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DRAFT EAST AFRICAN STANDARD

Compounded Fish feeds — Specification

EAST AFRICAN COMMUNITY

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that “Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose”.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

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Introduction

Fish feeds are essential for semi-intensive and intensive aquaculture farming systems. Fish nutrition has therefore become one of the most important subjects in aquaculture. Aquaculture nutrition and feeding is concerned with the supply of dietary nutrients to fish either directly in the form of an exogenous 'artificial' diet or indirectly through the increased production of natural live food organisms within the water body in which the fish are cultured. Natural food organisms, play a crucial role in the nutrition of fish within extensive and semi-intensive pond culture systems. In the intensive culture systems, with high stocking density natural food organisms play little or no role in the nutrition of the farmed species. The nutrition and feeding of fish within each culture system must be considered as being unique and evaluated on its own merits.

Additionally, the nutrient requirements for fish feeds will inevitably vary between omnivorous and carnivorous fish. Omnivorous fish will eat almost anything from vegetable and plant matter, insects, crustaceans and meat proteins while carnivorous fish eat meat only.

Feeds may be produced by mixing various feeding stuffs or ingredients which may themselves vary in composition. The choice of raw material mixtures will depend on locality, season and availability, economics and the quality of the product. The chemical composition of feedstuffs plays an important role in the formulation of balanced and economical rations for various classes of animals. This is only possible when exact knowledge of the chemical composition of feedstuffs is available. Studies on the nutritive value of feedstuffs available in the East African region show differences between analytical values.

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Compounded Fish feeds — Specification

1 Scope

This Draft East African Standard specifies requirements and method of sampling and test for compounded fish feeds used in aquaculture and it applies to tilapia and catfish feeds.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5983-1, *Animal feeding stuffs — Determination of nitrogen content and calculation of crude protein content — Part 1: Kjeldahl method*

ISO 5983-2, *Animal feeding stuffs — Determination of nitrogen content and calculation of crude protein content — Part 2: Block digestion/steam distillation method*

ISO 5985, *Animal feeding stuffs — Determination of ash insoluble in hydrochloric acid*

ISO 6490-1, *Animal feeding stuffs — Determination of calcium content — Part 1: Titrimetric method*

ISO 6491, *Animal feeding stuffs — Determination of phosphorus content — Spectrometric method*

ISO 6492, *Animal feeding stuffs — Determination of fat content*

ISO 6496, *Animal feeding stuffs — Determination of moisture and other volatile matter content*

ISO 6497, *Animal feeding stuffs — Sampling*

ISO 6498, *Animal feeding stuffs — Preparation of test samples*

ISO 6651, *Animal feeding stuffs — Semi-quantitative determination of aflatoxin B_1 — Thin-layer chromatographic method*

ISO 6654, *Animal feeding stuffs — Determination of urea content*

ISO 6865, *Animal feeding stuffs — Determination of crude fibre content — Method with intermediate filtration*

ISO 6866, *Animal feeding stuffs — Determination of free and total gossypol*

ISO 6869, *Animal feeding stuffs — Determination of the contents of calcium, copper, iron, magnesium, manganese, potassium, sodium and zinc — Method using atomic absorption spectrometry*

ISO 9831, *Animal feeding stuffs, animal products, and faeces or urine — Determination of gross calorific value — Bomb calorimeter method*

ISO 13903, *Animal feeding stuffs — Determination of amino acids content*

ISO 14565, *Animal feeding stuffs — Determination of vitamin A content — Method using high-performance liquid chromatography*

ISO 14718, *Animal feeding stuffs — Determination of aflatoxin B_1 content of mixed feeding stuffs — Method using high-performance liquid chromatography*

ISO 17375, *Animal feeding stuffs — Determination of aflatoxin B_1*

ISO 16050

3 Terms and definitions

For the purposes of this standard, the following terms and definitions shall apply.

3.1
Fish meal
commercial product made from fish and bones and offal from processed fish

3.2
Fingerling
young fish up to growing stage

3.3
Juvenile
stage of fish growth from the time the fish morphologically resembles the adult

4 Requirements

4.1 Ingredients for compounded fish feeds

All ingredients and raw materials shall not be decomposed or deteriorated and shall comply with relevant East Africa standards

Ingredients of animal origin shall be sterilised before use.

Where soy bean meal is used it shall have been subjected to adequate heat treatment to reduce the activity of trypsin inhibitor

Vitamin preparations added to feed shall be in stabilised form.

Urea or any other nitrogenous substances shall not be added to or included in any fish feed except such true protein and amino acids as required in this standard.

4.2 General quality requirements

4.2.1 Fish feeds may be in form of a meal, crumbs or pellets. If the feed is in the form of pellet, the pellets shall be of the following size and floating time as given in Table 1.

Table 1 Pellets size and floating time for fish feed

Sl.No.	Parameters	Starter feed	Grower feed	Finisher feed	Brooder feed	
Tilapia						
I.	Pellet size(mm)	2 (max)	2 – 5	4 - 6	2 - 5	
II.	Pellets should float on water for (minutes-minimum)	2	2	2	2	
Catfish						
viii)	Pellet size(mm)	2 (max)	2 – 5	4 - 6	2 - 5	

4.2.2 Compounded Fish feeds shall be free from harmful levels of substances such as metallic objects, and adulterants

4.2.3 Compounded Fish feeds shall be free from fungi, pathogenic microorganisms or insect infestation

4.2.4 Compounded Fish feed shall not be musty, rancid and shall not have any objectionable odours.

4.3 Composition of compounded fish feed

4.3.1 The level of free fatty acids in feeds should not exceed 15 % of the crude fat content at the time of manufacture.

4.3.2 Compounded Fish feed shall meet the requirements of the nutrients and metabolizable energy in Table 2 and Table 3. Tolerances for the variations that are acceptable in feed formulation are given in Annex A.

Table 2 — Nutritional requirements for compounded tilapia feeds

Sl.No.	Parameters	Starter feed	Grower feed	Finisher feed	Brooder feed	Method of test
	Moisture content of pellets (% Max)	**10**	**10**	**10**	**10**	**ISO 6496**
III.	Crude protein % (min).	35	30	24	32	ISO 5983-1,

IV.	Energy (DE) Kcal/Kg (min)	2500	2750	2900	2800	ISO 9831
V.	Amino acid levels a) Lysine % (min). b) Methionine % (min) c) Methionine + cysteine, %, min.	 2.1 0.9 1.4	 1.7 0.8 1.1	 1.7 0.8 1.1	 1.7 0.8 1.1	ISO 13903
VI.	Crude fibre % (max).	4	6	6	6	ISO 6865
VII.	Crude fat %	5-12	5-15	5-15	5-15	ISO 6492
VIII.	Calcium %,	1.0 -2.5	1.0 -2.5	1.0 -2.5	1.0 -2.5	ISO 6490-1
IX.	Phosphorus %	0.6 -2.0	0.6 -2.0	0.6 -2.0	0.6 -2.0	ISO 6491
X.	Sodium chloride, %	0.25-0.4	0.25-0.4	0.25-0.4	0.25-0.4	ISO 6495

Table 3 — Nutritional requirements for compounded catfish feeds

Sl.No.	Parameters	Starter feed	Grower feed	Finisher feed	Brooder feed	Test method
	Moisture content of pellets (% Max).	**10**	**10**	**10**	**10**	**ISO 6496**
i)	Crude protein % (min).	45	35	30	30	ISO 5983-1,
ii)	Energy (DE) Kcal/Kg (min).	3000	3000	3000	3000	ISO 9831
iii)	Amino acid levels Lysine % (min).	2.10.9	1.7	1.7	1.7	ISO 13903
	Methionine % (min)	1.4	0.8	0.8	0.8	
	Methionine + cystine % (min)		1.1	1.1	1.1	
iv)	Crude fibre % (max).	4	6	6	6	ISO 6865
v)	Crude fat %	5-12	5.15	5-15	5-15	ISO 6492
vi)	Calcium %	1.0 -2.5	1.0 -2.5	1.0 -2.5	1.0- 2.5	ISO 6490-1
vii)	Phosphorus %	0.6 -2.0	0.6 -2.0	0.6 -2.0	0.6 -2.0	ISO 6491

5 Feed additives and provisions related to their use

5.1 General requirements on additives

Additives in the following categories may be used in fish feeds:

- antioxidants,
- colourants,
- emulsifiers,
- stabilisers,
- thickeners and gelling agents,
- binders,
- anti-caking agents and coagulants,
- aromatic and appetising substances,
- enzymes and
- preservatives.

NOTE Material intended for mixing with animal feed as additives for use as feeding stuff should specify the kind of and, if appropriate the age group of the animal for which the feed is intended. In addition the quantity in grams per kilogram (or percent by weight) of the complete feed which conform to the provisions of this standard should be stated in the label (see Clause 7).

No antibiotic, hormone substance, drug or mineral may be added to or included in a feed other than such ingredients required to satisfy this standard and approved by World organization for animal health (OIE)

Where a consignment or a batch of feed or concentrate is prepared specifically for a consumer or group of consumers, substances may be added upon the express written instructions of the consumers provided that:

a) such additions are made in accordance with the provisions of the Competent Authority; and

b) the nature and quantities of such additions are clearly stated upon each and every container of the feed or concentrate.

6 Contaminants

6.1 Aflatoxins

Fish feeds shall comply with the maximum aflatoxin requirements stated in the table 6.

Table 6 Maximum tolerable limits for aflatoxin

S/N	Aflatoxin	Maximum limit (µg/kg)	Test method
	Total aflatoxin	100	ISO 16050
	Aflatoxin B1	10	ISO 6651, ISO 14718, ISO 17375

6.2 Pesticide residues

Fish feeds shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for the ingredient used in fish feed

6.3 Heavy metals

Fish feeds shall comply with the maximum limits of heavy metals as specified in the table 7

S/N	Heavy metal	Maximum limit (mg/kg)	Test method
	Arsenic	2.0	ISO 27085
	Lead	5.0	
	Cadmium	0.5	
	Mercury	0.1	

7 Packaging

Fish feeds for sale shall be packaged in containers that are of sufficient strength, and sufficiently sealed so as to withstand reasonable handling without tearing, bursting or falling open. The containers shall be clean and not previously used.

8 Labelling

Each package of compounded fish feed shall be legibly and indelibly labelled with the following:

a) name of the feed for example “tilapia grower feed” or “catfish finisher feed”;

b) name and address or contact information of manufacturer;

c) declared proportions of crude protein, crude fibre, crude fat, phosphorus, calcium, ,lysine, and methionine, ;

d) net weight in kilograms;

e) directions and precautions for use;

f) information about the species or category of animals for which the feed is intended;

g) lot identification;

h) manufacturing date;

i) storage instructions

j) “Use before” or expiry date.

10 Sampling

Representative samples shall be drawn in accordance with ISO 6497 and the preparation of test samples shall be in accordance with ISO 6498.

Annex A
(normative)

Tolerance limits on analytical constituents in fish feeds

Analytical constituents	Limits of variation (% by weight except where otherwise stated)
Ash	If present in excess 2 % for declaration of 10 % or more 20 % for the amount stated for declarations 5 % or more but less than 10 % 1 % for declarations of less than 5 %. If present is deficient 3 % for declaration of 10 % or more 30 % for the amount stated for declarations 5 % or more but less than 10 % 1.5 % for declarations of less than 5 %.
Calcium	If present in excess 3.6 % for declaration of 16 % or more 22.5 % for the amount stated for declarations 12 % or more but less than 16 % 2.7 % for declarations of 6 % or more but less than 12 %. 45 % for the amount stated for declarations 1 % or more but less than 6 % 0.45 % for declarations of less than 1%. If present is deficiency 1.2 % for declaration of 16 % or more 7.5 % for the amount stated for declarations 12 % or more but less than 16 % 0.9 % for declarations of 6% or more but less than 12 %. 15 % for the amount stated for declarations 1% or more but less than 6 % 0.15 % for declarations less than 1 %.
Cystine	In case of deficiency 20 % of the amount stated
Fibre	If present in excess: 1.8 % for all declarations If deficient: 45 % of the amount stated
Lysine	In case of deficiency 15 % of the amount stated If present in excess 4.5 % for declaration of 1 % or more 30 % of the amount stated for declarations 7.5 % or more but less than 15 % 2.25 % for declarations of 5 % or more but less than 7.5 %. 45 % for the amount stated for declarations 0.75 % or more but less than 5 % 0.3 % for declarations of less than 0.7 %.

Analytical constituents	Limits of variation (% by weight except where otherwise stated)
Methionine	In case of deficiency 15 % of the amount stated If present in excess 1 % for declaration of 10 % or more 10 % of the amount stated for declarations 5 % or more but less than 10 % 0.5 % for declarations of less than 5 %.
Oil	In case of deficiency 1.5 % for declarations of 15 % or more 10 % of the amount for declarations of 8% or more but less than 15 % If present in excess 3 % for declaration of 15 % or more 20 % of the amount stated for declarations 8 % or more but less than 15 % 0.8 % for declarations less than 8 %
Phosphorus	If present in excess 3.6 % for declaration of 16 % or more 2.25 % of the amount stated for declarations 12 % 45 % of the amount stated for declarations 1% or more but less than 6 % 0.45 % for declarations of less than 1 %. In case of deficiency 1.2 % for declaration of 16 % or more 7.5 % of the amount stated for declarations of 12 % or more but less than 16 % 0.9 % of the amount stated for declarations of 6 % or more but less than 12 % 15 % of the amount stated for declarations of 1 % or more but less than 6 % 0.15 % for declarations 1 % less than 1 %
Sodium	If present in excess 4.5 % for declaration of 15 % or more 30 % of the amount stated for declarations 7.5 % or more but less than 15 % 2.25 % of the amount stated for declarations 5 % or more but less than 7.5 % 0.45 % for declarations of 0.7 % or more but less than 5 %. In case of deficiency 1.5 % for declaration of 15% or more 10 % of the amount stated for declarations of 7.5 % or more but less than 15 % 0.75 % of the amount stated for declarations of 5 % or more but less than 7.5 % 15 % of the amount stated for declarations of 0.7 % or more but less than 5 % 0.1 % for declarations less than 0.7 %
Starch and total sugar	If present in excess 5 % for declaration of 25 % or more 20 % of the amount stated for declarations 10 % or more but less than 25 % 2 % of the amount stated for declarations less than 10 %.

Analytical constituents	Limits of variation (% by weight except where otherwise stated)
	In case of deficiency 2.5 % for declaration of 25 % or more 10 % of the amount stated for declarations of 10 % or more but less than 2 5% 1 % for declarations less than 1 %
Total sugar expressed as sucrose	If present in excess 4 % for declaration of 20 % or more 20 % of the amount stated for declarations 10 % or more but less than 20 % 2 % of the amount stated for declarations less than 10 %. In case of deficiency 2 % for declaration of 20 % or more 10 % of the amount stated for declarations of 10 % or more but less than 20 % 1 % for declarations less than 10 %
Ash insoluble in hydrochloric acid	If present in excess 10 % for declaration of more than 3 % 0.3 % of the amount stated for declarations of 3 % or less
Carotene	In case of deficiency, 30 % of the amount stated
Chlorides expressed as NaCl	If present in excess 10 % for declaration of more than 3 % 0.3 % of the amount stated for declarations of 3 % or less
Magnesium	In case of deficiency 1.5 % for declaration of 15 % or more 10 % of the amount stated for declarations of 2 % or more but less than 15 % 0.2 % for declarations less than 2 %
Minerals	
Cobalt	± 50 % of the amount stated for declarations above 200 mg/kg
Copper	± 30 of the amount stated for declarations above 200 mg/kg ± 50 of the amount stated for declarations up to an including 200 mg/kg
Iodine	± 50 % of the amount stated for declarations of 250 mg/kg or more
Iron	± 50 % of the amount stated for declarations less than 250 mg/kg
Manganese	± 50 % of the amount stated
Molybdenum	± 50 % of the amount stated
Selenium	± 50 % of the amount stated
Zinc	± 50 % of the amount stated
Vitamins	
Vitamin D2 and D 3	± 30 of the amount stated for declarations above 4000 IU/kg ± 50 of the amount stated for declarations up to an including 4000 IU/kg
Vitamins other than D2 and D 3	In case of deficiency ± 30 % of the amount stated

Annex B
Requirements for additives used in fish feed

B.1 Requirements for antioxidants

No feed shall contain any added antioxidant other than an antioxidant of a name or description specified in the first column of the table below. Where an antioxidant if added should not exceed the maximum content, if any, specified in the second column of the Table 3.

Table 3 — Requirements for antioxidants

Name or description	Maximum content in complete feed stuff, mg/kg
L-Ascorbic acid Sodium L-ascorbate Calcium di (L-ascorbate) 5,6-Diacetyl-L-ascorbic acid 6-Palmitoyl-L-ascorbic acid Tocopherol-rich extracts of a natural origin Synthetic alpha-tocopherol Synthetic gamma-tocopherol Synthetic delta-tocopherol	No limits
Propyl gallate Octyl gallate Dodecyl gallate	100, singly or in combination
Butylated hydroxyanisole (BHA)	150

B.2 Requirements for emulsifiers, stabilisers, thickeners and gelling agents

B.2.1 General

Fish feed shall contain no added emulsifier, stabiliser, thickener or gelling agent other than an emulsifier, stabiliser, thickener or gelling agent of a name or description, specified hereunder.

B.2.2 Name or description

Lecithins; Alginic acid; Sodium alginate; Potassium alginate; Ammonium alginate Calcium alginate; Prophylene glycol alginate (propane- 1,1-diol alginate) Agar; Carrageenan; Furcellaran; Locust bean gum (carob gum); Tamarind seed flour Gurar gum (gua flour); Tragacanth; Acacia (gum Arabic); Zanthan gum; D-glucitol (sorbitol); mannitol; Glycerol; Pectins; microcrystalline cellulose; Methylcellulose; Ethylcellulose; Hydroxylpropyl cellulose;Hydorxyprophylmethylcellulose; Ethylmethlcellulose; Carboxymethylcellulose;sodium salt; Sodium, potassium and calcium salts or edible fatty acids alone or in mixtures, derived from edible fat or distilled fatty acids Monoacyl and diacylglycerols esterified with the following acids: (a) acetic (b) lactic (c) citric (d) tartaric (e) monoacetylatartaric and (f) diacetyltartaric.

The additives listed shall conform to the requirement in Table 5.

Table 5 — Requirements for emulsifiers, stabilisers, thickeners and gelling agents

Name or description	Maximum content in complete feed, mg/kg
Poly (ethylene glycol) (M.W 6 000)	300
Polyoxypropylene polyoxyethelene polymers (M.W 6 800 - 9 000)	50

B.2.3 Sucrose esters or fatty acids

The following sucrose esters fatty acids may be added to fish feeds:

a) mixture of sucrose esters of monocyl and diacylglycerols (sucroglycerides, polyglycerides);

b) polyglycerol esters of non-polymerised edible fatty acids;

c) propylene glycol esters of fatty acids (propane-1,2-diol esters of fatty acids);

d) stearoyl-2-lactylic acid; sodium stearoyl-1,2-lacylate; calcium stearoyl-1,2-lactylate;

e) stearoyl-1-tartrate; glycerol poly (ethylene glycol) ricinolcate; dextrans; sorbitan monostearate;

f) sorbitan tristearte; sorbitan monolaurate; sorbitan mono-eleate; sorbitan monopalmitate;

g) partial polyglycerol esters of polycondensed fatty acids of castor oil (polyglycerol polyricinoleate) polyoxyethylene (20) sorbitan monolaurate;

h) polyoxyethylene (20) sorbitan monopalmitate, polyoxyethylene (20) sorbitan monostearate;

i) polyoxyethylene (20) sorbitan tristearate, polyoxyethylene (20) sorbitan monocleate;

j) polyoxyethylene (20) sorbitan tricleate, polyoxyethylene (8) sorbitan stearate; and

k) polyoxyethylene (40) stearate.

B.3 Requirements for binders, anti-caking agents and coagulants

B.3.1 General

Fish feed shall contain no added binder, anti-caking agent or coagulant other than a binder, anti-caking agent or coagulant of a name or description specified in 5.5.2.

B.3.2 Name or description

Lignosulphonates; Colloidal silica; Silicic acid, precipitate and dried; Sodium aluminosilicate, Sodium, potassium and calcium stearate; Kaolin and Kaslinitic clays free of asbestos natural accruing mixtures of minerals containing at least 65 % complex hydrated aluminium silicates whose main constituent in Kasolinite; Bentonite and other montmerillonitee clays; Vermiculite-hydrated silicate of magnesium, aluminium and iron; Citric acid; Kieselguhr (diatomaceous earth, purified); Calcium silicate (synthetic); Natural mixtures of steatite and chlorite free of asbestos.

B.4 Requirements for aromatic and appetising substances

Fish feed shall contain no added aromatic or appetising substance other than an aromatic or appetising substance of a name or description specified in Table 6 and taking account of any such substance which is naturally present, without exceeding the maximum content specified.

Table 6 — Requirements for aromatic and appetising substances

Name or description	Maximum content in complete feed, mg/kg
Saccharin	No limits
All natural products and corresponding synthetic products	No limits

Annex C
(informative)

Description of common feedstuffs

Product	Description	Main nutritional constituent
1. Alfalfa meal	Alfalfa as grown, dried and processed, and to which no other matter has been added	Crude protein, Crude fibre
2. Barley meal	The meal obtained by grinding barley, as grown, which shall be the whole grain together only with such other substances as may reasonably be expected to have become associated with the grain in the field.	Crude protein, Crude fibre
3. Bean meal	The meal obtained by grinding commercially pure leguminous beans (other than soya bean).	Crude protein, Crude fibre
4. Blood meal	The meal has been dried out to which no other matter has been added	Crude protein, Dry matter
5. Bone meal	Commercially pure steamed bone, raw or degreased, which has been ground or crushed and which contains phosphorus not less than 4.5% phosphorus.	Crude protein, Phosphorus, Calcium
6. Brewery and distillery grains	The product obtained by drying the residue from distillery mash-tube, and to which no other matter has been added	Crude fibre, Crude protein
7. Cassava, dried	The dried root of the species *Manhot esculanta*	Crude fibre, Crude protein
8. Clover meal	Clover as grown, dried and processed and to which no other matter has been added	Crude protein, Crude fibre
9. Coconut cake	The residue resulting after part removal of oil and of cortex from commercially pure coconut kernels	Crude protein Crude fibre
11. Cotton seed cake	The residue resulting after part removal of oil and of cortex from commercially pure cotton seed	Crude protein, Crude fibre
12. Sorghum meal	The meal obtained by grinding sorghum as grown which shall be the whole grain together only with such substances as may reasonably be expected to have become associated with the grain in the field.	Crude protein, Crude fibre
13. Fish meal	A product, which may contain an added antioxidant but to which no other matter has been added, obtained by drying and grinding or otherwise treating fish or fish waste.	Crude protein, Oil, total ash.
14. Grass, meal	Any product which, (i) is obtained by artificially drying any of the following: grass, clover, lucerne, green cereal, or any mixture consisting of any of them, and (ii) is otherwise as grown (that is to say including any growths harvested there with but with no other substance added thereto), and contains not less than 13 % crude protein calculated on the assumption that it contain 10 % moisture.	Crude protein, Crude fibre
15. Groundnut cake	The residue resulting after part removal of oil and part of non-removal of cortex from commercially pure groundnuts	Crude protein, Oil, crude fibre
16. Maize	Maize kernel or crushed maize kernel as grown for commercial purposes	Crude protein

17. Maize germ meal	Consisting mainly of embryo of kernel not less than 10 % oil, and not more than 5 % ash	
18. Maize and cob meal	Ground maize on the cob	Crude protein, Oil, crude fibre
19. Maize meal	Milled whole maize	Crude protein, Oil, crude fibre
20. Maize gluten meal	A by-product resulting from removal of a bran starch and germ from maize	Crude protein, Oil, crude fibre
21. Meat and bone meal	A product, which may contain an added antioxidant but to which no other matter has been added, containing not less than 65 % protein, obtained by drying and grinding animal carcasses of portions thereof but excluding hair, have been preliminarily treated for the removal of fat	Crude protein, Oil, crude fibre
22. Milk powder	Dried milk from which a substantial amount of fat has been removed and to which no other substance is added	Crude protein
23. Millet	Finger millet of the species *Eleusine coracana*	Crude protein, Crude fibre
24. Mineral mixture	Mixture of substances used whether in the form powder or licks and purporting to be essential for livestock	Percent of the mineral and trace elements
25. Molasses	A concentrated syrup product obtained in the manufacture of sugar from sugar cane to which no other matter has been added	Dry matter, sugar as sucrose
26. Oats, ground	The product obtained by grinding commercially pure oats	Crude protein, Crude fibre
27. Pea meal	The meal obtained by grinding or crushing commercially pure peas including pods	Crude protein, Crude fibre
28. Rice bran	The outside husk or rice kernel to which no other matter has been added	Crude protein, Crude fibre, oil
29. Rice meal	The product obtained by grinding commercially pure rice after the removal of hulls and to which no other substance is added	Crude fibre, Crude protein, oil
30. Rice polishings	The product obtained when polishing kernels after the removal of hulls and bran	Crude protein, oil, Crude fibre
31. Sesame cake	The residue resulting after the part removal of oil from commercially pure simsim kernels	Crude protein, oil, Crude fibre
32. Soya bean meal	The residue resulting after the part removal of oil from commercially pure soya bean seeds	Crude protein, oil, Crude fibre
33. Sweet potatoes	The dried tubers of the species *Ipomea batatas*	Crude protein, Crude fibre
34. Wheat meal	The meal obtained by grinding commercially pure wheat as grown and to which no other substance has been added	Crude protein, Crude fibre
35. wheat bran	Outside husk of what kernel to which no other matter was added	Crude protein, Crude fibre
36. Wheat pollard	A by-product of wheat separated during production of flour not mentioned otherwise in this schedule containing not more than 4 % of other than wheat vegetable substances	Crude protein, Crude fibre
37. Yeast dried	The product obtained by drying of yeast or yeast residues, and to which no other matter has been added.	Crude protein
38. Other feedstuffs	As may be described by the Department of Animal Resources from time to time	

Annex D
(informative)

Nutritional requirements for tilapia

Sl.No.	Parameters	Starter feed	Grower feed	Finisher feed	Brooder feed
i)	Vitamin A IU/Kg	3000	1500	3000	3000
ii)	Thiamine mg/Kg	18	9	18	18
iii)	Copper mg/Kg	6	3	6	6
iv)	Zinc mg/Kg	100	50	100	100
v)	Manganese mg/Kg	50	25	50	50
vi)	Iodine mg/Kg	6	3	6	6
vii)	Iron mg/Kg	60	30	60	60
viii)	Vitamin B_{12} mg/Kg	0.015	0.0075	0.015	0.015
ix)	Vitamin A IU/Kg	3000	1500	3000	3000
x)	Vitamin D IU/Kg	1500	750	1500	1500
xi)	Choline mg/Kg	1200	600	1200	1200
xii)	Vitamin E mg/Kg	120	60	120	120
xiii)	Riboflavin mg/Kg	24	12	24	24
xiv)	Pyridoxine mg/Kg	18	9	18	18
xv)	Pantothenic mg/Kg	48	24	48	48
xvi)	Biotin mg/Kg	0.2	0.1	0.2	0.2
xvii)	Ascorbic acid mg/Kg	300	150	300	300
xviii)	Institol mg/Kg	150	75	150	150

xix)	Thiamine mg/Kg	18	9	18	18

Nutritional requirements for catfish

Sl.No.	Parameters	Starter feed	Grower feed	Finisher feed	Brooder feed
i)	Vitamin A IU/Kg, min	900	900	900	900
ii)	Ascorbic acid mg/Kg, min	60	60	60	60
iii)	Copper mg/Kg	4.8	4.8	4.8	4.8
iv)	Zinc mg/Kg	20	20	20	20
v)	Manganese mg/Kg	2.4	2.4	2.4	2.4
vi)	Iron mg/Kg	20	20	20	20
vii)	Vitamin A IU/Kg	900	900	900	900
viii)	Vitamin D IU/Kg	220	220	220	220
ix)	Choline mg/Kg	400	400	400	400
x)	Vitamin E mg/Kg	23	23	23	23
xi)	Niacin mg/kg	14	14	14	14
xii)	Riboflavin mg/Kg	9	9	9	9
xiii)	Pyridoxine mg/Kg	3	3	3	3
xiv)	Pantothenic mg/Kg	15	15	15	15
xv)	Ascorbic acid mg/Kg	60	60	60	60
xvi)	Thiamine mg/Kg	1	1	1	1

