

32 **Table S3. List of candidate genes matched the GO terms.**

Chr	Gene Start	Gene End	Gene Name	GO Term Name
2	3185891	3194845	<i>FADD</i>	immune system process
2	3185891	3194845	<i>FADD</i>	innate immune response
2	3185891	3194845	<i>FADD</i>	positive regulation of adaptive immune response
2	114675917	114853524	<i>MAN2A1</i>	lung alveolus development
3	18629655	18643387	<i>LAT</i>	inflammatory response
3	18629655	18643387	<i>LAT</i>	immune response
3	56515143	56541806	<i>ZAP70</i>	innate immune response
3	94167752	94253662	<i>EPAS1</i>	lung development
3	94351279	94864954	<i>PRKCE</i>	macrophage activation involved in immune response
4	90051204	90080747	<i>VANGL2</i>	orthogonal dichotomous subdivision of terminal units involved in lung branching morphogenesis
4	90051204	90080747	<i>VANGL2</i>	planar dichotomous subdivision of terminal units involved in lung branching morphogenesis
4	90051204	90080747	<i>VANGL2</i>	lateral sprouting involved in lung morphogenesis
4	125109966	125310783	<i>TGFBR3</i>	immune response
6	30058595	30087031	<i>MMP2</i>	positive regulation of innate immune response
6	49110789	49178413	<i>CYP2B6</i>	drug metabolic process
6	49245802	49277917	<i>AXL</i>	inflammatory response
6	49638991	49660975	<i>CIC</i>	lung alveolus development
7	30512173	30524271	<i>SPDEF</i>	lung goblet cell differentiation
7	58779475	58786117	<i>CYP1A2</i>	lung development
7	58779475	58786117	<i>CYP1A2</i>	drug metabolic process
7	58802880	58809775	<i>CYP1A1</i>	drug metabolic process
8	70054756	70163415	<i>CXCL2</i>	inflammatory response
8	70054756	70163415	<i>CXCL2</i>	immune response
8	75416028	75428330	<i>TLR2</i>	positive regulation of inflammatory response
8	75416028	75428330	<i>TLR2</i>	inflammatory response

8	75416028	75428330	<i>TLR2</i>	cytokine secretion involved in immune response
8	75416028	75428330	<i>TLR2</i>	immune system process
8	75416028	75428330	<i>TLR2</i>	innate immune response
8	112670533	112762870	<i>SEC24B</i>	lung morphogenesis
8	112670533	112762870	<i>SEC24B</i>	lung lobe morphogenesis
9	36620587	36759552	<i>ATM</i>	immune system process
10	20392326	20707474	<i>DENND1B</i>	regulation of immune response
12	18142322	18184103	<i>MAP3K14</i>	immune response
12	40738450	40782893	<i>CCL11</i>	inflammatory response
12	40738450	40782893	<i>CCL11</i>	immune response
12	46709880	46895818	<i>ABR</i>	negative regulation of inflammatory response
13	25159603	25208313	<i>CTNNB1</i>	lung development
13	25159603	25208313	<i>CTNNB1</i>	epithelial tube branching involved in lung morphogenesis
13	25159603	25208313	<i>CTNNB1</i>	lung cell differentiation
13	25159603	25208313	<i>CTNNB1</i>	lung-associated mesenchyme development
13	25159603	25208313	<i>CTNNB1</i>	lung induction
13	25159603	25208313	<i>CTNNB1</i>	mesenchymal cell proliferation involved in lung development
13	25159603	25208313	<i>CTNNB1</i>	positive regulation of branching involved in lung morphogenesis
13	29411457	29445953	<i>LTF</i>	innate immune response in mucosa
13	29411457	29445953	<i>LTF</i>	antimicrobial humoral immune response mediated by antimicrobial peptide
13	67209260	67411314	<i>HRH1</i>	inflammatory response
14	53577131	53584546	<i>ZP4</i>	positive regulation of humoral immune response
16	19547007	19920513	<i>ADAMTS12</i>	regulation of inflammatory response
16	26023986	26083742	<i>C6</i>	immune response
16	53843251	54249181	<i>DOCK2</i>	myeloid dendritic cell activation involved in immune response
17	9245135	9261748	<i>IDO1</i>	cytokine production involved in inflammatory response
17	9245135	9261748	<i>IDO1</i>	positive regulation of chronic inflammatory response
17	9245135	9261748	<i>IDO1</i>	inflammatory response

17	9245135	9261748	<i>IDO1</i>	positive regulation of type 2 immune response
18	28946497	29028107	<i>WNT2</i>	positive regulation of epithelial cell proliferation involved in lung morphogenesis
18	28946497	29028107	<i>WNT2</i>	lung induction
18	37377924	37599931	<i>AOAH</i>	negative regulation of inflammatory response

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34 **Table S4. Information of genes which are previously reported as with swine EP or human asthma related genes. Descriptions of the gene**  
35 **functions are based on literature search and GeneCard.**

Candidate genes	Chr	Physical position	XP-EHH score	Fst value	Function	Reference
<i>TCF7</i>	2	142047175	0.75	0.58	Involved in the Wnt signaling pathway and immune response.	(Zhu <i>et al.</i> 2015)
<i>EPAS1</i>	3	100164175	0.57	0.72	Responds to hypoxia-responsive.	(Ai <i>et al.</i> 2014)
<i>TGFBR3</i>	4	136718160	0.96	0.83	Airway remodeling.	(Kim <i>et al.</i> 2010)
<i>MMP2</i>	6	27552563	1.02	0.58	Plays crucial role in the inflammatory response.	(Huang <i>et al.</i> 2009)
<i>AXL</i>	6	44979578	0.71	0.75	Mediates innate immune response.	(Sun <i>et al.</i> 2010)
<i>SPDEF</i>	7	35242328	0.95	0.64	Mediates mucus secretion in airway.	(Rajavelu <i>et al.</i> 2015)
<i>CYP1A1</i>	7	63474840	0.54	0.80	Responds to inflammatory response caused by <i>M.hyo</i> pneumoniae.	(Fang <i>et al.</i> 2016)
<i>CYP1A2</i>	7	63474840	0.54	0.80	Susceptibility to hyperoxic lung injury.	(Wang <i>et al.</i> 2015)
<i>CXCL2</i>	8	74284832	0.75	0.62	Inflammation response and the pathogenesis of airway remodeling.	(Al-Alwan <i>et al.</i> 2013)
<i>TLR2</i>	8	79818077	0.69	0.84	Responds to inflammatory response caused by <i>M.hyo</i> pneumoniae.	(Fang <i>et al.</i> 2013)
<i>CCL11</i>	12	42446570	0.66	0.57	Significantly related to increased risk of asthma.	(Zhou <i>et al.</i> 2017)
<i>CTNNB1</i>	13	27684730	0.73	0.60	Plays crucial role in the Wnt/ $\beta$ -catenin signaling pathway.	(Smolich <i>et al.</i> 1993)
<i>IL7R</i>	16	22326963	0.58	0.76	Responds to adaptive immune response.	(Kurz <i>et al.</i> 2006)
<i>WNT2</i>	18	30813337	0.54	0.63	Involved in the Wnt signaling pathway and immune response.	(Smolich <i>et al.</i> 1993)