Supplementary Table S1. Significant hot carcass weight (HCW) markers that are within 100,000 base pairs of identified significant markers ($p < 0.001$) and previously reported QTL and genes for those locations.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
1	34,450,639-34,492,226				
	156,254,566-156,294,225				
2	21,389,327-21,448,855		QTL 20354	Angus, Charolais, University of Alberta hybrid bulls	[11]
	37,729,012-37,813,654	Bos taurus PKP4			
	133,258,339-133,349,015	Bos taurus CAPZB			
6	42,057,261-42,120,804				
	89,104,201-89,133,819	Bos taurus MTHFD2L			
7	6,134,663-6,206,051	Bos taurus F2RL3			
	20,423,138-20,500,709	End of Bos taurus DOHH, Bos taurus SMIM24, Bos taurus LOC618071, Beginning of Bos taurus NFIC			
	26,309,154-26,360,833	End of Bos taurus CTXN3			
	83,621,039-83,648,346				
9	56,406,855-56,490,122				
10	12,659,662-12,707,435				
	60,168,183-60,267,486		QTL 10876	Commercial Angus	[12]

Supplementary Table S1. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
10	91,330,836-91,357,108				
11	252,264-317,337				
14	18,296,407-18,331,919		QTL 1733	Waygu	[13]
15	36,755,580-36,817,688				
	61,893,000-61,927,861				
16	2,813,940-2,841,879		QTL 11009	Commercial Angus	[12]
17	41,013,290-41,089,654				
	41,089,654-41,178,453				
19	57,098,859-57,128,225				
	57,128,225-57,149,037				
20	25,255,282-25,296,510		QTL 11107	Commercial Angus	[12]
	44,892,168-44,916,116				
	58,292,591-58,329,179	Beginning of Bos taurus ANKH			
	64,169,690-64,185,456				
22	56,603,472-56,675,252	Bos taurus TSEN2, Beginning of Bos taurus PPARG-TSEN2			
25	40,022,986-40,060,928				

Supplementary Table S1. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
27	40,951,386-41,049,981				
	41,191,284-41,226,347				
28	38,961,890-39,061,596				

Supplementary Table S2. Significant average hot carcass weight (HCW) markers that are within 100,000 base pairs of identified significant markers ($p < 0.001$) and previously reported QTL and genes for those locations.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
1	8,347,160-8,377,141				
	14,853,644-14,909,272				
	50,252,331-50,320,575	Bos taurus CBLB			
	118,694,108-118,777,869				
	138,528,244-138,612,242	Bos taurus NUDT16			
	156,254,566-156,294,225				
2	59,644,564-59,690,093		QTL 10665	Commercial Angus	[12]
			QTL 13187 **PRKAG3**	Aberdeen Angus sired steers	[14]
3	65,445,867-65,467,544		QTL 10699	Commercial Angus	[12]
	88,923,355-88,950,716				
	116,968,644-117,023,378	End of Bos taurus MLPH, Bos taurus PRLH			
4	93,398,396-93,462,288	Beginning of Bos taurus NRF1			
5	5,923,591-6,001,881				
	117,795,427-117,823,521				
6	14,094,866-14,120,051		QTL 10425, 10426, 10428, 10429	Japanese Black	[15]

Supplementary Table S2. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
6	20,350,438-20,430,846		QTL 1369	Belgian Blue x MARC III, Piedmontese x Angus	[16]
			QTL 10425, 10426, 10428, 10429	Japanese Black	[15]
	20,430,846-20,475,948		QTL 1369	Belgian Blue x MARC III, Piedmontese x Angus	[16]
			QTL 10425, 10426, 10428, 10429	Japanese Black	[15]
			QTL 24619	Angus, Brangus, Charolais, Gelbvieh, Hereford, Limousin, Red Angus, Shorthorn, Maine, Simmental	[17]
7	6,097,996-6,166,179				
	16,588,162-16,611,621	End of Bos taurus CD209, Beginning of Bos taurus EVI5L	QTL 10784	Commercial Angus	[12]
	62,508,803-62,599,314	Bos taurus SLC36A2	QTL 10809	Commercial Angus	[12]
	65,497,498-65,520,210				
	106,398,519-106,422,549				
8	64,438,267-64,476,783				

Supplementary Table S2. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
8	88,181,529-88,237,379				
9	26,228,944-26,262,054				
	28,337,856-28,400,169	End of Bos taurus CLVS2			
	31,043,707-31,116,835		QTL 37238, 37240, 37250, 37255, 37259, 37264, 37267, 37275	Holstein	[18]
	100,827,855-100,892,769				
	102,007,389-102,027,971	Bos taurus UNC93A			
10	66,659,307-66,687,859		QTL 10881	Commercial Angus	[12]
	68,089,016-68,162,634	End of Bos taurus KTN1	QTL 151847	Commercial Angus	[12]
	73,855,126-73,884,120	End of Bos taurus HIF1A			
	77,206,128-77,234,231	End of Bos taurus MAX			
	88,562,925-88,630,762	End of Bos taurus TMED8, Beginning of Bos taurus VIPAS39			
11	54,855,548-54,887,301	Bos taurus CTNNA2			
12	30,967,371-30,992,759	Beginning of Bos taurus SLC7A1	QTL 37280, 37281 – 37284	Holstein	[18]

Supplementary Table S2. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
12	51,403,603-51,461,607	Bos taurus MIR2285CC			
	57,769,768-57,840,455				
	90,483,656-90,536,166				
13	8,347,568-8,386,291	Bos taurus MACROD2	QTL 10938	Commercial Angus	[12]
	10,368,225-10,400,443		QTL 10938	Commercial Angus	[12]
	23,478,182-23,529,663	End of Bos taurus SPAG6			
	53,167,293-53,266,833	Bos taurus SIRPA			
	75,192,838-75,240,419				
14	18,811,289-18,832,428		QTL 1733	Waygu	[13]
	58,589,050-58,687,826				
15	71,342,153-71,375,213				
	73,739,991-73,762,207				
	81,540,854-81,595,546				
16	69,167,269-69,202,739	Bos taurus PTPN14			
17	4,306,870-4,347,226	Beginning of Bos taurus TRIM2	QTL 11040	Commercial Angus	[12]
	41,013,290-41,089,654				

Supplementary Table S2. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
17	41,089,654-41,178,453				
	41,178,453-41,272,672				
	73,206,420-73,257,794				
18	9,891,406-9,948,949	Bos taurus CDH13	QTL 1336	Sires: Hereford, Angus, Shorthorn, Charolais, Gelbvieh, Pinzgauer, Galloway, Longhorn, Nellore, Piedmontese, Saler Dam: Hereford, Angus	[19]
	22,574,534-22,610,574				
	40,502,223-40,587,048	Beginning of Bos taurus URI1			
	40,690,801-40,738,568				
19	8,622,586-8,648,705				
	58,551,913-58,591,027				
	60,165,029-60,247,211				
20	23,052,519-23,085,736	Bos taurus ANKRD55	QTL 11107	Commercial Angus	[12]
	58,240,835-58,264,762				
	58,264,762-58,362,004	Beginning of Bos taurus ANKH			

Supplementary Table S2. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
21	42,051,380-42,089,249	Beginning of Bos taurus NUBPL			
23	7,240,128-7,297,256	Bos taurus BOLA-DMB, Bos taurus BOLA-DMA, Bos taurus BRD2	QTL 11168	Commercial Angus	[12]
	28,792,687-28,819,118	Bos taurus TRIM15, Beginning of Bos taurus TRIM10			
	35,606,289-35,642,738				
	36,112,949-36,139,914				
24	46,606,824-46,688,139				
25	21,808,238-21,843,463	Bos taurus PRKCB	QTL 11210	Commercial Angus	[12]
26	6,620,890-6,692,455				
27	31,216,225-31,261,689	Bos taurus UNC5D			
	36,959,262-37,004,165				
	39,916,848-39,994,067				

Supplementary Table S2. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
29	24,228,574-24,259,532		QTL 1316 **PRNP**	Brahman x Angus cross	[20]
			QTL 1344	Sires: Hereford, Angus, Shorthorn, Charolais, Gelbvieh, Pinzgauer, Galloway, Longhorn, Nellore, Piedmontese, Saler Dam: Hereford, Angus	[19]
			QTL 11292	Commercial Angus	[12]

Supplementary Table S3. Significant marbling (MARB) markers that are within 100,000 base pairs of identified significant markers and previously ($p < 0.001$) reported QTL and genes for those locations.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
3	8,196,046-8,250,205	End of Bos taurus SDHC, Bos taurus MPZ, Beginning of Bos taurus PCP4L1	QTL 10060-10066 **RORC**	Angus, Shorthorn, other taurine	[21]
			QTL 11592 **RORC**	Angus, Hereford, Brahman	[22]
	17,195,924-17,280,333	Bos taurus LOR, Bos taurus LELP1			
	77,666,001-77,734,314		QTL 10700	Commercial Angus	[12]
	105,173,273-105,209,697	End of Bos taurus SCMH1, Beginning of Bos taurus CTPS1			
	119,550,145-119,584,154				
	121,251,149-121,310,309				
	121,310,309-121,374,825				
4	100,436,744-100,497,231				
5	118,475,383-118,501,191	End of Bos taurus FAM19A5			
6	14,094,866-14,120,051				
	23,700,430-23,738,304	Bos taurus PPP3CA			
	35,577,199-35,611,267		QTL 10770	Commercial Angus	[12]
	66,509,207-66,572,393				

Supplementary Table S3. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
8	41,096,123-41,147,533				
	76,530,816-76,582,220				
9	10,765,698-10,838,261		QTL 4507	Japanese Black	[23]
			QTL 10850	Commercial Angus	[12]
	34,943,071-35,002,290	Bos taurus NT5DC1, Bos taurus COL10A1	QTL 4906	Sires: Hereford, Angus, Shorthorn, Charolais, Gelbvieh, Pinzgauer, Galloway, Longhorn, Nellore, Piedmontese, Saler Dam: Hereford, Angus	[19]
	35,368,035-35,396,173		QTL 4906	Sires: Hereford, Angus, Shorthorn, Charolais, Gelbvieh, Pinzgauer, Galloway, Longhorn, Nellore, Piedmontese, Saler Dam: Hereford, Angus	[19]
	105,074,182-105,168,826				
10	73,855,126-73,884,120	Bos taurus HIF1A			
11	78,755,260-78,831,137	Bos taurus LAPTM4A	QTL 10909	Commercial Angus	[12]
13	43,009,513-43,054,682	Bos taurus ASB13	QTL 10947	Commercial Angus	[12]
	70,171,253-70,195,187	Bos taurus CHD6			
	82,443,688-82,455,320				

Supplementary Table S3. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
14	49,385,228-49,450,613				
15	55,185,032-55,254,553	End of Bos taurus DGAT2, Beginning of Bos taurus UVRAG			
	65,967,835-65,990,096	Bos taurus PAMR1			
	76,930,018-76,960,713	Bos taurus C15H11orf49			
16	2,246,201-2,329,194	Bos taurus MDM4			
17	9,558,819-9,624,970	Beginning of Bos taurus NR3C2	QTL 1371	Belgian Blue x MARC III, Piedmontese x Angus	[16]
	13,386,146-13,455,790	Beginning of Bos taurus HHIP	QTL 1371	Belgian Blue x MARC III, Piedmontese x Angus	[16]
	49,702,881-49,743,917				
19	10,305,065-10,367,765	Bos taurus YPEL2	QTL 11077	Commercial Angus	[12]
	10,617,246-10,694,269	End of Bos taurus CLTC, Bos taurus PTRH2, Beginning of Bos taurus VMP1	QTL 11077	Commercial Angus	[12]
	19,637,405-19,718,709	Beginning of Bos taurus NLK	QTL 11077	Commercial Angus	[12]
	19,718,709-19,789,422	End of Bos taurus NLK	QTL 11077	Commercial Angus	[12]
	23,732,618-23,798,617				
20	6,605,865-6,638,385				

Supplementary Table S3. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
20	18,631,431-18,719,808	End of Bos taurus DEPDC1B			
	18,719,808-18,743,927				
21	59,853,238-59,875,525				
	63,930,679-63,955,841				
23	51,097,849-51,118,713				
24	62,130,639-62,169,295				
26	20,813,204-20,903,573	Beginning of Bos taurus DNMBP			
	26,234,033-26,296,160		QTL 11238	Commercial Angus	[12]
27	32,129,484-32,157,142	Beginning of Bos taurus KCNU1	QTL 1372	Belgian Blue x MARC III, Piedmontese x Angus	[16]
	36,959,262-37,004,165				
	41,552,379-41,613,442				
29	51,438,462-51,502,868				

Supplementary Table S4. Significant average marbling (MARB) markers that are within 100,000 base pairs of identified significant markers ($p < 0.001$) and previously reported QTL and genes for those locations.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
1	16,196,001-16,245,203		QTL 10636	Commercial Angus	[12]
2	21,290,918-21,389,327		QTL 20298, 20299, 20317, 20398, 20399, 20400	Angus, Charolais, University of Alberta hybrid bulls	[11]
	21,389,327-21,448,855		QTL 20298, 20299, 20317, 20398, 20399, 20400	Angus, Charolais, University of Alberta hybrid bulls	[11]
	85,427,167-85,452,055	Beginning of Bos taurus PGAP1			
3	17,195,924-17,280,333	Bos taurus LOR, Bos taurus LELP1			
	116,781,408-116,801,749				
	116,943,803-116,968,664				
	116,968,664-116,990,141	Beginning of Bos taurus MLPH			
	116,990,141-117,023,378	End of Bos taurus MLPH			
4	96,282,870-96,308,638		QTL 24661	Angus, Brangus, Charolais, Gelbvieh, Hereford, Limousin, Red Angus, Shorthorn, Maine, Simmental	[17]
5	118,430,785-118,475,383	Bos taurus FAM19A5			
6	2,217,430-2,296,875		QTL 10756	Commercial Angus	[12]
	20,350,438-20,430,846				

Supplementary Table S4. Continued

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
6	20,430,846-20,475,948		QTL 10498	Hanwoo	[24]
7	5,352,670-5,400,415	End of Bos taurus B3GNT3			
8	58,505,244-58,594,366				
	58,986,469-59,085,873				
	106,245,419-106,291,686				
	108,652,993-108,732,464	Bos taurus BRINP1			
	108,732,464-108,772,548	Bos taurus BRINP1			
	108,772,548-108,819,340	Bos taurus BRINP1			
9	36,556,225-36,645,234	End of Bos taurus MARCKS	QTL 4906	Sires: Hereford, Angus, Shorthorn, Charolais, Gelbvieh, Pinzgauer, Galloway, Longhorn, Nellore, Piedmontese, Saler Dam: Hereford, Angus	[19]
10	34,316,340-34,407,598		QTL 10874	Commercial Angus	[12]
	34,407,598-34,438,367		QTL 10874	Commercial Angus	[12]
11	6,724,678-6,758,495	End of Bos taurus IL1R2			
	106,708,013-106,741,315	Beginning of Bos taurus CACNA1B			
12	85,428,753-85,453,952	Beginning of Bos taurus ARHGEF7			

Supplementary Table S4. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
13	17,146,206-17,232,510		QTL 10941	Commercial Angus	[12]
	43,319,313-43,367,995		QTL 10947	Commercial Angus	[12]
	67,810,247-67,888,763				
14	18,263,091-18,331,919		QTL 1334	Sires: Hereford, Angus, Shorthorn, Charolais, Gelbvieh, Pinzgauer, Galloway, Longhorn, Nellore, Piedmontese, Saler Dam: Hereford, Angus	[19]
	18,331,919-18,408,275		QTL 1334	Sires: Hereford, Angus, Shorthorn, Charolais, Gelbvieh, Pinzgauer, Galloway, Longhorn, Nellore, Piedmontese, Saler Dam: Hereford, Angus	[19]
	19,441,969-19,531,288	Bos taurus PRKDC	QTL 1334	Sires: Hereford, Angus, Shorthorn, Charolais, Gelbvieh, Pinzgauer, Galloway, Longhorn, Nellore, Piedmontese, Saler Dam: Hereford, Angus	[19]
	58,342,794-58,408,381				
	58,589,050-58,687,826				
	81,197,368-81,269,892	Bos taurus TAF2			
	81,269,892-81,309,300	End of Bos taurus DSCC1, Beginning of Bos taurus DEPTOR			

Supplementary Table S4. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
14	84,505,345-84,594,318				
15	35,333,265-35,364,770		QTL 10999	Commercial Angus	[12]
	54,939,673-54,995,188	Beginning of Bos taurus MOGAT2			
	82,558,282-82,655,879				
	82,655,879-82,689,485				
16	13,656,858-13,733,378		QTL 1353	Belgian Blue x MARC III, Piedmontese x Angus	[16]
	36,744,747-36,768,083	Beginning of Bos taurus ATP1B1			
	36,768,083-36,817,218	End of Bos taurus ATP1B1, Beginning of Bos taurus NME7			
17	41,178,453-41,272,672				
18	22,574,534-22,610,574				
19	8,622,586-8,648,705		QTL 11077	Commercial Angus	[12]
20	15,454,163-15,528,205				
21	9,741,507-9,784,549				
22	56,603,472-56,675,252	Bos taurus TSEN2, Beginning of Bos taurus PPARG-TSEN2			

Supplementary Table S4. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
23	3,626,219-3,664,434				
24	24,904,038-24,961,929				
26	26,234,033-26,267,018		QTL 11238	Commercial Angus	[12]
27	1,271,954-1,312,576				
	8,589,473-8,689,042	End of Bos taurus NEIL3, Beginning of Bos taurus AGA	QTL 1342	Sires: Hereford, Angus, Shorthorn, Charolais, Gelbvieh, Pinzgauer, Galloway, Longhorn, Nellore, Piedmontese, Saler Dam: Hereford, Angus	[19]
	20,791,916-20,863,121		QTL 1342	Sires: Hereford, Angus, Shorthorn, Charolais, Gelbvieh, Pinzgauer, Galloway, Longhorn, Nellore, Piedmontese, Saler Dam: Hereford, Angus	[19]
	30,479,059-30,510,177		QTL 11258 QTL 1372	Commercial Angus Belgian Blue x MARC III, Piedmontese x Angus	[12] [16]
	31,216,225-31,261,689	Bos taurus UNC5D	QTL 1372	Belgian Blue x MARC III, Piedmontese x Angus	[16]
	32,129,484-32,157,142	Beginning of Bos taurus KCNU1	QTL 1372	Belgian Blue x MARC III, Piedmontese x Angus	[16]
	36,935,085-36,959,262				
	41,613,442-41,649,895				

Supplementary Table S4. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
28	8,080,087-8,105,051	Beginning of Bos taurus TBCE	QTL 11270	Commercial Angus	[12]
	16,097,749-16,097,772		QTL 11270	Commercial Angus	[12]

Supplementary Table S5. Significant 12th rib fat (BF) markers that are within 100,000 base pairs of identified significant markers ($p < 0.001$) and previously reported QTL and genes for those locations.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
1	34,450,639-34,492,226		QTL 4854	Waygu x Limousin	[25]
	47,123,160-47,177,862				
	76,505,437-76,534,601				
	81,160,609-81,239,683	End of Bos taurus FETUB ETV5	QTL 10649	Commercial Angus	[12]
	127,998,001-128,031,876	Beginning of Bos taurus SLC25A36			
	128,864,268-128,938,068	Bos taurus CLSTN2			
	131,642,361-131,684,053				
3	81,428,130-81,472,159		QTL 10701	Commercial Angus	[12]
4	5,639,667-5,712,778				
	62,549,908-62,606,492				
	74,076,693-74,148,361				
	80,350,223-80,407,501	Bos taurus SUGCT			
5	12,174,285-12,213,478				
	118,307,910-118,392,147	Bos taurus FAM19A5			

Supplementary Table S5. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
7	38,997,984-39,060,855	Bos taurus DOK3, Bos taurus DDX41, Bos taurus FAM193B			
8	91,086,691-91,125,290	Bos taurus MRPL50, Beginning of Bos taurus ZNF189			
	104,829,510-104,862,806				
9	92,242,453-92,250,839				
	98,306,160-98,349,764				
10	102,849,006-102,935,702	End of Bos taurus CASC4, Beginning of Bos taurus CTDSPL2			
11	91,995,272-92,059,274				
	95,501,827-95,516,698	Beginning of Bos taurus NR5A1			
	98,407,974-98,482,863	Bos taurus TTC16, Bos taurus TOR2A, Bos taurus SH2D3C, Bos taurus CDK9			
12	60,040,871-60,134,810				
13	48,594,834-48,622,655				
	65,761,897-65,855,988	End of Bos taurus NDRG3, Bos taurus DSN1			
14	27,271,835-27,321,716		QTL 10965	Commercial Angus	[12]
	27,669,598-27,751,888		QTL 10965	Commercial Angus	[12]

Supplementary Table S5. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
14	48,184,967-48,256,343				
	70,250,637-70,314,452				
	75,517,287-75,571,250				
15	34,294,990-34,342,385				
16	66,609,042-66,676,299				
17	5,590,969-5,663,467				
	7,756,498-7,794,593				
19	16,578,349-16,598,801	Bos taurus ASIC2			
20	28,850,177-28,887,439		QTL 15736	Angus x Brahman	[26]
			QTL 20540, 20542	Brangus	[27]
21	27,927,781-27,956,825		QTL 11125	Commercial Angus	[12]
	27,956,825-28,055,227	Beginning of Bos taurus APBA2	QTL 11125	Commercial Angus	[12]
22	60,105,535-60,130,492	Bos taurus EEFSEC			
23	41,901,234-41,965,164				
	52,038,120-52,068,611				
	52,068,611-52,128,894	Beginning of Bos taurus EXOC2			

Supplementary Table S5. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
24	61,885,106-61,931,908	Beginning of Bos taurus LOC511106			
27	32,541,258-32,561,963				
28	6,499,231-6,547,497	Beginning of Bos taurus KCNK1			
	21,014,194-21,066,992		QTL 20273	Crosses of Angus, Charolais, University of Alberta hybrid bulls	[11]

Supplementary Table S6. Significant average 12th rib fat (BF) markers that are within 100,000 base pairs of identified significant markers ($p < 0.001$) and previously reported QTL and genes for those locations.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
1	1,288,510-1,359,951		QTL 1317 **IFNAR1**	Brahman x Angus cross	[20]
	14,853,644-14,909,272				
	50,252,331-50,320,575	Beginning of Bos taurus CBLB			
	100,513,127-100,605,192		QTL 10653	Commercial Angus	[12]
2	16,157,387-16,238,330		QTL 1322	Sires: Hereford, Angus, Shorthorn, Charolais, Gelbvieh, Pinzgauer, Galloway, Longhorn, Nellore, Piedmontese, Saler Dam: Hereford, Angus	[19]
	111,103,057-111,181,420	End of Bos taurus ACSL3			
3	10,956,984-11,040,167	Beginning of Bos taurus SPTA1			
	17,241,980-17,280,333	Bos taurus LELP1	QTL 1325	Sires: Hereford, Angus, Shorthorn, Charolais, Gelbvieh, Pinzgauer, Galloway, Longhorn, Nellore, Piedmontese, Saler Dam: Hereford, Angus	[19]
	82,037,605-82,113,195	End of Bos taurus EFCAB7, Beginning of Bos taurus ITGB3BP	QLT 10701	Commercial Angus	[12]
3	89,579,376-89,675,602	Beginning of Bos taurus PLPP3			
	112,922,761-112,955,526	Beginning of Bos taurus INPP5D			

Supplementary Table S6. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
3	115,730,569-115,790,125	End of Bos taurus ASB18, Beginning of Bos taurus IQCA1			
	116,968,644-117,023,378	End of Bos taurus MLPH, Bos taurus PRLH			
4	21,937,293-21,973,829		QTL 20280, 20285, 20368, 20446	Crosses of Angus, Charolais, University of Alberta hybrid bulls	[11]
	96,258,114-96,282,870				
5	6,976,839-7,053,234		QTL 20001 **MYF5**	Jiaxian Red, Qinchuan, Luxi, Nanyang, Xianan	[28]
	97,884,594-97,972,722	Beginning of Bos taurus ETV6			
6	20,276,795-20,297,397		QTL 24647	Angus, Brangus, Charolais, Gelbvieh, Hereford, Limousin, Red Angus, Shorthorn, Maine, Simmental	[17]
	44,305,092-44,337,791				
	107,016,833-107,095,193				
7	12,833,745-12,889,689	End of Bos taurus WDR83OS, Bos taurus MAN2B1			
	66,156,674-66,212,415				
	66,212,415-66,254,499				
8	37,081,128-37,158,190	Bos taurus DMAC1			

Supplementary Table S6. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
8	81,573,118-81,612,097	Bos taurus C8H9orf3			
	112,323,763-112,345,659				
9	31,043,707-31,067,189				
	74,223,999-74,293,236	Bos taurus MTFR2, Bos taurus BCLAF1			
	81,166,662-81,216,232				
10	66,659,307-66,687,859				
	101,953,883-101,984,056				
	102,887,596-102,935,702	Bos taurus CTDSPL2			
11	103,799,585-103,830,982	Beginning of Bos taurus CARD9			
12	48,909,344-48,984,802				
	48,984,802-49,006,756				
	49,006,756-49,057,460				
12	49,057,460-49,095,991				
	82,765,192-82,812,721	Bos taurus MIR2301, Beginning of Bos taurus FAM155A			
14	33,580,690-33,604,665		QTL 10971	Commercial Angus	[12]

Supplementary Table S6. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
14	58,589,050-58,687,826				
15	41,707,747-41,757,348	Bos taurus GALNT18			
	80,003,887-80,097,824				
16	1,199,397-1,296,954	Bos taurus PRELP, Bos taurus OPTC			
	31,382,509-31,462,716	Bos taurus SMYD3			
17	4,868,261-4,926,550	End of Bos taurus ARFIP1			
	34,409,623-34,429,947				
	41,178,453-41,272,672		QTL 11052	Commercial Angus	[12]
	49,702,881-49,791,728				
	70,699,234-70,776,835				
	72,710,280-72,790,867	End of Bos taurus UFD1, Bos taurus CDC45, Bos taurus CLDN5, End of Bos taurus SEPT5			
18	3,146,088-3,177,824		QTL 11058	Commercial Angus	[12]
19	5,057,128-5,083,994	End of Bos taurus TOM1L1, Beginning of Bos taurus COX11			
	22,749,859-22,771,407	Beginning of Bos taurus PRPF8			

Supplementary Table S6. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
19	22,771,407-22,864,442	End of Bos taurus PRPF8, Bos taurus TLCD2, Bos taurus MIR22, Bos taurus MIR3600, Bos taurus SERPINF2, Bos taurus SERPINF1, Beginning of Bos taurus SMYD4			
	33,862,979-33,895,220	Bos taurus ALDH3A1			
	58,551,913-58,591,027				
20	18,631,431-18,719,808	End of Bos taurus DEPDC1B			
	18,719,808-18,743,927				
	22,093,001-22,165,165		QTL 20540, 20542	Brangus	[27]
	57,373,160-57,403,850				
21	58,994,572-58,996,585				
22	499,356-574,301	Beginning of Bos taurus VOPP1			
	56,765,689-56,833,606	Beginning of Bos taurus PPARG-TSEN2, Beginning of Bos taurus PPARG, Bos taurus MIR2373			
22	56,833,606-56,916,823				
	58,397,411-58,429,229	Beginning of Bos taurus HDAC11			

Supplementary Table S6. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
23	45,048,666-45,106,522	Beginning of Bos taurus NEDD9			
24	1,529,327-1,582,182				
	62,104,076-62,130,639	End of Bos taurus SERPINB10			
25	17,860,710-17,891,876				
26	22,557,427-22,628,269				
27	8,589,473-8,649,727	End of Bos taurus NEIL3			
	8,649,727-8,689,042	Beginning of Bos taurus AGA			
	11,657,439-11,715,052				
28	6,499,231-6,547,497	End of Bos taurus KCNK1			
	7,001,292-7,068,698	Bos taurus SCL35F3			
	7,068,698-7,138,132	Bos taurus SCL35F3			

Supplementary Table S7. Significant rib eye area (REA) markers that are within 100,000 base pairs of identified significant markers ($p < 0.001$) and previously reported QTL and genes for those locations.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
1	122,789,893-122,814,776				
	143,741,734-143,831,554	Bos taurus PDXK, Bos taurus CSTB			
	145,643,805-145,682,206	Beginning of Bos taurus COL6A1			
	145,682,206-145,710,047	End of Bos taurus COL6A1			
3	82,187,624-82,250,730	End of Bos taurus ALG6			
7	16,588,162-16,611,621	End of Bos taurus CD209, Bos taurus EVI5L			
	60,436,313-60,475,602				
	78,762,342-78,822,792				
	84,925,417-84,991,860				
8	19,811,075-19,863,242				
	37,136,374-37,158,190				
9	99,334,002-99,354,827				
10	32,409,981-32,433,588	Bos taurus C10H15orf41			
	88,563,925-88,605,589	End of Bos taurus TMED8			
11	20,202,555-20,271,885				
	22,688,045-22,716,948	Bos taurus SLC8A1			

Supplementary Table S7. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
11	75,586,338-75,662,200				
12	4,324,502-4,397,035				
	86,938,949-86,961,976	Bos taurus RASA3			
13	79,914,560-79,991,041				
14	20,323,857-20,347,849				
	27,575,294-27,669,598				
15	34,763,290-34,852,656	End of Bos taurus KCNC1, Bos taurus MYOD1			
	37,237,274-37,309,941				
	55,206,099-55,254,553	Beginning of Bos taurus UVRAG			
	56,571,496-56,663,853				
16	38,807,074-38,830,470	Beginning of Bos taurus FMO1			
17	13,941,499-13,984,972				
	41,089,654-41,178,453				
20	25,255,282-25,296,510				
	43,579,015-43,649,910				
23	46,334,617-46,401,353				

Supplementary Table S7. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
23	52,038,120-52,128,894	Beginning of Bos taurus EXOC2			
25	28,974,015-29,065,778	Bos taurus CALN1			
26	37,733,926-37,797,893				

Supplementary Table S8. Significant average rib eye area (REA) markers that are within 100,000 base pairs of identified significant markers ($p < 0.001$) and previously reported QTL and genes for those locations.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
1	48,726,549-48,802,718				
	114,085,424-114,180,799				
	151,835,916-151,858,713				
2	9,810,493-9,867,063	Bos taurus ZC3H15			
	15,250,050-15,303,929				
	18,164,650-18,233,729				
	29,369,336-29,405,628				
	59,644,564-59,690,093				
3	62,458,422-62,509,283	Bos taurus ADGRL2			
4	15,468,000-15,537,254				
	28,350,426-28,413,603	Bos taurus TWISTNB			
5	109,134,816-109,167,093	Bos taurus BID			
	117,738,204-117,795,427				
	119,949,553-120,016,258	Beginning of Bos taurus ACR			
7	2,323,494-2,346,546	Beginning of Bos taurus ZNF879			
	3,488,080-3,570,752				
	56,055,399-56,152,302				

Supplementary Table S8. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
7	78,762,342-78,822,792				
	78,822,792-78,877,775				
	80,229,987-80,307,024				
8	81,612,097-81,638,162	End of Bos taurus C8H9orf3, Bos taurus MIR2475, Bos taurus MIR23B, Bos taurus MIR276, Bos taurus MIR24-1, Beginning of Bos taurus FANCC			
9	14,794,389-14,817,532				
	98,566,722-98,648,213				
10	61,648,704-61,769,231	Beginning of Bos taurus FBN1			
	68,089,016-68,162,634	End of Bos taurus KTN1			
	68,162,634-68,231,955				
	72,023,342-72,060,561				
	88,563,925-88,630,762	End of Bos taurus TMED8, Beginning of Bos taurus VIPAS39			
	90,543,010-90,589,157	Bos taurus NRXN3			
11	41,114,000-41,204,355				
	54,855,548-54,887,301	Bos taurus CTNNA2			
	55,229,674-55,264,686	Bos taurus CTNNA2			

Supplementary Table S8. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
11	71,811,673-71,875,673	End of Bos taurus BABAM2, Beginning of Bos taurus RBKS			
12	77,964,481-78,014,490	Bos taurus ITGBL1			
13	2,342,625-2,372,577	Bos taurus PLCB4			
	4,634,576-4,733,016				
	37,675,851-37,725,131	Bos taurus PCSK2			
	37,725,131-37,757,395	End of Bos taurus PCSK2, Beginning of Bos taurus LOC515755			
	57,524,735-57,570,093	End of Bos taurus GNAS			
	59,963,672-60,002,265	Beginning of Bos taurus PSMF1			
14	2,194,228-2,239,085				
	18,811,289-18,832,428				
	19,132,330-19,172,385				
15	73,739,991-73,762,207				
16	933,282-950,232	Bos taurus ADORA1			
	61,668,331-61,716,582	End of Bos taurus ACBD6			
17	49,702,881-49,791,728				
	63,885,514-63,939,534	Bos taurus ACACB			
20	53,635,068-53,674,655	Bos taurus CDH18			
	69,430,215-69,459,313				
22	6,450,949-6,485,383				

Supplementary Table S8. Continued.

Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
22	51,214,861-51,245,935	Beginning of Bos taurus CELSR3			
	51,452,218-51,484,825				
23	32,682,177-32,757,561				
	51,621,297-51,719,827				
	52,068,611-52,091,670	Beginning of Bos taurus EXOC2			
24	60,745,394-60,842,899				
25	40,282,215-40,341,603				
26	9,669,992-9,725,747				
27	37,283,994-37,357,125	End of Bos taurus SLC20A2			
	37,357,125-37,389,551	Bos taurus SMIM19			
	37,389,551-37,430,965				
	39,916,848-39,994,067				
29	21,987,120-22,019,432				

Supplementary Table S9. Significant internal fat (KPH) markers that are within 100,000 base pairs of identified significant markers ($p < 0.001$) and previously reported QTL and genes for those locations.

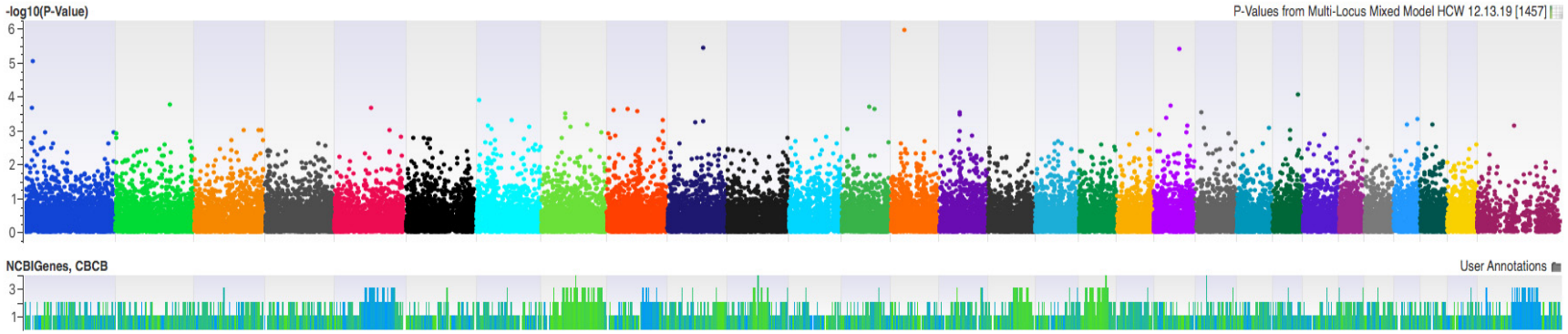
Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
1	883,895-950,841				
	10,404,023-10,468,415	Bos taurus APP			
	16,145,053-16,169,001				
	118,694,108-118,714,300				
	142,401,535-142,446,153				
2	30,262,141-30,307,800	Bos taurus SCN1A			
4	53,316,893-53,400,639				
	117,292,302-117,339,600				
6	3,093,621-3,149,732				
	27,158,687-27,183,822		QTL 12153	Jersey x Limousin	[29]
	30,782,962-30,832,561		QTL 12153	Jersey x Limousin	[29]
	41,343,408-41,443,081	Bos taurus KCNIP4	QTL 12153	Jersey x Limousin	[29]
	42,155,077-42,239,393		QTL 12153	Jersey x Limousin	[29]
	44,622,597-44,649,549		QTL 12153	Jersey x Limousin	[29]
6	66,509,207-66,572,393				

Supplementary Table S9. Continued.

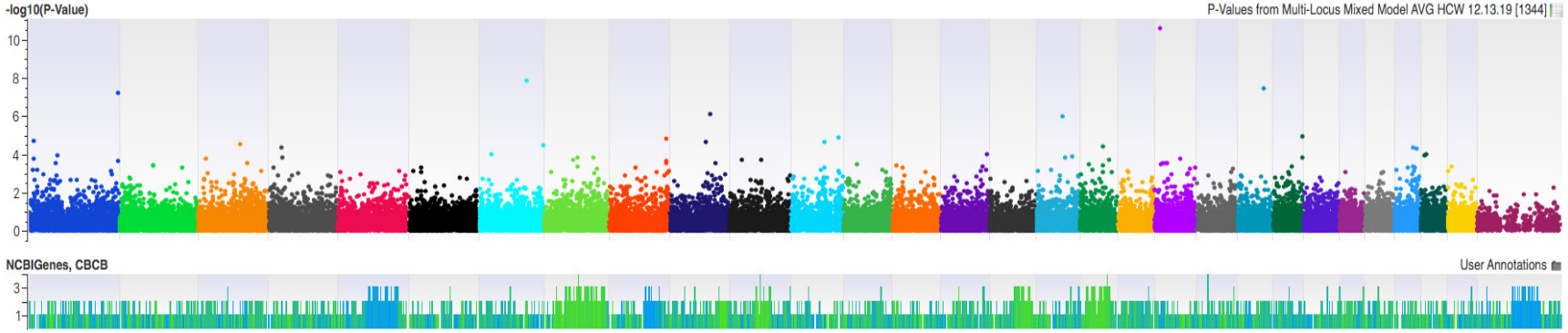
Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
8	40,775,647-40,800,617				
	51,330,787-51,369,892				
	73,881,694-73,907,982				
	101,044,054-101,135,756	Bos taurus DNAJC25, Bos taurus GNG10			
	101,135,756-101,167,884				
9	55,740,550-55,802,932				
10	92,952,608-92,984,267				
11	15,919,622-15,945,389	End of Bos taurus LTBP1			
12	45,919,459-45,952,853				
13	49,963,611-50,004,272				
	62,881,877-62,909,025	End of Bos taurus CDK5RAP1, Beginning of Bos taurus SNTA1			
14	59,112,331-59,139,878				
16	37,479,436-37,505,165	Beginning of Bos taurus SCYL3	QTL 1354	(Brahman x Angus) x Hereford, Angus, MARC III	[30]
17	1,180,289-1,261,843				
	64,189,856-64,225,341	Beginning of Bos taurus CORO1C			

Supplementary Table S9. Continued.

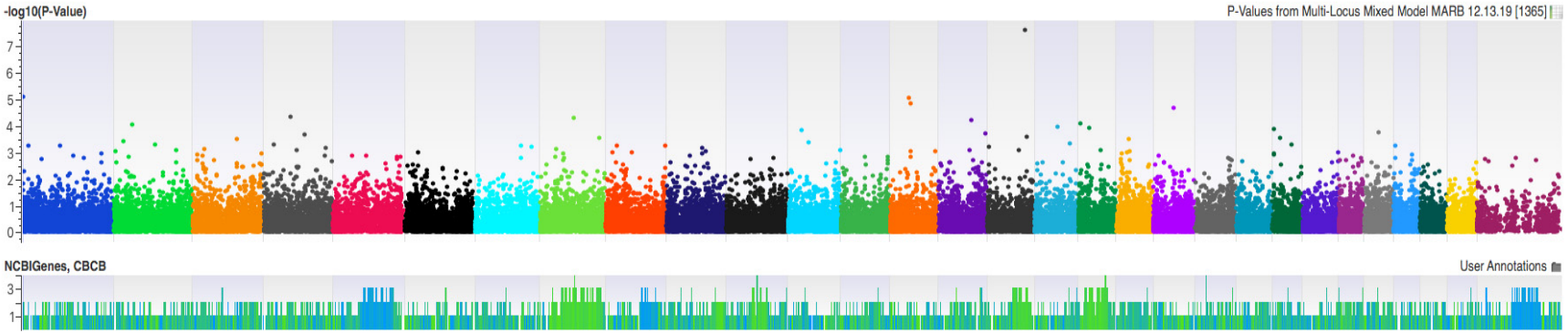
Chromosome	Position (base pairs)	Positional Candidate Gene	Previously Identified QTL/Genes	Breed	Reference
17	68,952,931-69,030,893	Beginning of Bos taurus MTMR3			
20	26,330,033-26,397,183		QTL 12157	Jersey x Limousin	[29]
21	7,283,843-7,311,519	Bos taurus LRRC28			
	57,819,236-57,848,290	Bos taurus GON7, Bos taurus UBR7			
22	37,615,930-37,652,444	End of Bos taurus THOC7			
24	56,487,933-56,564,480				
25	40,022,986-40,060,928				
26	6,051,502-6,092,833				
27	30,025,162-30,089,811				
29	41,778,946-41,854,768				
	42,620,218-42,696,595	Bos taurus CCDC88B, Bos taurus RPS6KA4			
	42,985,739-43,043,207	End of Bos taurus PYGM, Bos taurus SF1, Bos taurus MAP4K2, Beginning of Bos taurus MEN1			



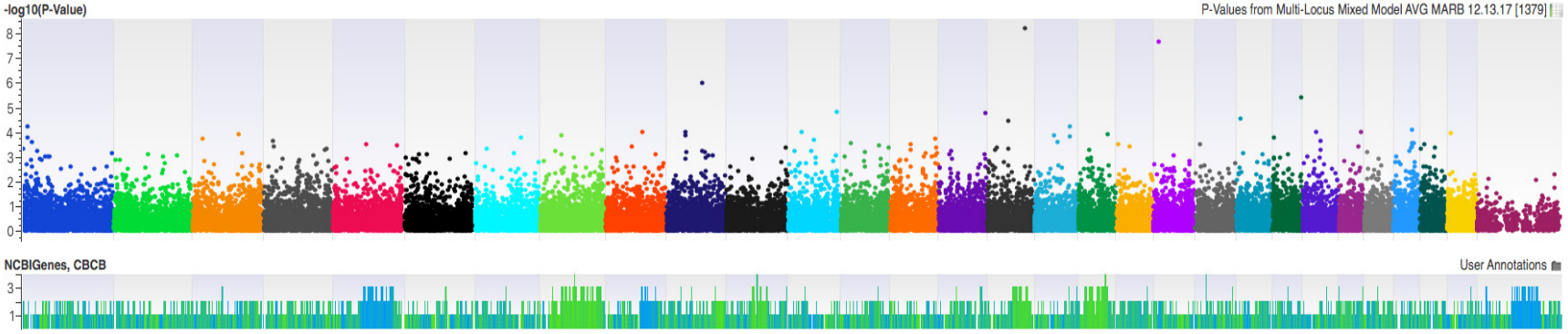
Supplementary Figure S1. Manhattan plot for hot carcass weight (HCW). Markers above –log10(*p*-value) of 5 x 10^{-8} are genome-wide association significant markers. Vertical clusters of markers are also of interest as they are indicating suggestive QTL in those regions.



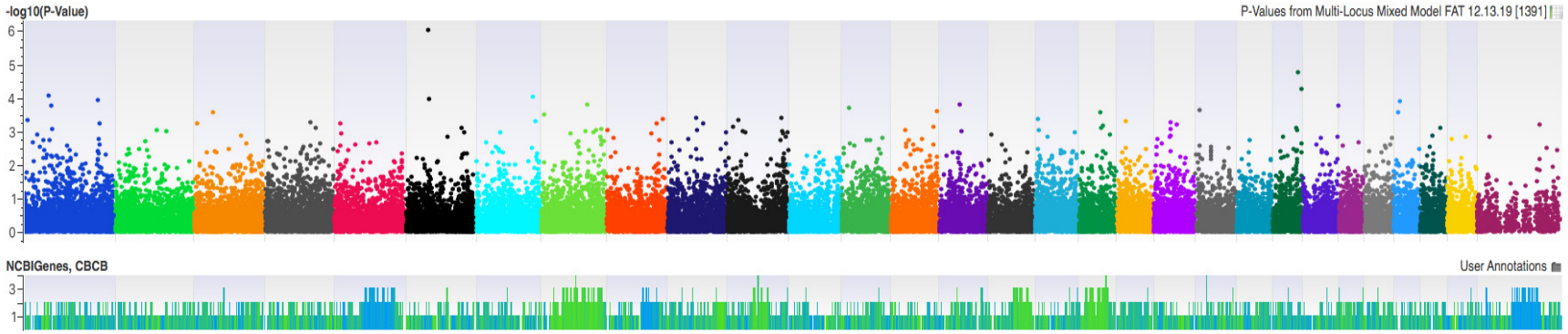
Supplementary Figure S2. Manhattan plot for average hot carcass weight (HCW). Markers above –log10(*p*-value) of 5 x 10^{-8} are genome-wide association significant markers. Vertical clusters of markers are also of interest as they are indicating suggestive QTL in those regions.



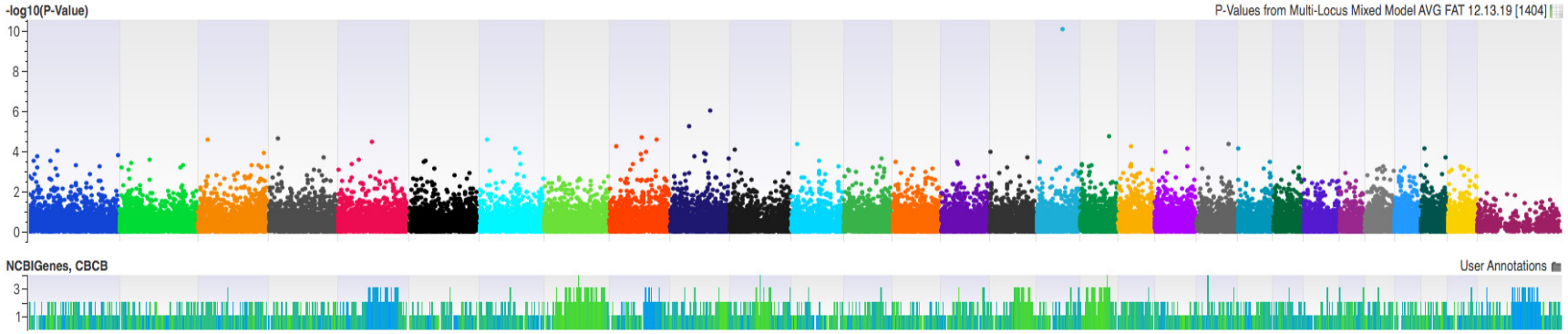
Supplementary Figure S3. Manhattan plot for marbling (MARB). Markers above –log10(*p*-value) of 5 x 10^{-8} are genome-wide association significant markers. Vertical clusters of markers are also of interest as they are indicating suggestive QTL in those regions.



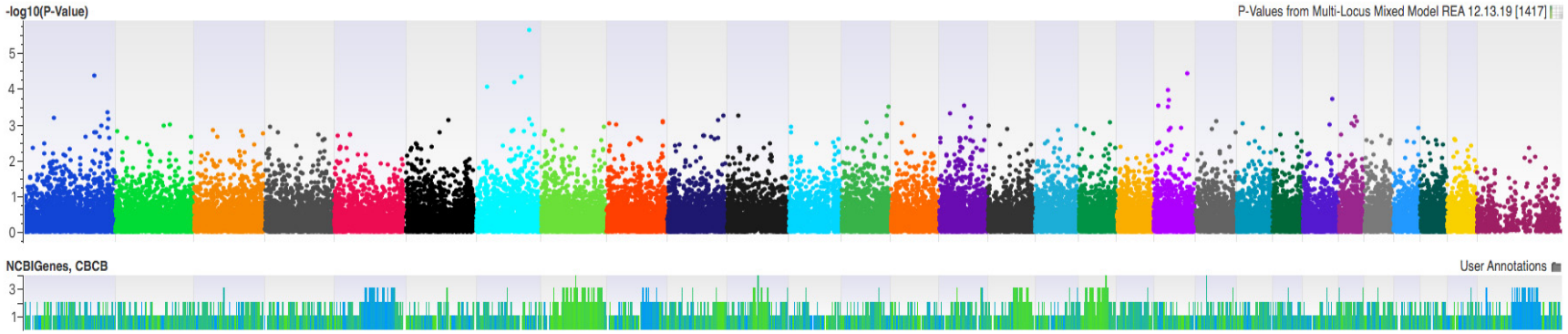
Supplementary Figure S4. Manhattan plot for average marbling (MARB). Markers above –log10(*p*-value) of 5 x 10^{-8} are genome-wide association significant markers. Vertical clusters of markers are also of interest as they are indicating suggestive QTL in those regions.



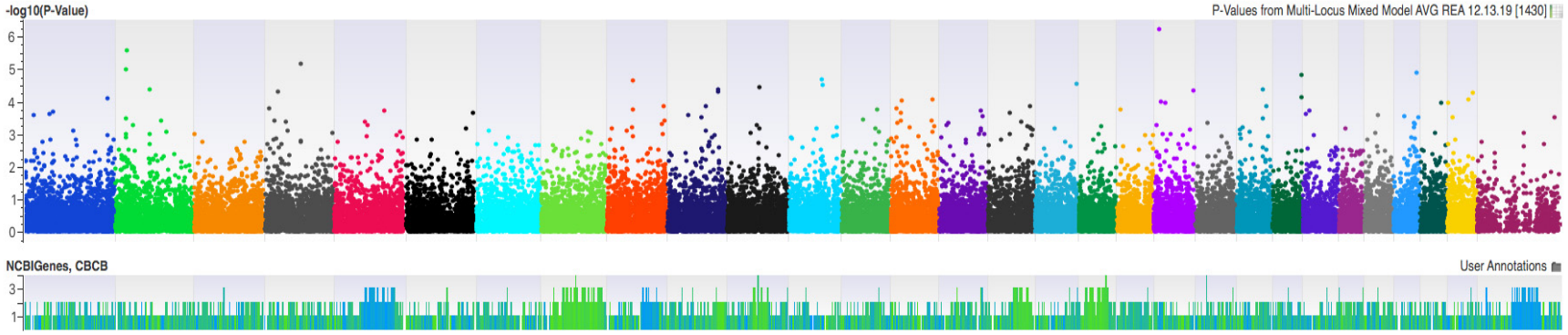
Supplementary Figure S5. Manhattan plot for 12th rib fat (BF). Markers above –log10(*p*-value) of 5 x 10^{-8} are genome-wide association significant markers. Vertical clusters of markers are also of interest as they are indicating suggestive QTL in those regions.



Supplementary Figure S6. Manhattan plot for average 12th rib fat (BF). Markers above –log10(*p*-value) of 5 x 10^{-8} are genome-wide association significant markers. Vertical clusters of markers are also of interest as they are indicating suggestive QTL in those regions.



Supplementary Figure S7. Manhattan plot for rib eye area (REA). Markers above –log10(*p*-value) of 5 x 10^{-8} are genome-wide association significant markers. Vertical clusters of markers are also of interest as they are indicating suggestive QTL in those regions.



Supplementary Figure S8. Manhattan plot for average rib eye area (REA). Markers above –log10(*p*-value) of 5 x 10^{-8} are genome-wide association significant markers. Vertical clusters of markers are also of interest as they are indicating suggestive QTL in those regions.