

Table 10. List of feed ingredients of plant origin (cereal grains and oil seeds) those are used or have the potential to be used as protein and/or energy supplement in tilapia feed (nutrient content in % dry matter)

Feed ingredients		Primary use (please tick)			Dry matter (%)	Crude protein (%)	Digestible energy (kJ/g)	Crude fat (%)	NFE (%)	Inclusion (% max)	Main nutritional interest	Main nutritional deficiencies	Processing restrictions
		Protein supplement	Energy supplement	Both									
<b>Plant origin</b>													
<b>Cereal grain/by-product</b>													
Corn	Grain, ground	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	87.8	9.6	16.3	2	74	35			
	Gluten meal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	93.0	63.0		8	25	20			
Millet	Grain	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	89.3	11.2	16.4						
Rice	Bran	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	90.0	12.2	16.6						Poor water stability
	Bran (solvent extracted)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	89.5	12.3	14.5	2	56	35	Vitamins		Poor water stability
Sorghum	Grain	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	88.8	10.6	16.3			35			
	Distillers dried grains with solubles	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	95.0	33.2	19.8						
Wheat	Grain	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	87.9	12.0	16.0	2	80	35			
	Bran	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	87.9	14.7	16.0			30			Poor water stability
	Flour	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	89	16		2	80	35			
	Midlings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	89	17		4	66	40			
Corn gluten	Meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	93	63		8	25	20			
<b>Oilseed/by-product</b>													
Coconut	Oilcake, mechanically extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	91.5	20.8	17.3			25-50		Lys	High fibre
	Meal, solvent extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	89	21		4	45	25		Some EAA	High fibre
Cottonseed	Oilcake, with hulls (undec.), mechan. extr.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	89.3	21.9	16.9					Lys, met	Gossypol
	Oilcake, without hulls (dec.), mechan. extr.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	92.2	41.2	18.7	2	39	50		Lys	Gossypol
	Oilmeal, dec., solvent extr., 41% protein	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	90.2	41.7	17.3			50			Gossypol
	Oilmeal, dec., solvent extr., 50% protein	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	92.5	50.0	18.3			50			Gossypol
Groundnut/peanut	Oilcake, undec., mechanically extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	90.0	30.2	18.5					Met	Aflatoxin risk
	Oilmeal, undec., solvent extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	92.2	31.7	17.6						Aflatoxin risk
	Oilcake, dec., mechanically extracted	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	90.4	46.2	19.1			25			Aflatoxin risk
	Oilmeal, dec., solvent extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	91.3	48.7	18.0			25			Aflatoxin risk
Rapeseed	Oilcake, mechanically extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	91.9	34.1	18.6			75		Cys	ANF
	Oilmeal, solvent extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	91.0	37.3	17.2			75			ANF
Sesame	Oilcake, mechanically extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	92.0	40.4	19.0			25		Lys, Zn	
Soybean	Soybean meal, full fat	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	94	38		20	31	40		S amino acids	High fat, ANF
	Oilcake, undecor., mechanically extracted	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	89.0	41.6	18.1				Lys	S amino acids	ANF
	Oilmeal, undecor., solvent extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	88.4	44.4	17.3			35	Lys	S amino acids	ANF
	Oilmeal, decor., solvent extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	89.6	49.0	17.7		32	60-70	Lys		ANF
Sunflower seed	Oilcake, undecor., mechanically extracted	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	92.7	31.6	18.9				Met	Lys	
	Oilmeal, undecor., solvent extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	90.3	30.8	16.8						
	Oilcake, decor., mechanically extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	92.2	37.1	19.2						
	Oilmeal, decor., solvent extracted	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	92.3	43.4	18.0						
Canola	Meal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	93	38		4	40	25		Some EAA	

Lys = Lysine; EAA = essential amino acid; Met = Methionine; Cys = Cystine; Zn = Zinc; S amino acid = sulphur amino acid (methionine plus cystine); ANF = Anti-nutritional factors