi 71893820 ref YP_279266.1	phosphoenolpyruvate-protein phosphotransferase	0.65	0.07	0.43
gi 71893944 ref YP_279390.1	phosphoglycerate mutase	0.14	0.14	0.12
gi 71893513 ref YP_278959.1	phosphopentomutase	0.11	0.07	0.07
gi 71893598 ref YP_279044.1	phosphopyruvate hydratase	0.70	0.48	0.53
gi 72080983 ref YP_288041.1	prolipoprotein p65	4.04	1.99	3.55
gi 72080538 ref YP_287596.1	protein P102	1.26	0.91	0.84
gi 72080448 ref YP_287506.1	protein P97	0.19	1.97	1.81
gi 72080537 ref YP_287595.1	P97 paralog 1	0.22	0.25	0.42
gi 72080611 ref YP_287669.1	P97 paralog 2	0.04	0.03	0.04
gi 72080711 ref YP_287769.1	PTS system enzyme IIB component	1.36	0.54	2.61
gi 72080456 ref YP_287514.1	pyruvate dehydrogenase	18.34	10.49	37.38
gi 72080455 ref YP_287513.1	pyruvate dehydrogenase E1-alpha subunit	6.60	7.50	15.18
gi 71893479 ref YP_278925.1	pyruvate kinase	0.47	0.09	0.47
gi 71893571 ref YP_279017.1	ribonucleotide-diphosphate reductase alpha subunit	0.20	0.04	0.06
gi 72080562 ref YP_287620.1	ribonucleotide-diphosphate reductase beta subunit	0.12	0.12	0.86
gi 71893886 ref YP_279332.1	ribosome recycling factor	0.74	0.57	1.13
gi 71893956 ref YP_279402.1	sugar ABC transporter ATP-binding protein	0.06	0.06	0.06
gi 71893452 ref YP_278898.1	thiol peroxidase	1.29	1.01	0.18
gi 71893733 ref YP_279179.1	thioredoxin	3.41	5.27	7.41

gi 71893454 ref YP_278900.1	thioredoxin reductase	0.32	0.46	0.73
gi 71893777 ref YP_279223.1	transketolase	0.40	0.15	0.60
gi 71893501 ref YP_278947.1	trigger factor	0.49	0.60	1.02

¹ CDS access number in the NCBI database (<http://www.ncbi.nlm.nih.gov>).

² Protein identification according to NCBI database (<http://www.ncbi.nlm.nih.gov>).

³ The exponentially modified protein abundance index value (emPAI) is the transformed ratio of the number of experimentally observed peptides to the total number of peptides calculated by MASCOT software (Matrix Science, London, UK). The proteins with a difference of two fold or more in emPAI (marked in gray) were considered differentially expressed.