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Forage quality declines with rising temperatures, with implications for livestock production and methane emissions

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Table S1: Sites included in the database, detailing latitude, longitude, Mean Annual Temperature (MAT, °C), Mean Annual Rainfall (MAR, mm) and altitude (m). The site with no climatic data is indicated by an em-rule (–). Some sites did not contribute both NDF and CP values.

Site	Country	Latitude	Longitude	MAT	MAR	Altitude
Calden[1]	Argentina	-38.450	-63.750	15.0	400.0	95
Buenos Aires[2]	Argentina	-37.183	-62.133	15.9	602.7	181
Mutdapily[3]	Australia	-27.767	152.667	19.9	815.0	40
Pernambuco[4]	Brazil	-8.014	-34.951	25.7	2310.3	23
Lacombe[5]	Canada	52.467	-113.733	2.4	466.0	855
Melfort[5]	Canada	52.817	-104.600	0.7	439.0	483
Alberta[6]	Canada	53.756	-113.339	3.0	455.8	674
Fredericton[7]	Canada	45.917	-66.604	5.6	1065.0	26
Gansu[8]	China	37.667	103.533	-1.0	385.7	3000
Fodder Research[9]	Czech Republic	49.517	15.967	6.9	617.0	560
Grange[10,11,12,13]	Ireland	53.500	-6.670	6.3	877.3	83
Moorepark[14]	Ireland	52.163	-8.260	10.0	1040.0	70
Tohoku[15]	Japan	39.733	141.133	9.3	1180.0	110
Ohda[16]	Japan	35.167	132.500	15.9	1603.9	53
Sumiyoshi[17]	Japan	31.983	131.467	17.3	2378.0	11
Nuevo Leon[18]	Mexico	25.717	-100.033	22.0	500.0	393
Sauces Ranch[19]	Mexico	25.407	-99.776	22.0	360.0	272
Chifeng[20]	Mongolia	42.261	118.931	4.5	380.0	900
Wageningen[21]	Netherlands	51.967	5.667	9.3	771.4	7
Lincoln[22]	New Zealand	-43.633	172.467	11.5	581.2	22
Waimate North[23]	New Zealand	-35.300	173.900	–	–	83
Quassim[24]	Saudi Arabia	26.308	43.767	24.7	160.6	652
Alpine region[25]	Slovenia	46.050	14.467	10.8	914.8	300
Atatürk[26]	Turkey	39.917	41.267	4.4	37.9	1850
Black Sea[27]	Turkey	41.244	36.510	14.6	709.3	4
Erzurum[28]	Turkey	39.906	41.271	5.7	409.4	1905
Aberystwyth[29]	United Kingdom	52.367	-4.083	10.0	1174.0	100
Ty Gwyn[30]	United Kingdom	52.267	-4.083	10.0	1823.8	257
Fort Keogh[31]	United States	46.367	-105.083	8.2	498.3	719
Ithaca[32]	United States	42.440	-76.500	8.4	963.9	120
Logan[33]	United States	41.767	-111.817	9.1	509.6	1406
Mount Pleasant[32]	United States	41.110	-73.810	11.5	1327.0	100

[1] Distel et al., 2005, [2] Catanese et al., 2009, [3]Callow et al., 2003, [4]dos Santos et al., 2003, [5]McCartney et al., 2008, [6]Suleiman et al., 1999, [7]Bélanger and Mcqueen, 1997, [8]Dong et al., 2003, [9]Skladanka et al., 2010, [10]Conaghan et al., 2008[11]Keating and O'Kiely, 2000, [12]King et al., 2012, [13]Mceniry et al., 2014, [14]Beecher et al., 2015, [15] Nashiki et al., 2005, [16]Kobayashi et al., 2008, [17]Hirata et al., 2008, [18,19]Ramirez, 2007, [20]Zhao et al., 2012, [21]Smit et al., 2005, [22]Bryant et al., 2012, [23]Ulyatt et al., 2002, [24]Al-Ghumaiz and Motawei, 2011, [25]Čop et al., 2009, [26]Akgun et al., 2008, [27] Surmen et al., 2013, [28]Sahin et al., 2012, [29]Lee et al., 2001, [30]Weller and Cooper, 2001, [31]Haferkamp and Grings, 2002, [32]Cherney and Cherney, 1997, [33]Griggs et al., 2007

Table S2: Species included in the database showing NDF (% DM) and CP (% DM) mean, standard deviation (SD), maximum (Max) and minimum (Min) values. Hybridised species are denoted by a multiplication sign (x).

	NDF (% DM)				CP (% DM)			
	Mean	SD	Max	Min	Mean	SD	Max	Min
Agropyron cristatum	–	–	–	–	17	7	36	8
Agropyron intermedium	–	–	–	–	16	5	26	9
Agropyron riparium	–	–	–	–	16	3	23	11
Agropyron trachycaulum	–	–	–	–	15	5	25	10
Agropyron trichophorum	–	–	–	–	16	5	27	11
Alopecurus pratensis	58	9	70	39	15	4	24	8
Aristida longiseta	87	1	88	85	–	–	–	–
Arrhenatherum elatius	61	1	61	60	8	1	9	7
Bouteloua curtipendula	74	3	79	72	11	3	14	8
Bouteloua gracilis	83	5	90	77	–	–	–	–
Bouteloua trifida	74	3	76	70	11	4	15	8
Brachiaria brizantha	75	–	75	75	7	–	7	7
Brachiaria fasciculata	64	5	72	60	14	4	18	10
Bromus inermis	–	–	–	–	16	6	26	7
Cenchrus ciliaris	76	2	78	74	–	–	–	–
Cenchrus incertus	77	3	80	74	–	–	–	–
Chloris ciliata	70	3	72	65	13	3	18	10
Dactylis glomerata	58	5	64	43	14	4	26	9
Digitaria insularis	72	2	75	70	11	3	13	7
Echinochloa crusgalli	64	2	66	63	11	1	12	10
Elymus nutans	–	–	–	–	14	1	15	13
Elymus sibiricus	–	–	–	–	14	8	26	5
Elytrigia intermediata	–	–	–	–	20	9	32	6
Eremochloa ophiuroides	–	–	–	–	12	3	20	8
Festuca arundinacea	57	3	60	53	15	4	23	9
Festuca arundinacea x *Lolium multiflorum*	58	2	61	56	8	1	9	8
Festuca pratensis	–	–	–	–	11	1	12	11
Festuca rubra	–	–	–	–	17	3	21	11
Hilaria belangeri	79	4	83	75	–	–	–	–
Holcus lanatus	54	9	65	39	11	4	19	5
Hordeum brevisubulatum	–	–	–	–	14	1	15	13
Leptochloa filiformis	70	4	75	67	12	2	15	10
Lolium multiflorum	46	6	56	36	15	5	28	6
Lolium multiflorum × *Festuca pratensis*	–	–	–	–	12	1	13	12
Lolium perenne	50	8	62	34	18	8	34	7
Lolium perenne × *Festuca pratensis*	–	–	–	–	11	0	11	10
Panicum hallii	71	3	76	67	13	5	18	8
Panicum obtusum	65	8	74	55	14	2	17	12
Pascopyrum smithii	–	–	–	–	18	6	26	7
Paspalum notatum	–	–	–	–	12	3	19	9
Paspalum unispicatum	68	2	70	64	11	3	13	9
Pennisetum clandestinum	46	4	48	43	23	1	23	22
Pennisetum maximum	78	1	79	77	7	0	7	7
Pennisetum purpureum	69	1	70	68	9	1	10	9

Phalaris arundinacea	58	5	67	52	–	–	–	–
Phleum pratense	51	8	67	36	15	4	23	9
Poa crymophila	–	–	–	–	13	5	20	8
Rhynchelytrum repens	72	2	74	69	10	2	11	7
Roegneria turczaninovii	–	–	–	–	15	1	16	14
Setaria grisebachii	72	8	81	61	14	4	17	9
Setaria macrostachya	74	7	86	63	13	2	16	11
Stipa clarazii	55	2	57	54	16	6	22	11
Stipa eriostachya	66	6	69	59	10	5	16	7
Tridens eragrostoides	73	2	76	71	13	2	17	11
Tridens muticus	75	3	78	72	11	4	16	8