Open Access

Asian Australas. J. Anim. Sci.
Vol. 28, No. 10 : 1371-1379 October 2015
http://dx.doi.org/10.5713/ajas.14.0715

www.ajas.info
pISSN 1011-2367 eISSN 1976-5517

Stories and Challenges of Genome Wide Association Studies in Livestock — A Review

Aditi Sharma*[,a], Jun Seop Lee[a], Chang Gwon Dang, Pita Sudrajad, Hyeong Cheol Kim, Seong Heum Yeon, Hee Seol Kang, and Seung-Hwan Lee[1,]*

Hanwoo Experiment Station, Pyeongchang 232-950, Korea

- Supplementary Data –

Supplementary Table S1. Genome wide association studies carried out in pigs

Chr	Position[1]	Number of Markers	Trait	Breed	Candidate genes	Reference
6		60K+	androstenone levels	Duroc	*CYP2A19, SULT2A1*, , *SULT2B1,* cytochrome P450 *CYP2, HSD17B14, LHB*	Duijvesteijn et al. (2010)
14	14,730,418	62,163	pH1	Swiss Large White breed	*NA*	Becker et al. (2013)
2	42886909-42938876	62,163	Carcass length	Swiss Large White breed	*NA*	Becker et al. (2013)
16	6198618-6343134	62,163	Rear view hind legs	Swiss Large White breed	*NA*	Becker et al. (2013)
10	39424934-40670821	62,163	Rear view hind legs	Swiss Large White breed	*NA*	Becker et al. (2013)
1	64094344	60K+	Eating Behaviour (Daily feed intake)	Danish Duroc boars	*GABRR2*	Do et al. (2013)
2	18828505		Mean feed intake rate	Danish Duroc boars	*TP53I11*	Do et al. (2013)
5	101511939		Total time spent at feeder per day	Danish Duroc boars	ALX1	Do et al. (2013)
10	38641420		Mean feed intake per visit	Danish Duroc boars	ACO1	Do et al. (2013)
11	6392619-8523653		Total time spent at feeder per day	Danish Duroc boars	TEX26	Do et al. (2013)
12	34360905-34781411		Number of visits to the feeder per day	Danish Duroc boars	MSI2	Do et al. (2013)
12	39543788		Number of visits to the feeder per day	Danish Duroc boars	MYO19	Do et al. (2013)
12	59746968		Total time spent at feeder per day	Danish Duroc boars	ELAC2	Do et al. (2013)
1	70.12-70.27	SNP60	farrowing traits (Total number born)	Composite population (Yorkshire), Duroc, a maternal Landrace line, and a terminal Landrace		Schneider et al. (2012)
1	86.01-86.17	SNP60	farrowing traits (Total number born)	Composite population (Yorkshire)		Schneider et al. (2012)
1	173.58-173.66	SNP60	farrowing traits (Total number born)	Composite population (Yorkshire)	*FEM1B*	Schneider et al. (2012)
4	71.61-71.71	SNP60	farrowing traits (Total number born)	Composite population (Yorkshire)	*CRH*	Schneider et al. (2012)
4	126.77-126.1	SNP60	farrowing traits (Total number born)	Composite population (Yorkshire)	*SNX7*	Schneider et al. (2012)
4	132.43-132.54	SNP60	farrowing traits (Total number born)	Composite population (Yorkshire)	*HFM1, ATP-dependent DNA helicase homolog*	Schneider et al. (2012)
13	78.66-78.91	SNP60	farrowing traits (Total number born)	Composite population (Yorkshire)		Schneider et al. (2012)
14	146.55-146.66	SNP60	farrowing traits (Total number born)	Composite population (Yorkshire)		Schneider et al, (2012)
15	18.92-19.01	SNP60	farrowing traits (Total number born)	Composite population (Yorkshire)		Schneider et al. (2012)
15	130.35-130.51	SNP60	farrowing traits (Total number born)	Composite population (Yorkshire)	*ACSL3*	Schneider et al. (2012)

17	30.76-30.90	SNP60	farrowing traits (Total number born)	Composite population (Yorkshire)		Schneider et al. (2012)
1	86.07-86.19	SNP60	farrowing traits (Number born live)	Composite population (Yorkshire)		Schneider et al. (2012)
1	154.35-154.56	SNP60	farrowing traits (Number born live)	Composite population (Yorkshire)		Schneider et al. (2012)
1	182.39-182.51	SNP60	farrowing traits (Number born live)	Composite population (Yorkshire)		Schneider et al. (2012)
1	173.58-173.66	SNP60	farrowing traits (Number born live)	Composite population (Yorkshire)		Schneider et al. (2012)
4	132.43-132.54	SNP60	farrowing traits (Number born live)	Composite population (Yorkshire)		Schneider et al. (2012)
6	70.58-70.74	SNP60	farrowing traits (Number born live)	Composite population (Yorkshire)	*CAPZB*	Schneider et al. (2012)
10	38.23-38.51	SNP60	farrowing traits (Number born live)	Composite population (Yorkshire)	*GALT*	Schneider et al. (2012)
13	78.66-78.91	SNP60	farrowing traits (Number born live)	Composite population (Yorkshire)	*DNAJ*	Schneider et al. (2012)
15	91.58-91.75	SNP60	farrowing traits (Number born live)	Composite population (Yorkshire)	*CWC22*	Schneider et al. (2012)
15	127.70-127.82	SNP60	farrowing traits (Number born live)	Composite population (Yorkshire)		Schneider et al. (2012)
15	130.35-130.51	SNP60	farrowing traits (Number born live)	Composite population (Yorkshire)		Schneider et al. (2012)
17	63.84-65.63	SNP60	farrowing traits (Number born live)	Composite population (Yorkshire)	*AURKA, RAB22A*	Schneider et al. (2012)
11	45.59-45.72	SNP60	farrowing traits (Number born dead)	Composite population (Yorkshire)	*DACH1*	Schneider et al. (2012)
1	86.07-86.19	SNP60	Birth weight	Composite population (Yorkshire)		Schneider et al. (2012)
1	173.58-173.66	SNP60	Birth weight	Composite population (Yorkshire)		Schneider et al. (2012)
1	202.06 - 202.22	SNP60	Birth weight	Composite population (Yorkshire)		Schneider et al. (2012)
2	2.46-2.73	SNP60	Birth weight	Composite population (Yorkshire)		Schneider et al. (2012)
3	92.31-92.52	SNP60	Birth weight	Composite population (Yorkshire)		Schneider et al. (2012)
4	61.34-61.51	SNP60	Birth weight	Composite population (Yorkshire)		Schneider et al. (2012)

4	70.07-70.25	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
4	71.57-71.66	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
4	73.47-73.83	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
4	118.84-118.90	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
5	68.05-68.21	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
5	90.45-90.51	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
6	3.91-81.16	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
7	7.41-7.73	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
7	60.70-90.10	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
9	1.18-1.33	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
9	127.27-127.34	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
10	38,28-38.55	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
14	61.01-61.15	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
14	112.98-113.10	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
15	18.92-19.01	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
15	69.51-69.98	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
15	74.00-74.93	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
15	121.05-121.15	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
15	123.59-123.81	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)
15	124.04-124.47	SNP60	Birth weight	Composite population (Yorkshire)	Schneider et al. (2012)

17	30.65-30.87	SNP60	Birth weight	Composite population (Yorkshire)		Schneider et al. (2012)
17	65.33-65.48	SNP60	Birth weight	Composite population (Yorkshire)		Schneider et al. (2012)
7	34.55-36.004		Hematocrit, hemoglobin	Large White × Minzhu F2 Resource Population	*ENSSSCP00000001643, GRM4, ENSSSCP00000001654, SCUBE3, LOC100157423*	Luo et al. (2012)
8	43.65-47.03		mean corpuscular hemoglobin	Large White × Minzhu F2 Resource Population	*KIT,GUCY1A3, TDO,GUCV1B3*	Luo et al. (2012)
1	29.24		Red blood cell count	Large White × Minzhu F2 Resource Population	CDK5RAP2	Luo et al. (2012)
12	26.02-26.16		Red blood cell volume distribution width	Large White × Minzhu F2 Resource Population	LOC100511101,ENSSSCP00000018640	Luo et al. (2012)
8	42.15-73.78		Mean corpuscular volume	Large White × Minzhu F2 Resource Population	*KIT,KDR,TLL1,CPE,GUCY1A3,TDO,GUCY1B3,HOPX, REST*	Luo et al. (2012)

Supplementary Table S2. Genome wide association studies carried out in chicken

Chr	Position	Number of markers	Trait	Breed	Candidate genes	Reference
4	71.6 to 80.2	60 k	Late growth	Cross between Silky Fowl and White Plymouth Rock	*LDB2*	Gu et al. (2011)
4	78.4 to 79.5	60 K Chicken SNP	Carcass weight and eviscerated weight	Beijing-You chickens	*LCORL*, *LAP3*, *LDB2*, *TAPT1*	Liu et al. (2013)
2	78.1	6,695	Dry matter content in breast	Beijing-You chickens, commercial fast-growing broiler line (Cobb-Vantress)	*FAM105A*	Sun et al. (2013)
Z	16.2	6,695	Dry matter content in breast	Beijing-You chickens, commercial fast-growing broiler line (Cobb-Vantress)	*ST8SIA5*	Sun et al. (2013)
14	14.7	6	Dry matter content in thigh muscle	Beijing-You chickens, commercial fast-growing broiler line (Cobb-Vantress)	*TBC1D24*	Sun et al. (2013)
1	65.6	6	Intramuscular fat in breast	Beijing	*MGST1*	Sun et al. (2013)
3	40.6	6	Intramuscular fat in breast	Beijing	*NTPCR*	Sun et al. (2013)
4	43.3	6	Intramuscular fat in breast	Beijing	*AGA*	Sun et al. (2013)
5	27	6	Intramuscular fat in breast	Beijing	*TYRO3*	Sun et al. (2013)
Z	18.7	6	Intramuscular fat in breast	Beijing	*KIF2A*	Sun et al. (2013)