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Use of insects for fish and poultry compound feed in sub-Saharan Africa – a systematic review

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Table S1. Scholarly data bases and journals consulted.

Data base	Journal
Academic Search	Journal of Insects as Food and Feed
African Journals OnLine (AJOL)	Journal of Insect Science
AGRICOLA: Agricultural Online Access	Insect molecular biology
AGRIS: Agricultural database	Systematic Entomology
Biological Abstracts	Ecological Entomology
BioOne	Bulletin of Insectology
CAB Abstracts	
Directory of Open Access Journals	
Google Scholar	
JSTOR: Journal Storage	
Jum	
Mendeley	
SciELO	
Science.gov	
ScienceOpen	
WorldWideScience	
The Zoological Record	

Table S2. Essential amino acid (AA) composition (g/100 g protein) of insect and conventional feeds vs poultry and fish requirements.

Amino acid	Black soldier fly	Housefly larvae (maggot)	House cricket	Grasshopper (<i>Zonocerus variegatus</i>)	Conventional feeds		Fish requirements		Broiler chicken		
	larvae meal	meal	meal								
	Substrate				Source	Type					
	¹ Beef manure	¹ Swine manure	² Larvae cattle blood + wheat bran	³ Milk powder + sugar + fresh layer droppings	⁴ Broiler chick starter mash	⁸ Harvesed from the wild	² Fish meal	² Soy meal	⁵ Nile tilapia	⁶ African cat fish	⁷ 0-3 weeks
Essential AA											
Methionine	0.9	0.83	2.28	2.34	0.94	1.89	1.68	0.52	2.68	2.4	0.50
Cystine	–	–	0.52	0.42	–	0.65	0.82	0.74	0.53	–	–
Valine	3.4	2.23	3.61	2.92	3.89	3.54	3.09	2.06	2.80	2.4	0.90
Isoleucine	2.0	1.51	3.06	1.46	2.65	3.67	2.97	2.07	3.11	2.0	0.80
Leucine	3.5	2.61	6.35	2.90	4.72	5.06	4.45	3.29	3.39	3.5	1.20
Phenylalanine	2.2	1.49	3.96	3.57	1.38	3.05	2.35	2.12	3.75	4.0	0.72
Histidine	1.9	2.61	3.09	1.98	1.63	–	1.36	1.02	1.72	1.2	0.35
Lysine	3.4	2.21	6.04	5.22	3.61	4.84	4.55	2.62	5.12	4.8	1.10
Threonine	0.6	1.41	2.03	2.27	2.23	3.07	2.60	1.66	3.75	2.8	0.80
Tryptophan	0.2	0.59	–	3.17	0.39	–	0.69	0.65	1.00	–	0.20
Non-essential AA											
Tyrosine	–	–	2.91	4.55	2.59	–	1.98	1.27	1.79	–	–
Methionine + cysteine ⁹	–	–	–	–	–	–	–	–	–	–	0.90
Phenylalanine + tyrosine ⁹	–	–	–	–	–	–	–	–	–	–	1.34

¹ Newton *et al.*, 2005.

² Aniebo *et al.*, 2009.

³ Hwangbo *et al.*, 2009.

⁴ Nakagaki *et al.*, 1986.

⁵ El-Sayed, 2006.

⁶ Jimoh *et al.*, 2014.

⁷ Klasing, 2015.

⁸ Adeyeye, 2005.

⁹ Broilers only.

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