

### Supplementary Material

#### **Predicting the extent to which excess lipid is deposited in the physical components of a broiler when dietary protein content is reduced**

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**Table S1.** Mean body weight, body protein weight and body lipid weight of female (F) and male (M) broilers of two strains at 14, 28, 42 and 56 d, fed a range of balanced protein (BP) feeds.

BP <sup>1</sup>	14 d				28 d				42 d				56 d			
	Cobb		Ross		Cobb		Ross		Cobb		Ross		Cobb		Ross	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
<b>Mean body weight (g)</b>																
0.60	358	390	347	322	995	1021	874	932	1815	1911	1810	1863	2849	3156	2666	2960
0.70	398	444	371	387	1136	1270	1165	1175	2068	2375	2090	2363	3131	3619	3151	3763
0.85	448	469	408	433	1218	1439	1207	1352	2356	2786	2358	2774	3244	4224	3411	4111
1.00	460	500	431	437	1287	1463	1292	1434	2285	2929	2363	2936	3434	4105	3303	4431
1.15	438	479	412	446	1318	1472	1228	1495	2386	2896	2311	2971	3355	4318	3514	4473
1.30	437	461	403	423	1231	1475	1299	1406	2276	2926	2427	3030	3241	4054	3348	4445
SEM	5.31	6.12	4.12	3.98	11.6	11.9	11.7	12.7	22.0	28.2	21.9	30.8	37.5	39.8	26.5	50.0
<b>Body protein weight (g)</b>																
0.60	54.3	57.4	50.8	48.6	145	146	123	136	258	285	262	271	354	406	331	390
0.70	57	66	55.7	61.0	168	187	170	174	302	368	310	355	416	504	419	535
0.85	66.3	66	62.9	67.3	187	223	182	209	360	440	368	449	485	661	500	643
1.00	69.9	75.5	65.2	66.6	202	232	204	228	362	474	377	491	539	654	508	718
1.15	66.2	71.3	62.3	68.3	209	242	195	240	386	484	377	503	530	707	541	742
1.30	66.6	69.6	60.0	65.0	198	243	209	230	370	490	397	516	513	672	514	743
SEM	1.09	0.97	0.86	0.94	1.09	0.97	2.01	2.66	3.82	6.00	5.00	6.00	6.50	8.50	4.30	8.20
<b>Body lipid weight (g)</b>																
0.60	50.6	48.1	45.9	35.3	206	189	171	159	398	374	381	358	736	757	674	655
0.70	53.1	52.6	47.2	42.5	207	226	221	200	417	436	411	422	721	799	728	787
0.85	52.5	51.1	47.8	44.3	189	210	184	183	410	429	402	424	614	699	624	639
1.00	48.3	57.8	40.5	39.2	167	180	164	157	310	362	325	350	519	574	523	620
1.15	36.9	43.9	33.2	34.9	130	139	112	129	274	294	257	293	504	520	530	477
1.30	35.4	35	31.5	31.1	105	101	104	96.1	209	273	226	272	502	385	485	415
SEM	1.59	1.33	1.06	0.98	3.45	3.49	2.74	3.92	8.50	6.90	5.80	7.00	14.9	17.4	10.2	12.9

<sup>1</sup>Balanced protein content as a proportion of that recommended by Rostagno et al. (2017).

**Table S2. Mean weights of carcass and components of male (M) and female (F) broilers of Cobb and Ross strains, at 14, 28, 42 and 56 days, fed increasing levels of balanced protein<sup>1</sup> (BP)**

BP	14 days				28 days				42 days				56 days			
	Ross		Cobb		Ross		Cobb		Ross		Cobb		Ross		Cobb	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
<i>Carcass weight (g)</i>																
0.60	248	263	286	268	654	609	722	710	1339	1350	1379	1348	2274	2076	2458	2196
0.70	300	296	337	298	838	826	913	809	1788	1598	1831	1573	2875	2483	2877	2430
0.85	329	313	367	339	979	876	1061	902	2101	1811	2196	1801	3295	2804	3432	2619
1.00	330	323	366	339	1049	964	1110	968	2245	1866	2238	1755	3590	2693	3331	2731
1.15	325	315	329	331	1104	893	1085	979	2306	1844	2285	1841	3634	2799	3507	2664
1.30	316	310	339	325	1075	959	1105	934	2356	1904	2277	1787	3365	2689	3266	2607
RMSE	13.3				46.5				89.5				132			
<i>Breast weight (g)</i>																
0.60	72	77	78	75	201	182	224	217	397	408	415	396	656	645	791	680
0.70	96	90	101	91	256	272	294	251	577	526	594	509	940	849	962	801
0.85	106	97	115	105	327	298	367	307	734	645	776	638	1190	992	1213	985
1.00	107	99	109	106	358	337	387	325	852	697	806	634	1373	1075	1227	1037
1.15	105	101	104	101	390	311	376	333	838	675	874	664	1366	1078	1332	1036
1.30	100	96	110	94	396	327	384	318	866	713	877	658	1280	1034	1258	1011
RMSE	6.2				22.7				41.2				61.4			
<i>Leg (thigh and drum) weight (g)</i>																
0.60	75	77	82	75	195	180	215	211	416	396	424	401	686	576	713	595
0.70	84	87	97	84	248	237	269	225	537	450	538	440	827	668	802	669
0.85	92	88	108	94	287	246	297	251	611	490	627	510	909	731	963	669
1.00	99	96	109	99	310	255	314	267	647	527	647	490	964	725	949	747
1.15	101	93	96	99	326	259	324	280	697	531	670	540	1004	753	930	708
1.30	97	94	105	96	315	293	330	282	723	562	674	525	954	737	918	698
RMSE	5.9				16.1				28.5				35.5			
<i>Wing weight (g)</i>																
0.60	27	29	34	32	74	70	79	82	140	143	147	138	218	198	228	205
0.70	34	36	38	36	93	95	100	90	181	168	187	161	271	234	269	236
0.85	38	38	40	40	108	100	119	100	217	185	214	194	304	249	312	247
1.00	38	43	41	41	117	106	124	110	221	192	226	192	331	249	305	245
1.15	38	37	43	41	122	98	120	108	237	191	223	201	333	254	330	255
1.30	37	37	40	41	118	111	123	106	236	197	233	187	314	238	313	243
<sup>2</sup> RMSE	2.4				5.5				10.1				13.3			

<sup>1</sup> Balanced protein content as a proportion of that recommended by Rostagno et al. 2017).

<sup>2</sup>RMSE, root mean-square error

**Table S3.** Content of protein and lipid (g/kg) in skin-free breast of female (F) and male (M) broilers of two strains, fed a range of dietary balanced protein (BP) levels, and the pooled standard error of the mean (SEM).

BP <sup>1</sup>	Protein in breast (g/kg)				Lipid in breast (g/kg)			
	Cobb		Ross		Cobb		Ross	
	F	M	F	M	F	M	F	M
<b>14 d</b>								
0.60	190	189	189	186	66.9	51.5	54.8	54.2
0.70	191	179	193	196	57.9	48.1	39.6	48.5
0.85	191	190	187	202	38.8	44.2	46.1	35.2
1.00	195	197	191	190	33.3	44.2	36.6	45.1
1.15	190	190	182	191	36.0	36.4	35.5	36.3
1.30	194	198	181	191	25.5	32.2	37.8	33.1
SEM	2.18	1.91	1.81	1.89	3.33	2.22	3.64	2.68
<b>28 d</b>								
0.60	182	183	187	188	59.3	68.7	65.9	76.6
0.70	186	188	191	191	57.8	71.8	58.3	41.9
0.85	188	196	195	195	36.6	48.0	45.4	30.9
1.00	188	198	197	195	33.7	40.3	32.1	27.8
1.15	189	202	198	197	39.2	40.4	31.6	24.9
1.30	189	201	199	196	18.6	20.8	22.5	20.9
SEM	2.01	2.11	2.21	1.74	2.58	1.77	1.64	2.87
<b>42 d</b>								
0.60	187	189	188	190	81.6	76.9	76.8	73.6
0.70	190	192	188	191	71.4	65.8	69.5	64.6
0.85	192	193	193	195	58.2	51.7	53.4	49.7
1.00	195	196	196	198	46.8	45.2	47.1	42.4
1.15	198	198	197	198	40.8	38.5	41.9	41.1
1.30	197	197	198	199	39.6	42.2	42.4	41.6
SEM	1.52	2.12	1.76	2.99	1.67	1.48	2.45	2.04
<b>56 d</b>								
0.60	177	181	181	189	84.4	87.5	90.4	79
0.70	186	188	184	191	81.3	81.5	84.4	75.2
0.85	189	196	191	197	61.5	53.4	58.8	51.5
1.00	193	199	194	199	45.4	45.9	57.1	43.8
1.15	197	199	199	200	48.2	44.8	48.8	38.7
1.30	196	201	201	201	52.3	41.9	45.4	37.9
SEM	2.21	1.77	1.69	1.64	1.71	1.80	2.43	1.80

<sup>1</sup> Balanced protein content as a proportion of that recommended by Rostagno et al. (2017)

**Table S4.** Content of protein and lipid (g/kg) in leg (thigh +drum) with skin and bone of female (F) and male (M) broilers of two strains, fed a range of dietary balanced protein (BP) levels, and the pooled standard error of the mean (SEM).

BP <sup>1</sup>	Protein in leg (g/kg)				Lipid in leg (g/kg)			
	Cobb		Ross		Cobb		Ross	
	F	M	F	M	F	M	F	M
<b>14 d</b>								
0.60	153	154	144	144	108	104	125	90.1
0.70	139	146	139	149	90.1	94.9	95.4	93.5
0.85	160	147	151	150	84.0	82.8	90.0	81.9
1.00	158	154	151	153	72.5	79.4	68.4	62.9
1.15	159	154	157	157	61.6	62.8	53.2	50.2
1.30	163	153	161	156	50.9	49.7	50.6	61.5
SEM	2.03	1.66	1.55	1.60	3.93	3.18	1.89	2.31
<b>28 d</b>								
0.60	154	146	143	150	133	130	148	126
0.70	156	147	148	153	140	137	119	121
0.85	161	155	153	159	109	105	107	96.7
1.00	163	157	158	162	86.8	87.0	84.0	81.0
1.15	164	160	155	163	62.2	61.6	67.6	72.3
1.30	166	162	159	164	54.9	46.7	57.5	41.9
SEM	2.40	1.73	1.90	2.34	2.79	2.20	2.84	2.52
<b>42 d</b>								
0.60	136	145	142	141	172	165	168	163
0.70	137	148	149	143	163	161	171	156
0.85	148	150	150	155	155	131	144	138
1.00	155	155	157	161	125	127	135	117
1.15	166	164	163	167	113	94.5	98.6	87.7
1.30	166	165	162	167	80.3	88.7	95.3	88.4
SEM	1.76	1.90	1.65	1.35	2.57	1.97	2.13	1.43
<b>56 d</b>								
0.60	137	137	134	139	183	165	192	147
0.70	145	145	143	149	169	150	167	155
0.85	152	155	151	151	141	137	134	132
1.00	153	156	152	159	122	112	132	111
1.15	154	158	152	156	126	105	132	109
1.30	156	158	150	158	119	92.8	123	97.3
SEM	1.34	1.70	1.43	2.15	3.35	3.01	2.43	3.37

<sup>1</sup> Balanced protein content as a proportion of that recommended by Rostagno et al. (2017)

**Table S5.** Content of protein and lipid (g/kg) in the wings of female (F) and male (M) broilers of two strains, fed a range of dietary balanced protein (BP) levels, and the pooled standard error of the mean (SEM).

BP <sup>1</sup>	Protein in wing (g/kg)				Lipid in wing (g/kg)			
	Cobb		Ross		Cobb		Ross	
	F	M	F	M	F	M	F	M
<b>14 d</b>								
0.60	148	125	164	155	144	151	94.9	110
0.70	139	134	142	137	128	118	134	124
0.85	142	144	136	137	125	120	119	126
1.00	133	133	142	139	117	117	110	106
1.15	137	136	146	146	98.9	92.4	83.9	87.2
1.30	144	146	149	151	95.9	79.4	85.4	68.1
SEM	2.57	2.19	3.10	2.81	4.42	4.02	3.97	2.68
<b>28 ds</b>								
0.60	134	144	135	143	180	175	175	155
0.70	130	144	132	143	191	196	199	183
0.85	136	144	139	145	181	168	174	161
1.00	144	147	145	147	134	142	143	128
1.15	146	150	150	149	116	92.2	96.5	94.5
1.30	151	152	151	151	88.9	61.6	106	73.6
SEM	2.06	1.82	1.85	1.91	3.54	2.80	4.49	4.06
<b>42 d</b>								
0.60	143	149	144	145	185	176	187	179
0.70	144	148	148	146	196	189	187	167
0.85	151	155	150	153	186	159	173	159
1.00	156	156	150	156	156	153	158	143
1.15	157	159	155	159	130	114	131	109
1.30	157	158	157	161	113	131	126	130
SEM	1.88	1.98	1.96	1.53	4.67	4.44	3.23	2.43
<b>56 d</b>								
0.60	150	152	151	150	216	202	221	193
0.70	150	154	154	153	220	199	209	189
0.85	155	155	160	156	193	170	178	164
1.00	157	157	164	157	163	146	176	152
1.15	162	159	166	161	173	148	177	118
1.30	162	160	168	164	159	116	168	117
SEM	1.54	1.48	1.39	1.76	3.84	3.73	3.96	4.52

<sup>1</sup> Balanced protein content as a proportion of that recommended by Rostagno et al. (2017).

**Table S6.** Content of protein and lipid (g/kg) in the remainder of the body of female (F) and male (M) broilers of two strains, fed a range of dietary balanced protein (BP) levels, and the pooled standard error of the mean (SEM).

BP <sup>1</sup>	Protein in remainder (g/kg)				Lipid in remainder (g/kg)			
	Cobb		Ross		Cobb		Ross	
	F	M	F	M	F	M	F	M
<b>14 d</b>								
0.60	140	137	131	142	174	146	164	130
0.70	128	141	139	148	174	150	167	137
0.85	129	119	145	141	156	142	153	132
1.00	137	136	138	139	140	153	121	115
1.15	137	134	138	137	105.8	120	108	104
1.30	135	131	133	138	108.6	102	100	94.5
SEM	3.33	2.22	3.64	2.68	1.29	1.09	1.09	0.87
<b>28 d</b>								
0.60	129	127	124	128	296	251	262	229
0.70	132	128	126	129	248	238	276	242
0.85	137	136	130	135	228	207	222	196
1.00	139	142	139	141	198	176	193	161
1.15	143	148	141	142	141	137	133	122.7
1.30	146	148	143	146	131	104	117	105.7
SEM	2.58	1.77	1.64	2.87	3.13	3.26	2.31	2.97
<b>42 d</b>								
0.60	125	132	126	129	304	266	291	254
0.70	128	139	128	133	282	257	274	248
0.85	131	140	138	147	250	226	253	217
1.00	137	143	139	151	191	170	195	168
1.15	136	149	142	154	163	147	159	140
1.30	140	150	143	154	127	124	120	115
SEM	1.67	1.48	2.45	2.04	6.60	4.80	4.50	5.20
<b>56 d</b>								
0.60	89.2	94.9	91.2	102	381	357	353	318
0.70	96.8	107	96.0	114	338	333	347	300
0.85	120	132	113	131	297	251	286	235
1.00	133	134	120	138	240	215	250	217
1.15	130	140	121	146	234	178	229	155
1.30	132	144	119	151	242	131	224	127
SEM	1.71	1.80	2.43	1.80	12.1	15.0	10.1	10.8

<sup>1</sup> Balanced protein content as a proportion of that recommended by Rostagno et al. (2017)