Supplemental Material Table 1. Concentrations (µmol/L) of dispensable amino acids of sow venous, umbilical venous and arterial and foetal venous plasma at 64 dp after feeding experimental diets with different protein and carbohydrate ratios from the beginning of gestation (LSmeans ± SEM)*

Amino acid (µmol/L)	Blood vessel	Diet			SEM	D	BlV	D × BlV
		LP-HC	ST	HP-LC				
Ala	SV	736^{a,F}	596^{a,B}	289^{b,B}	42	0.016	<0.001	<0.001
	UV	838^{E}	870^{A}	794^{A}	42			
	UA	802	827^{A}	760^{A}	42			
	FV	793	835^{A}	755^{A}	42			
Arg	SV	211^{A}	226^{A}	193^{A}	9	0.550	<0.001	0.060
	UV	150^{B}	147^{B}	143^{B}	9			
	UA	134^{B,C}	134^{B,C}	129^{B,C}	9			
	FV	124^{C}	122^{C}	115^{C}	10			
Asn	SV	49^{B,F}	53^{F}	51^{F}	4	0.890	<0.001	0.939
	UV	64^{A}	64^{E}	61^{E}	4			
	UA	61^{A}	60	60	4			
	FV	60^{E}	61	59	4			
Asp	SV	16^{C}	8^{C}	9^{C}	5	0.802	<0.001	0.677
	UV	32^{B,C,F}	34^{B}	29^{B,F}	5			
	UA	50^{B,E}	49^{B}	48^{B,E}	5			
	FV	95^{A}	89^{A}	98^{A}	5			

Cys	SV	58.0^{A}	61.1^{A}	55.6^{A}	3	0.710	<0.001	0.909
	UV	41.6^{B}	40.5^{B}	38.3^{B}	3			
	UA	38.9^{B}	38.7^{B}	36.7^{B}	3			
	FV	40.6^{B}	41.6^{B}	38.5^{B}	3			
Gln	SV	639^{C}	634^{B}	513^{B}	45	0.494	<0.001	0.004
	UV	1280^{A}	1183^{A}	1280^{A}	45			
	UA	913^{B}	830^{B}	888^{B}	45			
	FV	868^{B}	796^{B}	831^{B}	47			
Glu	SV	218^{D}	178^{D}	88^{D}	62	0.263	<0.001	0.204
	UV	473^{C}	620^{C}	470^{C}	62			
	UA	1279^{B}	1412^{B}	1332^{B}	62			
	FV	1548^{A}	1689^{A}	1667^{A}	66			
Gly	SV	1419^{a,A}	1488^{a,A}	898^{b,A}	37	<0.001	<0.001	<0.001
	UV	547^{B}	562^{B}	490^{B}	37			
	UA	558^{B}	569^{B}	504^{B}	37			
	FV	582^{B}	579^{B}	518^{B}	39			
Pro	SV	380	404	355	34	0.458	<0.001	0.992
	UV	337	347	287	34			
	UA	314	332	293	34			
	FV	319	327	275	35			
Ser	SV	200^{B}	184^{B}	163^{B}	12	0.672	<0.001	0.147
	UV	293^{A}	302^{A}	288^{A}	12			

	UA	304^{A}	311^{A}	306^{A}	12			
	FV	288^{A}	295^{A}	291^{A}	12			
Tyr	SV	79^{b,A}	104^{a,A}	104^{a,A}	4	0.044	<0.001	<0.001
	UV	39^{B}	46^{B}	40^{B}	4			
	UA	37^{B}	43^{B}	37^{B}	4			
	FV	36^{B}	43^{B}	36^{B}	4			
Cit	SV	122^{A}	116^{A}	111^{A}	6	0.344	<0.001	0.641
	UV	95^{B}	84^{B}	88^{B}	6			
	UA	98^{B}	87^{B}	91^{B}	6			
	FV	96^{B}	83^{B}	89^{B}	6			
Orn	SV	106^{a,A}	91^{a,b,A}	86^{b,A}	6	0.402	<0.001	0.530
	UV	76^{B}	71^{B}	68^{B}	6			
	UA	79^{B}	73^{B}	73^{A,B}	6			
	FV	82^{B}	76^{A,B}	74^{A,B}	7			
Tau	SV	68^{C}	64^{C}	87^{C}	13	0.856	<0.001	0.498
	UV	142^{B}	156^{B}	152^{B}	13			
	UA	158^{B}	166^{B}	161^{B}	13			
	FV	290^{A}	268^{A}	284^{A}	14			

LP-HC, low protein-high carbohydrate; ST, standard; HP-LC, high protein-low carbohydrate; SV, sow venous plasma; UV, umbilical venous plasma; UA, umbilical arterial plasma; FV, foetal venous plasma; D, diet; BlV, blood vessel; D × BlV, diet × blood vessel interaction.

^{a,b,c} Mean values within a row with unlike lower case superscript letters were significantly different ($P \leq 0.05$) according to Tukey post hoc test.

[d,e] Mean values within a row with unlike lower case superscript letters tended to be different (P<0.15) according to Tukey post hoc test.

[A,B,C,D] Mean values within a column with unlike capital superscript letters were significantly different (P<0.05) according to Tukey post hoc test.

[E,F] Mean values within a column with unlike capital superscript letters tended (P<0.15) to differ according to Tukey post hoc test.

*Effect of gender: Arg, Cit, Tau (P≤0.05); effect of foetal mass group: Ala, Asp, Cit (P≤0.05); effect of collection group rank during caesarian section: Ala, Pro, Tyr, Cit (P≤0.05); diet × gender interaction: Ala (P≤0.05); diet × foetal mass group interaction: Cit (P≤0.05); diet × collection group rank during caesarian section interaction: Ala, Glu (P≤0.05). LSmeans are shown in Supplemental Material Tables 3 and 4.

Supplemental Material Table 2. Concentrations (µmol/L) of dispensable amino acids of sow venous, umbilical venous and arterial and foetal venous plasma at 94 dp after feeding experimental diets with different protein and carbohydrate ratios from the beginning of gestation (LSmeans ± SEM)*

Amino acid (µmol/L)	Blood vessel	Diet			SEM	D	BlV	D × BlV
		LP-HC diet	ST diet	HP-LC diet				
Ala	SV	$804^{a,A}$	$640^{b,A,D}$	$371^{c,B}$	28	0.018	<0.001	<0.001
	UV	545^{B}	$583^{A,B,E}$	549^{A}	28			
	UA	517^{B}	556^{B}	511^{A}	28			
	FV	521^{B}	$586^{A,B,E}$	533^{A}	28			
Arg	SV	118^{A}	142^{A}	127^{A}	7	0.044	<0.001	0.930
	UV	$115^{A,B}$	$135^{A,B}$	119	7			
	UA	$106^{A,B}$	$128^{A,B}$	109^{B}	7			
	FV	97^{B}	121^{B}	97^{B}	7			
Asn	SV	37^{B}	34^{B}	35^{B}	3	0.983	<0.001	0.490
	UV	58^{A}	59^{A}	59^{A}	3			
	UA	54^{A}	55^{A}	55^{A}	3			
	FV	54^{A}	58^{A}	56^{A}	3			
Asp	SV	$5^{e,C}$	$17^{d,C}$	8^{C}	3	0.016	<0.001	0.811
	UV	15^{B}	24^{B}	$14^{B,D}$	3			
	UA	19^{B}	29^{B}	$19^{B,E}$	3			
	FV	$31^{e,A}$	$44^{d,A}$	34^{A}	3			

Cys	SV	41[b,D]	63[a,B]	60[a,B]	3	0.052	<0.001	<0.001
	UV	34	41[A,D]	35[A]	3			
	UA	33[F]	40[A]	34[A]	3			
	FV	34	34[A,E]	33[A]	3			
Gln	SV	482[a,b,d,C]	500[a,C]	361[b,e,C]	30	0.599	<0.001	<0.001
	UV	881[A]	914[A]	917[A]	30			
	UA	726[B]	749[B]	737[B]	30			
	FV	678[B]	718[B]	722[B]	30			
Glu	SV	228.6[a,b,C]	311.0[a,C]	127.7[b,C]	30	0.016	<0.001	<0.001
	UV	179.7[C]	244.1[C]	184.7[C]	30			
	UA	448.4[B]	534.5[B]	479.8[B]	30			
	FV	739.6[b,A]	914.2[a,A]	797.5[a,b,A]	30			
Gly	SV	920[a,A]	783[b,A]	657[c,A]	24	0.002	<0.001	<0.001
	UV	519[B]	515[B]	456[B]	24			
	UA	525[B]	526[B]	460[B]	24			
	FV	538[B]	569[B]	486[B]	25			
Pro	SV	318[B]	282[B]	290[B]	16	0.149	<0.001	0.574
	UV	208[A,D]	162[A]	190[A]	16			
	UA	202[A]	160[A]	183[A]	16			
	FV	156[A,E]	126[A]	172[A]	17			
Ser	SV	142[B]	149[B]	115[B]	9	0.325	<0.001	0.007
	UV	230[A]	236[A]	230[A]	9			

	UA	221^{A}	229^{A}	219^{A}	9			
	FV	215^{A}	235^{A}	215^{A}	9			
Tyr	SV	57^{b,A}	84^{a,A}	97^{a,A}	4	0.013	<0.001	<0.001
	UV	32^{B}	46^{B}	37^{B}	4			
	UA	30^{B}	44^{B}	34^{B}	4			
	FV	31^{B}	44^{B}	35^{B}	4			
Cit	SV	106^{B}	92^{B}	94^{B}	6	0.422	<0.001	0.001
	UV	146^{A}	156^{A}	144^{A}	6			
	UA	147^{A}	160^{A}	146^{A}	6			
	FV	150^{A}	164^{A}	148^{A}	6			
Orn	SV	83^{A}	85^{A}	93^{A}	5	0.135	<0.001	0.011
	UV	42^{B}	58^{B}	49^{B}	5			
	UA	42^{B}	59^{B}	50^{B}	5			
	FV	44^{B}	66^{B}	55^{B}	5			
Tau	SV	67^{C}	77^{C}	93^{D}	8	0.719	<0.001	<0.001
	UV	93^{B}	97^{B}	92^{D}	8			
	UA	98^{B,A}	102^{B}	95	8			
	FV	113^{A}	131^{A}	110^{E}	8			

LP-HC, low protein-high carbohydrate; ST, standard; HP-LC, high protein-low carbohydrate; SV, sow venous plasma; UV, umbilical venous plasma; UA, umbilical arterial plasma; FV, foetal venous plasma; D, diet; BlV, blood vessel; D × BlV, diet × blood vessel interaction.

^{a,b,c} Mean values within a row with unlike lower case superscript letters were significantly different ($P \leq 0.05$) according to Tukey post hoc test.

[d,e] Mean values within a row with unlike lower case superscript letters tended to be different (P<0.15) according to Tukey post hoc test.

[A,B,C] Mean values within a column with unlike capital superscript letters were significantly different (P<0.05) according to Tukey post hoc test.

[D,E] Mean values within a column with unlike capital superscript letters tended (P<0.15) to differ according to Tukey post hoc test.

*Effect of replicate: Gln, Glu, Orn (P≤0.05); effect of gender: Arg (P≤0.05); effect of foetal mass group: Asp, Cit (P≤0.05); effect of collection group rank during caesarian section: Ala, Glu, Gly, Pro, Ser, Tyr (P≤0.05); diet × gender interaction: Ala, Arg, Gly, Tau (P≤0.05); diet × foetal mass group interaction: Gln, Pro, Cit (P≤0.05); diet × collection group rank during caesarian section interaction: Ala, Asp, Pro, Cit (P≤0.05). LSmeans are shown in Supplemental Material Tables 5 and 6.

Supplemental Material Table 3. Main factors affecting foetal plasma amino acid concentrations at 64 dp (least square means ± SEM)*

Main effect	Amino acid	Concentration (µmol/L)			SEM	*P*-value
Gender		male	female			
	Arg	148[b]	157[a]		1	0.021
	Cit	92[b]	101[a]		3	<0.001
	Tau	155[b]	178[a]		7	0.001
Foetal mass group		light	medium	heavy		
	His	75[a]	68[b]	70[b]	2	0.015
	Ala	793[a,d]	732[a,b,e]	699[b]	26	0.020
	Asp	55[a]	43[b]	41[b]	3	0.014
	Cit	100[b,e]	91[a,b,d]	98[a]	3	0.006
Collection group rank		foetuses no. 1-3	foetuses no. 4-6	foetuses no. 7-8		
	Ile	91[b]	93[b]	103[a]	4	<0.001
	Leu	140[b,e]	148[a,b,d]	156[s]	4	0.001
	Phe	42[b,e]	45[b,d]	49[a]	1	<0.001
	Ala	730[a,b,d]	716[b,e]	777[a]	24	0.009
	Pro	318[e]	317[e]	357[d]	20	0.040
	Tyr	51[b]	52[b]	58[a]	2	0.006
	Cit	101[a]	100[a]	89[b]	3	<0.001

[a,b] Mean values within a row with unlike lower case superscript letters were significantly different ($P \leq 0.05$) according to Tukey post hoc test.

[d,e] Mean values within a row with unlike lower case superscript letters tended ($P < 0.15$) to differ according to Tukey post hoc test.

Supplemental Material Table 4. Interactions between diet and gender, foetal mass group and collection group rank affecting foetal plasma amino acid concentrations at 64 dp (LS means ± SEM)*

Amino acids		Diet			Pooled	
(µmol/L)		LP-HC	ST	HP-LC	SEM	*P*-value
Gender						
Lys	male	221	180	209	15	0.010
	female	230	212	182		
Met	male	43	42	40	2	0.007
	female	47^{a}	42^{a,b}	37^{b}		
Ala	male	775	765	689^{D}	39	0.009
	female	809^{a}	799^{a}	610^{b,E}		
Foetal mass group						
Cit	light	121^{a}	86^{b,E}	94^{b}	6	0.001
	medium	96	89^{E}	89		
	heavy	91	101^{D}	102		
Collection group rank						
Ala	foetuses no. 1-3	750	745^{B}	696^{D}	41	0.002
	foetuses no. 4-6	802^{a}	745^{a,B}	602^{b,E}		
	foetuses no. 7-8	824^{a}	855^{a,A}	650^{b}		
Glu	foetuses no. 1-3	880	987	1048^{A}	61	0.008
	foetuses no. 4-6	918^{a,b}	1013^{a}	753^{b,B}		

foetuses no. 7-8	840	924	866[A,B]

[a,b] Mean values within a row with unlike lower case superscript letters were significantly different ($P \leq 0.05$) according to Tukey post hoc test.

[d,e] Mean values within a row with unlike lower case superscript letters tended to be different ($P < 0.15$) according to Tukey post hoc test.

[A,B] Mean values within a column with unlike capital superscript letters were significantly different ($P < 0.05$) according to Tukey post hoc test.

[D,E] Mean values within a column with unlike capital superscript letters tended ($P < 0.15$) to differ according to Tukey post hoc test.

Supplemental Material Table 5. Main factors affecting foetal plasma amino acid concentrations at 94 dp (least square means ± SEM)*

Main effect	Amino acid	Concentration (µmol/L)					SEM	*P*-value
Replicate		1	2	3	4	5		
	His	67^{c}	82^{a,b,d}	76^{b,c,e}	82^{a}	80^{a}	5	0.011
	Lys	176^{a}	113^{b}	99^{b,c}	173^{a}	156^{a,c}	19	0.003
	Gln	585^{b}	735^{a}	730^{a}	739^{a}	704^{a}	31	0.009
	Glu	526^{a,d}	421^{a,b,e}	404^{b,c}	412^{a,c,e}	400^{b,c}	27	0.014
	Orn	75^{a}	51^{b}	45^{b,e}	67^{a,b,d}	64^{a,b,d}	5	0.005
Gender		male	female					
	Lys	140^{b}	148^{a}				7	0.042
	Arg	121^{a}	115^{b}				4	0.033
Foetal mass group		light	medium	heavy				
	Lys	138^{b}	137^{b}	156^{a}			7	0.005
	Asp	25^{a}	21b	19b			2	<0.001
	Cit	130^{b}	140^{a,b}	143^{a}			4	0.002
Collection group rank		foetuses no. 1-3	foetuses no. 4-6	foetuses no. 7-8				
	His	74^{b}	76^{a,b,e}	82^{a,d}			2	0.012
	Leu	122^{c}	129^{b}	146^{a}			5	<0.001
	Lys	134^{b,e}	147^{a,b}	150^{a,d}			8	0.001
	Phe	38^{b,e}	41^{b,d}	49^{a}			2	<0.001
	Ala	511^{c}	554^{b}	614^{a}			17	<0.001
	Pro	210^{a}	191^{b}	211^{a}			10	0.045

Ser	196[e]	203[d]	210[d]		6	0.020
Tyr	45[b]	46[a,b,e]	52[a,d]		3	0.036

[a,b,c] Mean values within a row with unlike lower case superscript letters were significantly different ($P \leq 0.05$) according to Tukey post hoc test.

[d,e] Mean values within a row with unlike lower case superscript letters tended ($P < 0.15$) to differ according to Tukey post hoc test.

Supplemental Material Table 6. Interactions between diet and replicate, gender, foetal mass group and collection group rank affecting foetal plasma amino acid concentrations at 94 dp (LS means ± SEM)*

Amino acids		Diet			Pooled	
(µmol/L)		LP-HC	ST	HP-LC	SEM	*P*-value
Replicate						
His	1	$61^{B,E}$	76	65	5	0.047
	2	$72^{A,B}$	94	79		
	3	$86^{A,B,E}$	78	64		
	4	88^{A}	76	81		
	5	$80^{A,B}$	82	78		
Gender						
His	male	74	84^{d}	72^{e}	2	0.008
	female	80	79	74		
Ile	male	65^{e}	85^{d}	83^{d}	5	0.020
	female	65^{b}	$78^{a,b}$	90^{a}		
Leu	male	116^{b}	155^{a}	128^{b}	7	0.022
	female	115^{b}	143^{a}	$136^{a,b}$		
Met	male	26	30	23	2	0.010
	female	26	27	26		
Ala	male	615^{a}	601^{a}	481^{b}	27	0.027
	female	579	581	501		
Arg	male	116^{D}	135^{d}	111^{e}	6	0.017
	female	$101^{e,E}$	127^{d}	115		
Gly	male	643^{a}	$577^{a,b}$	519^{b}	22	0.038
	female	608^{a}	620^{a}	510^{b}		

Tau	male	100	97	93	8	0.002
	female	86	106	102		
Foetal mass group						
His	light	76	86[d]	72[e]	3	0.008
	medium	77	77	78		
	heavy	77	80	70		
Gln	light	710	699	684	31	0.002
	medium	727	697	680		
	heavy	637[e]	764[d]	688		
Pro	light	217[d]	131[b,e,B,E]	239[a,D]	18	0.002
	medium	227	192[A,B,D]	192[E]		
	heavy	220	225[A]	196		
Cit	light	126[B]	143	122	6	0.022
	medium	145[A]	139	135		
	heavy	141	147	142		
Collection group rank						
Ile	foetuses no. 1-3	64[b]	70[a,b,B]	87[a]	6	0.012
	foetuses no. 4-6	68[e]	73[B]	89[d]		
	foetuses no. 7-8	64[e]	100[A,d]	84		
Leu	foetuses no. 1-3	115[b]	153[a]	127[a]	8	0.006
	foetuses no. 4-6	117[b]	144[a]	132[a]		
	foetuses	113[b]	150[a]	137[a]		

	no. 7-8					
Met	foetuses no. 1-3	27	29	25	3	0.025
	foetuses no. 4-6	26	29	23		
	foetuses no. 7-8	25	29	25		
Phe	foetuses no. 1-3	35	41^{B}	39	3	<0.001
	foetuses no. 4-6	37	44^{B}	42		
	foetuses no. 7-8	36^{b}	$67^{a,A}$	43^{b}		
Ala	foetuses no. 1-3	$564^{d,E}$	$505^{e,C}$	463	29	0.009
	foetuses no. 4-6	$606^{a,D}$	$566^{a,b,d,B}$	$490^{b,e}$		
	foetuses no. 7-8	$620^{a,b}$	$702^{a,A}$	520^{b}		
Asp	foetuses no. 1-3	19	23^{B}	20	3	<0.001
	foetuses no. 4-6	20	26^{B}	18		
	foetuses no. 7-8	14^{b}	$38^{a,B}$	17^{b}		
Pro	foetuses no. 1-3	211	189	230^{A}	18	0.041
	foetuses no. 4-6	224^{d}	167^{e}	181^{B}		
	foetuses no. 7-8	228	190	$215^{A,B}$		
Cit	foetuses no. 1-3	133	144	137	7	0.032

foetuses no. 4-6	143	139	139
foetuses no. 7-8	135	146	122

[a,b] Mean values within a row with unlike lower case superscript letters were significantly different ($P \leq 0.05$) according to Tukey post hoc test.

[d,e] Mean values within a row with unlike lower case superscript letters tended to be different ($P < 0.15$) according to Tukey post hoc test.

[A,B] Mean values within a column with unlike capital superscript letters were significantly different ($P < 0.05$) according to Tukey post hoc test.

[D,E] Mean values within a column with unlike capital superscript letters tended ($P < 0.15$) to differ according to Tukey post hoc test.