Status of Fishmeal Monitoring and Problems in the Use of Fishmeal

鱼粉的监测现状及鱼粉使用中的问题

China National Feed Quality Inspection and Testing Center (Beijing)

国家饲料质量检验检测中心（北京）

Dr. Xia Fan, professor

樊 霞 研究员/博士

Nov. 30, 2022

2022年11月30日

Brief introduction to IQSTAP
质标所基本情况

IQSTAP

Scientific research conditions
科研条件

- **Laboratory building: 17,079m²**
- **实验大楼： 17079m²；**
- **Instruments: 1,600 sets, total value> RMB 150 million;**
- **仪器设备：1600多台（套），总价值>1.5亿元；**
- **Members: 86 scientific researchers, including 45 researchers with doctor's degree**
- **人员组成：86位科研人员，其中具有博士学位45人。**

Brief introduction to IQSTAP
质标所基本情况

IQSTAP

Research object
研究对象

Edible agricultural products and feeds
食用农产品及饲料

Key work/ 重点开展工作

01 Researches on the testing technologies of residue dynamics of toxic and harmful substances such as veterinary drugs and heavy metals, quality and safety traceability of agricultural products, and their authenticity identification.
兽药和重金属等有毒有害物质残留动态、农产品质量安全溯源及真假识别等检测技术研究。

02 Research the theory and key technologies of product quality and safety risk analysis, quality and safety control technology of planting and breeding process of agricultural product , construct the early warning system of technical barriers to agricultural products trade and establish the quick response mechanism.
产品质量安全风险分析理论和关键技术、农产品种养殖过程质量安全控制技术等研究、农产品贸易技术壁垒预警体系建设及快速反应机制。

03 Research, standardize and revise the quality and safety standards for national and international agricultural products
开展国内外农产品质量安全标准研究与制修订。

04 Provide the monitoring technical supports to the quality and safety risk monitoring, supervision and spot checks of national agricultural products and feeds (including technical supports to administrative license)
承担国家农产品及饲料质量安全风险监测、监督抽查等监控技术支持（含行政许可的技术支持）。

Brief introduction to NFQC
国家饲料质检中心简介

IQSTAP

- **An authority for research on feed testing technologies, standard formulation and revision, quality supervision and inspection, quality and safety evaluation, and confirmation and quantitative testing of pesticide and veterinary drug residues and illegal additives in feed.**
- 我国饲料检测技术研究、标准制修订、质量监督检验、质量安全评价以及饲料中农兽药残留和非法添加物确认和定量检测权威机构。

Ministry of Agriculture and Rural Affairs
农业农村部

State Administration for Market Regulation
国家市场监督管理总局

Guide
指导

Authorize
授权

Certification and Accreditation Administration
国家认证认可监督管理委员会

（8 times/次）
Metrological certification
计量认证

China National Accreditation Service for Conformity Assessment
中国合格评定国家认可委员会

实验室认可
Laboratory accreditation
（8 times/次）

国家饲料质量检验检测中心(北京)
NFQC
China National Feed Quality Inspection and Testing Center (Beijing)

Fair status of the third party
第三方公正地位

Issue the fair inspection data
出具公正检验数据

Society/ 社　会

Capable of testing 1,482 items in 9 categories, such as feeds, livestock and aquatic products and biological materials.
具备饲料、畜禽水产品、生物材料等9大类1482项检测能力

Legal person
法人母体

IQSTAP, CAAS
中国农业科学院农业质量标准与检测技术研究所

国家农业检测基准实验室
（饲料非法添加物）
National Reference Laboratory for Agricultural Testing P.R.China

National Reference Laboratory for Agricultural Testing P.R.China
(Illegal additives in feed)

Contents

汇报内容

PART ONE

01

License management of fishmeal

鱼粉的许可管理

I. Fishmeal
一、饲用鱼粉

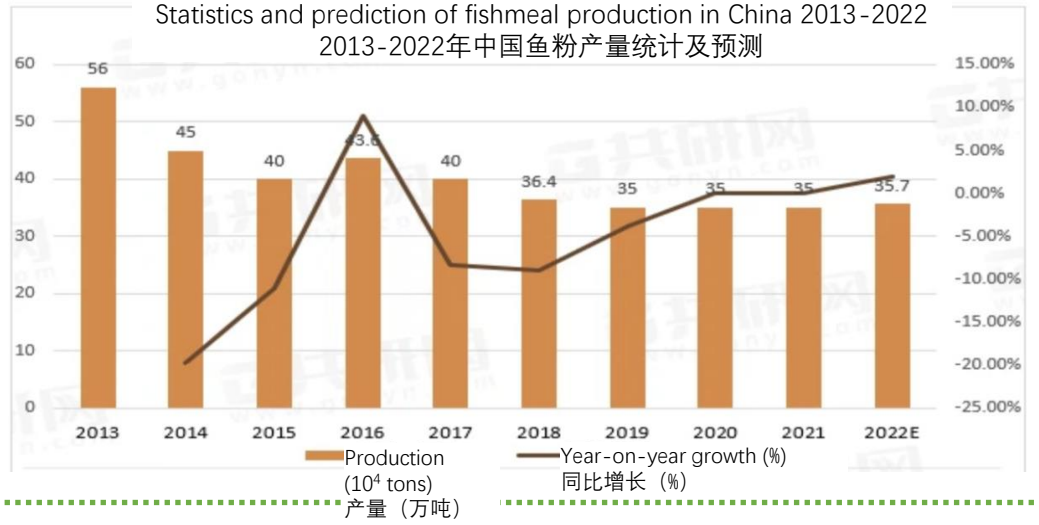
IQSTAP

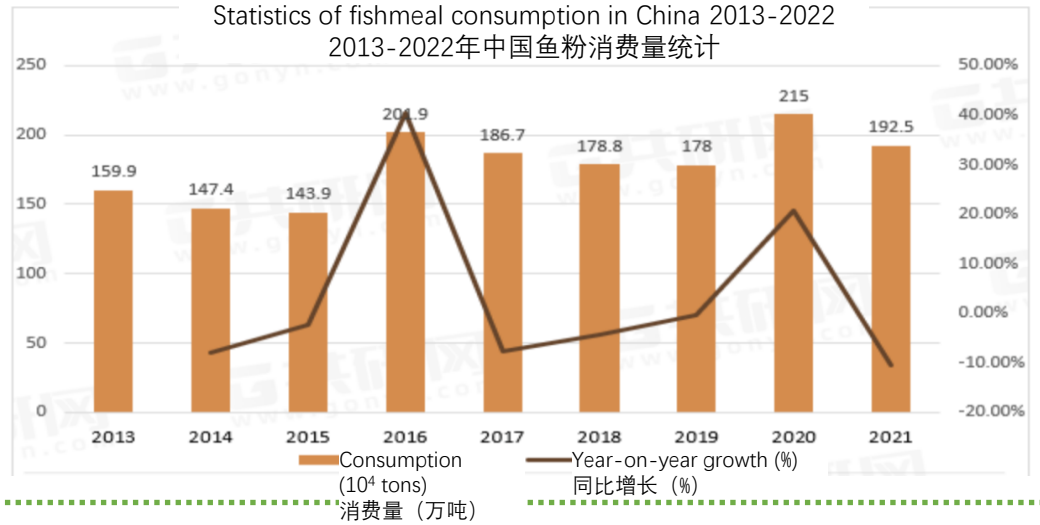
Fishmeal/ 饲用鱼粉

Fishmeal is a kind of high protein feed material made from one or more kinds of fish species after being defatted, dehydrated and ground. It is high in methionine, lysine and tryptophan that are deficient in vegetable protein feeds. In addition, it contains a number of B vitamins and Ca, P, Mn, Fe, Zn, I, Se and other minerals. It is widely applied in animal husbandry, aquaculture and special breeding feed.

是以一种或多种鱼类为原料，经去油、脱水、粉碎加工后的高蛋白质饲料原料，富含植物性蛋白质饲料缺乏的蛋氨酸、赖氨酸、色氨酸，并含有大量B族维生素和钙、磷、锰、铁、锌、碘、硒等矿物质，在畜牧、水产及特种养殖饲料中广泛应用。

- At present, the domestic annual production of fishmeal is about 0.5 million tons and the annual imported fishmeal is about 1.5 million tons.
目前，我国鱼粉年产量大约在50万吨左右，年均进口鱼粉约150万吨。
- **Most high-quality fishmeal is imported!**
高品质饲用鱼粉主要依赖进口！





II. Grading of fishmeal quality
二、饲用鱼粉质量分级

IQSTAP

- 鱼粉加工工艺主要包括原料收集、挤压、蒸煮、干燥、粉碎等。
- 生产企业一般建有质控实验室，对产品的粗蛋白质、粗脂肪、水分、粗灰分、组胺、挥发性盐基氮等品质项目进行监测。
- 目前，国内尚未形成系统性的鱼粉分级评价体系，产品质量水平很大程度上依赖于经验判断。

国内鱼粉等级依据

蛋白质、氨基酸、
挥发性盐基氮、组胺等

↓

特级、一级、二级、三级

进口鱼粉等级依据

蛋白质、氨基酸
作为主要指标

↓

含量是决定产品等级的首要因素

- The fishmeal processing technologies mainly include material collecting, pressing, steaming, cooking, drying, grinding, etc.
- Most producers have the quality control laboratories to monitor the quality of crude protein, crude fat, moisture, crude ash, histamine, VBN and so on.
- At present, China has no systematic fishmeal grading evaluation system. The fishmeal quality is evaluated mainly depending on experience.

Basis of domestic fishmeal grade

Protein, amino acids, VBN, histamine, etc.

↓

Premium, Grade I, Grade II and Grade III

Basis of imported fishmeal grade

Protein and amino acids as main indicators

↓

Content is the primary factor of product grade

II. Grading of fishmeal quality
二、饲用鱼粉质量分级

IQSTAP

- Products with different grades have corresponding requirements for content and limit, and are tested and monitored in the production, sale and use process pertinently.
- 不同级别产品具有对应的含量和限量要求，并在产品生产、销售和使用过程中针对性进行检测和监测。

◆ **粗蛋白含量**:

特级鱼粉 ≥ 66.0%， 一级鱼粉 ≥ 62.0%，

二级鱼粉 ≥ 58.0%； 三级鱼粉 ≥ 50.0%

如果粗蛋白含量 ≤ 45%，就可以判定鱼粉品质不合格。

◆ **粗灰分含量**:

特级鱼粉 ≤ 18%， 一级鱼粉 ≤ 20%，

二级鱼粉 ≤ 24%； 三级鱼粉 ≤ 30%

粗灰分 > 30%表明不是全鱼粉，可能是鱼排粉或掺杂等。

◆ **盐分含量**:

红鱼粉 ≤ 5%，白鱼粉 ≤ 2.5%

盐分 > 5 %，表明鱼粉中掺有小干鱼或鱼溶浆等。

◆ **Crude protein content:**

Premium fishmeal ≥ 66.0%， Grade I fishmeal ≥ 62.0%,
Grade II fishmeal ≥ 58.0%； Grade III fishmeal ≥ 50.0%

If the crude protein content is ≤ 45%, the fishmeal is judged as unqualified.

◆ **Crude ash content:**

Premium fishmeal ≤ 18%， Grade I fishmeal ≤ 20%，
Grade II fishmeal ≤ 24%； Grade III fishmeal ≤ 30%

If the crude ash content is > 30%, the fishmeal is not fishmeal made from whole fish and may be by-product fishmeal, or mixed with other materials.

◆ **Salt content:**

Red fishmeal ≤ 5%， White fishmeal ≤ 2.5%

If the salt content is > 5%, the fishmeal is mixed with dried small fish or fish soluble.

III. License for fishmeal
三、饲用鱼粉的许可

IQSTAP

Fishmeal is the single feed in the Catalogue of Feed Ingredients, and it can only be produced, operated and used after obtaining market license and import registration license (MOA license).
鱼粉属于《饲料原料目录》中的单一饲料，需要办理市场许可和进口登记方可生产、经营和使用。

- ✓ 《动物源性饲料产品安全卫生管理办法》（2004年10月1日起施行）
- ✓ 《饲料和饲料添加剂生产许可管理办法》（2012年7月1日起施行）
- ✓ 《饲料原料目录》节选:八、本目录第四部分所列单一饲料品种，是根据《饲料和饲料添加剂管理条例》及《饲料和饲料添加剂生产许可管理办法》和《进口饲料和饲料添加剂登记管理办法》，应当办理生产许可证和进口登记证的产品。未取得生产许可证或进口登记证的单一饲料产品不得作为饲料原料生产、经营和使用。

- ✓ *Measures for the Administration of Safety and Hygiene of Animal Derived Feed Products* (implemented since Oct. 1, 2004)
- ✓ *Measures for the Administration of Production License of Feeds and Feed Additives* (implemented since July 1, 2012)
- ✓ Catalogue of Feed Ingredients: Article 8. The single feed products listed in Part IV are those products that should have the production license and import registration certificate according to *the Regulations on the Administration of Feeds and Feed Additives*, *the Measures for the Administration of Production License of Feeds* and *Feed Additives and the Measures for the Administration of Registration of Imported Feeds and Feed Additives*. Single feed products without production license or import registration license (MOA license) shall not be produced, operated and used as feed materials.

III. License for fishmeal (domestic)
三、饲用鱼粉的许可(国产)

IQSTAP

- The production history of domestic fishmeal is more than 30 years, with significant development.
- The adjustment of fishmeal policy has greatly promoted the industrial merger, and further standardization, large scale and environmental protection of fishmeal production. (In 2008, 11 producers were merged as 1 producer in Lushun, Dalian; in 2013, 270 producers were merged as 62 producers in Rongcheng, Shandong; in 2016, 9 producers were merged as 1 producer in Rizhao, Shandong. The merger process always on the way!)
- Continuous improvement of production process after merger
  - Defatting, pressing and low-temperature drying; closed cooling technology;
  - Simple process before merger: grinding dried fish into fishmeal with a crusher VS improved process after merger: production line.

- 国产鱼粉的生产已经走过了30多年，前后差异显著。
- 对鱼粉政策的调整，使得产业大量整合，鱼粉生产进一步规范化、规模化、环保化。（2008年，大连旅顺11家整合成1家；2013年，山东荣成270家整合成62家； 2016年，山东日照9家整合成1家。整合工作一直在路上！）
- 整合后生产工艺不断改进
  - 脱脂、压榨、低温干燥；封闭式凉粉工艺；
  - 原简单工艺：一个粉碎机把鱼干粉碎成鱼粉 VS 现在工艺改进：流水线生产。


VS


(Source: Jiyuan Guo)
（来源：郭吉原）

III. License for fishmeal (imported)
三、饲用鱼粉的许可(进口)

IQSTAP

进口饲用鱼粉的加工工艺成熟，特别是蛋白质及微量元素含量更高，常作为高品质饲料原料。

The imported fishmeal is processed by mature technology, has higher content of protein and trace elements, so is often used as high-quality feed materials.

加强对进口饲用鱼粉的安全准入和风险研判，对促进我国饲料生产及畜牧、水产养殖行业健康发展具有重要意义。

It is of great significance to strengthen the safety access and risk analysis of imported fishmeal to promote the healthy development of feed production, animal husbandry and aquaculture industries in China.

- ***Regulations on the Administration of Feeds and Feed Additives*** **(the State Council Decree No. 609 in 2011)-implemented since May 1, 2012**

  《饲料和饲料添加剂管理条例》（国务院2011年第609号令）——自2012年5月1日起施行

- ***Measures for the Administration of Registration of Imported Feeds and Feed Additives*** **(the Ministry of Agriculture Decree No. 2 in 2014)-implemented since July 1, 2014**

  《进口饲料和饲料添加剂登记管理办法》（农业部2014年第2号令）——自2014年7月1日起施行

- ***Requirements for Registration Application Materials for Imported Feeds and Feed Additives*** **(the Ministry of Agriculture Announcement No. 2109)**

  《进口饲料和饲料添加剂登记申请材料要求》（农业部公告第2109号）

To help the applicant correctly understands the approval requirements, the Ministry of Agriculture specially formulated the material requirements:

为帮助申请人正确理解审批要求，农业部特别制定了材料要求：

◆***Requirements for Registration Materials for Imported Feeds and Feed Additives***

《进口饲料和饲料添加剂登记材料要求》

◆***Requirements for Registration Materials for Renewal for Imported Feeds and Feed Additives***

《进口饲料和饲料添加剂续展登记材料要求》

◆***Requirements for Registration Materials for Alteration for Imported Feeds and Feed Additives***

《进口饲料和饲料添加剂变更登记材料要求》

IV. Import registration (development history of registration management)
四、进口登记（登记管理发展历程）

IQSTAP

1986年

China started the registration for imported feed additives.
我国开始对“进口饲料添加剂”进行登记管理。

1999年

The imported feed (mainly fishmeal and fish oil) was added into the scope of registration administration.
“进口饲料”被纳入登记管理的范围（主要是鱼粉和鱼油！）

Before May 2018 / 2018年5月以前

4 institutions with testing qualification:
具有检测资质的4家单位分别为：

- National Feed Quality Supervision and Inspection Center (Beijing)
- 国家饲料质量监督检验中心（北京）
- Feed Quality Supervision, Inspection and Testing Center of the Ministry of Agriculture (Jinan)
- 农业部饲料质量监督检验测试中心（济南）
- Feed Quality Supervision, Inspection and Testing Center of the Ministry of Agriculture (Shenyang)
- 农业部饲料质量监督检验测试中心（沈阳）
- Feed Quality Supervision, Inspection and Testing Center of the Ministry of Agriculture (Guangzhou)
- 农业部饲料质量监督检验测试中心（广州）

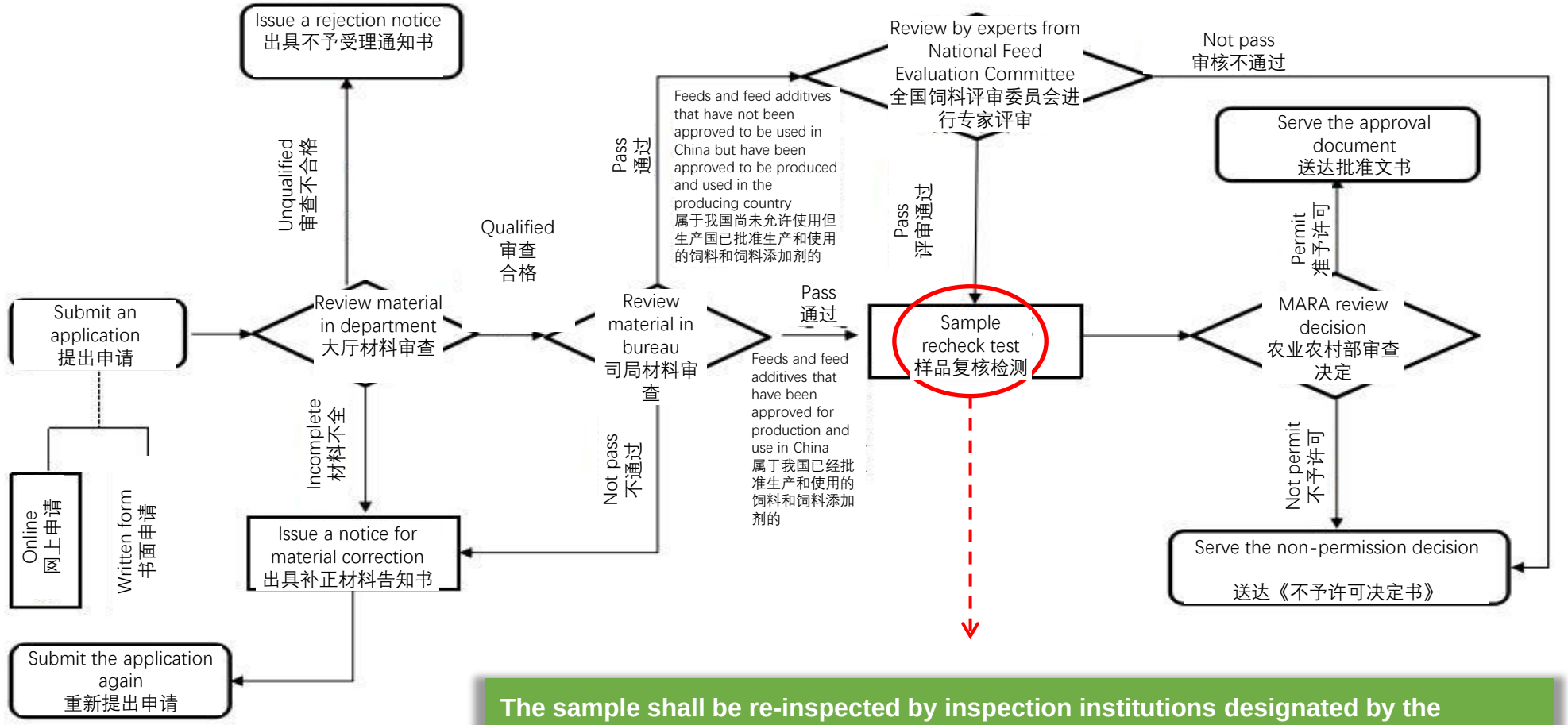
Oct. 2018 / 2018年10月

- Led by: National Feed Quality Supervision and Inspection Center (Beijing)
  牵头：国家饲料质量监督检验中心（北京）/
- 6 testing institutions achieved the testing qualification
  新增6家承检机构

Jan. 2020 / 2020年1月开始

- Led by: National Feed Quality Supervision and Inspection Center (Beijing)
  牵头：国家饲料质量监督检验中心（北京）
- Liaoning Institute for the Inspection and Testing of Agricultural Products, Animal Drugs and Feed Products
  辽宁省农检院
- Henan Feed Testing Institute
  河南省饲料检测所
- Hubei Feed Testing Institute
  湖北省饲料检测所
- Institute of Animal Sciences of CAAS
  中国农科院北京畜牧兽医研究所

IV. Import registration (flow chart)
四、进口登记（流程图）



The sample shall be re-inspected by inspection institutions designated by the Ministry of Agriculture and Rural Affairs (MARA).
样品复核检测在农业农村部指定的检测机构开展。

Recheck test is a key step in the registration of imported feeds and feed additives.
复核检测是进口饲料和饲料添加剂登记程序中的关键一环。

PART TWO

02

Status of fishmeal monitoring

鱼粉的监测现状

I. Quality standards for fishmeal
一、鱼粉产品质量相关标准

IQSTAP

- **Standards for fishmeal**
- **鱼粉产品标准**
  - ✓ **GB/T 19164-2003 Fishmeal (implemented before May 1, 2022)**
    《鱼粉》（GB/T 19164-2003）（2022年5月1日前有效）
  - ✓ **GB/T 19164-2021 Feed Materials-Fishmeal (implemented since May 1, 2022)**
    《饲料原料 鱼粉》（GB/T 19164-2021）（2022年5月1日实施）
- **GB 13078-2017 Hygienical Standard for Feeds**
  《饲料卫生标准》（GB 13078-2017）
- **Import registration and recheck test items**
  进口登记及复核检测项目

II. Fishmeal quality and safety factors
二、鱼粉质量安全影响因素

In addition to sensory requirements, there are 5 categories of quality and safety risk indicators for fishmeal:
除感官要求外，饲用鱼粉应主要关注以下5类质量安全风险指标：

Category 类 别	Main indicators 主要指标
Quality 质量指标类	Crude protein, crude fat, moisture, salt, ash, sand, lysine, methionine, urea, etc. 粗蛋白质、粗脂肪、水分、盐分、灰分、砂分、赖氨酸、蛋氨酸、尿素等；
Processing 加工指标类	Pepsin digestibility, volatile base nitrogen, acid value of lipids, particle size, impurities, etc. 胃蛋白酶消化率、挥发性盐基氮、油脂酸价、粉碎粒度、杂质等；
Microorganism 微生物类	Total number of molds, salmonella, bacteria, parasites, etc. 霉菌总数、沙门氏菌、细菌总数、寄生虫等；
Heavy metal 重金属类	Total As, Pb, Hg, Cd, Cr, F, etc. 总砷、铅、汞、镉、铬、氟等；
Poisonous and harmful substance 有毒有害物质类	Nitrite, histamine, melamine, polychlorinated biphenyls, benzene hexachloride, DDT, hexachlorobenzene, dioxins and dioxin like polychlorinated biphenyls, malachite green, leucomalachite green 亚硝酸盐、组胺、三聚氰胺、多氯联苯、六六六、滴滴涕、六氯苯、二噁英和二噁英类多氯联苯、孔雀石绿、隐性孔雀石绿等。

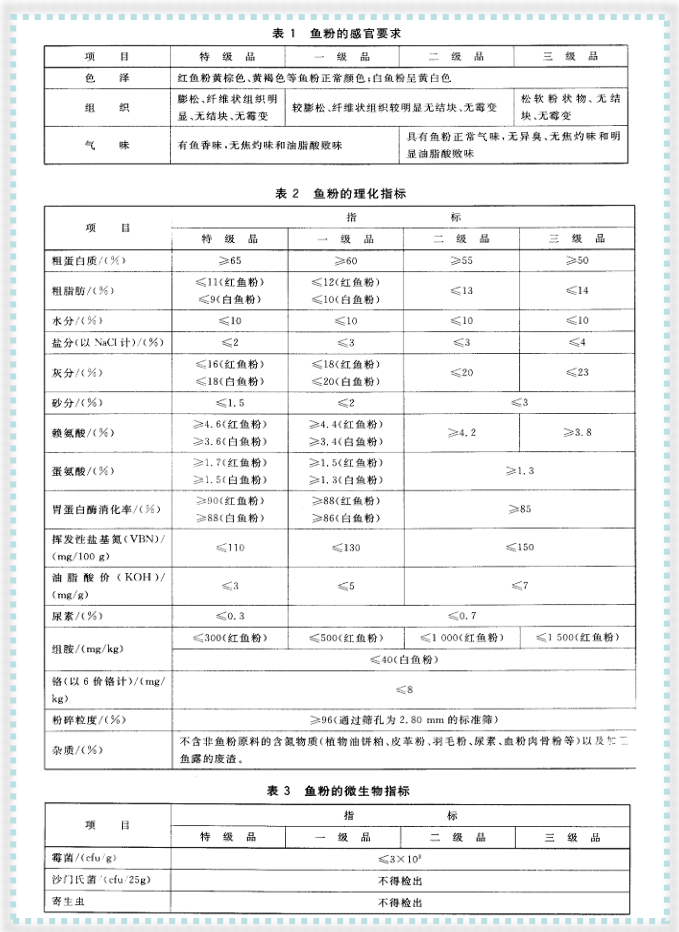


表 1　鱼粉的感官要求

项　目	特　级　品	一　级　品	二　级　品	三　级　品
色　泽	红鱼粉黄棕色、黄褐色等鱼粉正常颜色；白鱼粉呈黄白色			
组　织	膨松、纤维状组织明显、无结块、无霉变	较膨松、纤维状组织较明显无结块、无霉变		松软粉状物、无结块、无霉变
气　味	有鱼香味，无焦灼味和油脂酸败味		具有鱼粉正常气味，无异臭、无焦灼味和明显油脂酸败味	

表 2　鱼粉的理化指标

项　目	指　标			
	特　级　品	一　级　品	二　级　品	三　级　品
粗蛋白质/(%)	≥65	≥60	≥55	≥50
粗脂肪/(%)	≤11(红鱼粉) ≤9(白鱼粉)	≤12(红鱼粉) ≤10(白鱼粉)	≤13	≤14
水分/(%)	≤10	≤10	≤10	≤10
盐分(以 NaCl 计)/(%)	≤2	≤3	≤3	≤4
灰分/(%)	≤16(红鱼粉) ≤18(白鱼粉)	≤18(红鱼粉) ≤20(白鱼粉)	≤20	≤23
砂分/(%)	≤1.5	≤2	≤3	
赖氨酸/(%)	≥4.6(红鱼粉) ≥3.6(白鱼粉)	≥4.4(红鱼粉) ≥3.4(白鱼粉)	≥4.2	≥3.8
蛋氨酸/(%)	≥1.7(红鱼粉) ≥1.5(白鱼粉)	≥1.5(红鱼粉) ≥1.3(白鱼粉)	≥1.3	
胃蛋白酶消化率/(%)	≥90(红鱼粉) ≥88(白鱼粉)	≥88(红鱼粉) ≥86(白鱼粉)	≥85	
挥发性盐基氮(VBN)/(mg/100 g)	≤110	≤130	≤150	
油脂酸价(KOH)/(mg/g)	≤3	≤5	≤7	
尿素/(%)	≤0.3	≤0.7		
组胺/(mg/kg)	≤300(红鱼粉)	≤500(红鱼粉)	≤1 000(红鱼粉)	≤1 500(红鱼粉)
	≤40(白鱼粉)			
铬(以 6 价铬计)/(mg/kg)	≤8			
粉碎粒度/(%)	≥96(通过筛孔为 2.80 mm 的标准筛)			
杂质/(%)	不含非鱼粉原料的含氮物质(植物油饼粕、皮革粉、羽毛粉、尿素、血粉肉骨粉等)以及加工鱼露的废渣。			

表 3　鱼粉的微生物指标

项　目	指　标			
	特　级　品	一　级　品	二　级　品	三　级　品
霉菌/(cfu/g)	≤3×10³			
沙门氏菌/(cfu/25g)	不得检出			
寄生虫	不得检出			

(2003 version)
(2003版)

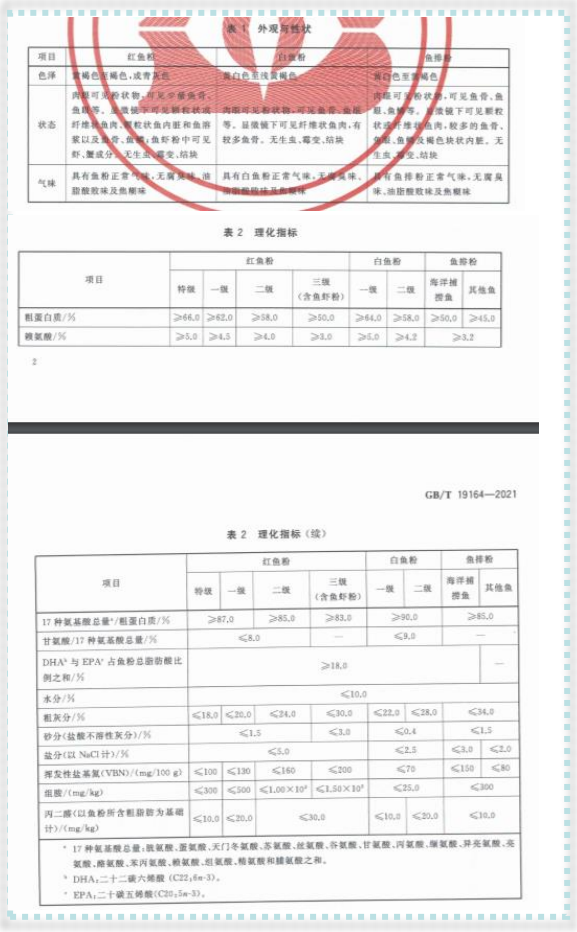


表 1　外观与性状

项目	红鱼粉	白鱼粉	鱼排粉
色泽	黄褐色至褐色，或青灰色	黄白色至浅黄褐色	黄白色至褐色
状态	肉眼可见的状物，有见骨质鱼骨、鱼眼等，显微镜下可见颗粒状或纤维状鱼肉，颗粒状鱼内脏和鱼溶浆以及骨骼、鱼鳞、鱼虾粉中可见虾、蟹或分，无生虫，霉变，结块	肉眼可见粉状物，可见鱼骨、鱼眼等。显微镜下可见颗粒状或纤维状鱼肉，较多的鱼骨。无生虫，霉变，结块	肉眼可见粉状物，可见鱼骨、鱼眼、鱼鳞等。显微镜下可见颗粒状或纤维状鱼肉，较多的鱼骨、角质、鱼鳞及褐色块状内脏。无生虫，霉变，结块
气味	具有鱼粉正常气味，无腐臭味、油脂酸败味及鱼腥味	具有白鱼粉正常气味，无腐臭味、油脂酸败味及鱼腥味	具有鱼排粉正常气味，无腐臭味、油脂酸败味及鱼腥味

表 2　理化指标

项目	红鱼粉				白鱼粉		鱼排粉	
	特级	一级	二级	三级(含鱼虾粉)	一级	二级	海洋捕捞鱼	其他鱼
粗蛋白质/%	≥66.0	≥62.0	≥58.0	≥50.0	≥64.0	≥58.0	≥50.0	≥45.0
赖氨酸/%	≥5.0	≥4.5	≥4.0	≥3.0	≥5.0	≥4.2	≥3.2	

GB/T 19164—2021

表 2　理化指标(续)

项目	红鱼粉				白鱼粉		鱼排粉	
	特级	一级	二级	三级(含鱼虾粉)	一级	二级	海洋捕捞鱼	其他鱼
17 种氨基酸总量[a]/粗蛋白质/%	≥87.0	≥85.0	≥83.0		≥90.0		≥85.0	
甘氨酸/17 种氨基酸总量/%	≤8.0			—	≤9.0		—	
DHA[b] 与 EPA[c] 占鱼粉总脂肪酸比例之和/%	≥18.0			—				
水分/%	≤10.0							
粗灰分/%	≤18.0	≤20.0	≤24.0	≤30.0	≤22.0	≤28.0	≤34.0	
砂分(盐酸不溶性灰分)/%	≤1.5			≤3.0	≤0.4		≤1.5	
盐分(以 NaCl 计)/%	≤5.0				≤2.5		≤3.0	≤2.0
挥发性盐基氮(VBN)/(mg/100 g)	≤100	≤130	≤160	≤200	≤70	≤150	≤80	
组胺/(mg/kg)	≤300	≤500	≤1.00×10³	≤1.50×10³	≤25.0		≤300	
丙二醛(以鱼粉所含粗脂肪为基础计)/(mg/kg)	≤10.0	≤20.0	≤30.0		≤10.0	≤20.0	≤10.0	

[a] 17 种氨基酸总量：脱氨酸、蛋氨酸、天门冬氨酸、苏氨酸、丝氨酸、谷氨酸、甘氨酸、丙氨酸、缬氨酸、异亮氨酸、亮氨酸、酪氨酸、苯丙氨酸、赖氨酸、组氨酸、精氨酸和脯氨酸之和。
[b] DHA：二十二碳六烯酸(C22:6n-3)。
[c] EPA：二十碳五烯酸(C20:5n-3)。

(2021 version)
(2021版)

III. Monitoring of fishmeal quality
三、鱼粉质量监测

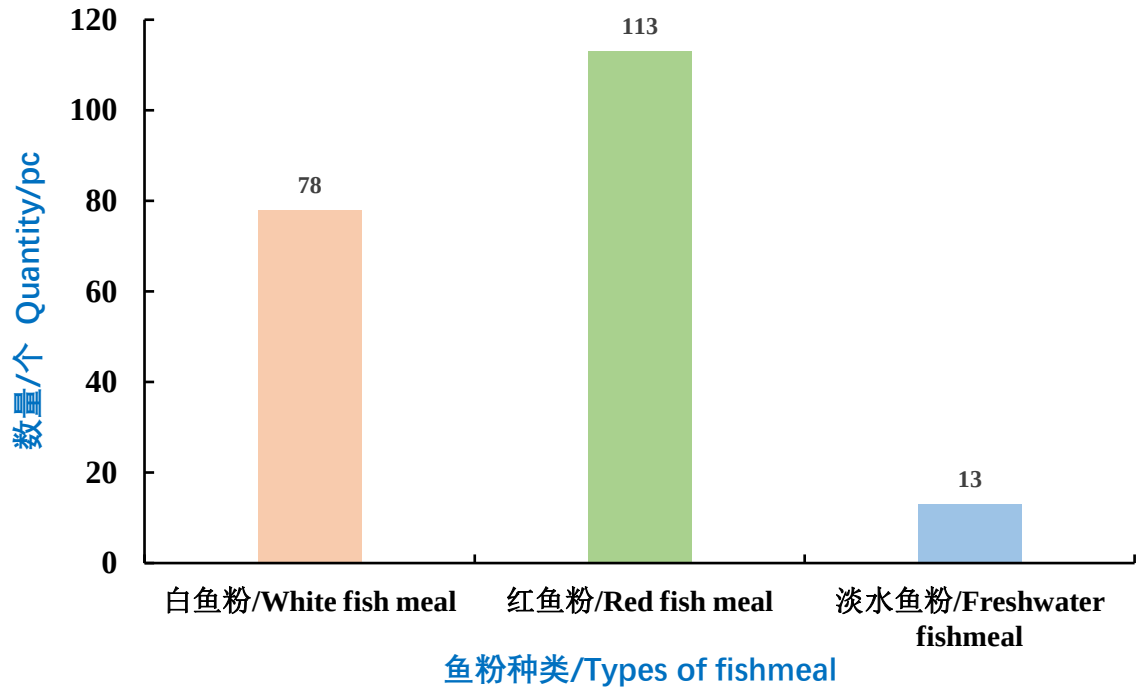
IQSTAP

- In recent five years (2017-2021), **204 imported fishmeal products, 31 fish oil products, 6 fish soluble products and 1 fish soluble meal product** were re-inspected.
- 近5年（2017-2021年），共对**204个进口鱼粉、31个鱼油、6个鱼溶浆和1个鱼溶浆粉**产品进行了质量复核检测。

Introduction to imported fishmeal in quality re-inspection step/
进入质量复核检测环节的进口鱼粉的基本情况:

Among 204 imported fishmeal products were in quality re-inspection step from 2017 to 2021, the number of products of red fish fishmeal was the largest, accounting for half of total fishmeal with the proportion about 55.4%.

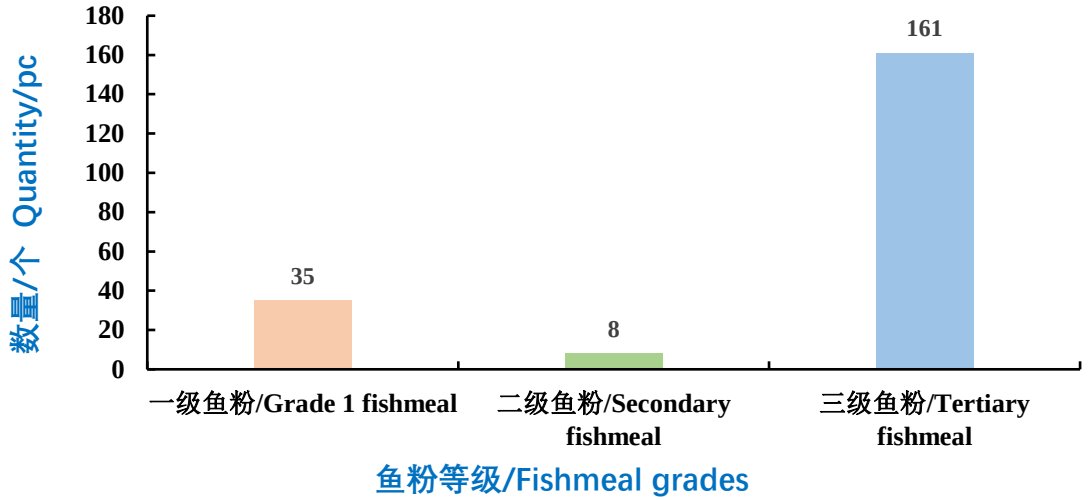
2017年至2021年进入进口饲料质量复核检测环节的204个鱼粉产品中，其中红鱼粉产品数量最多，占鱼粉总数的一半以上，占比约为55.4%。

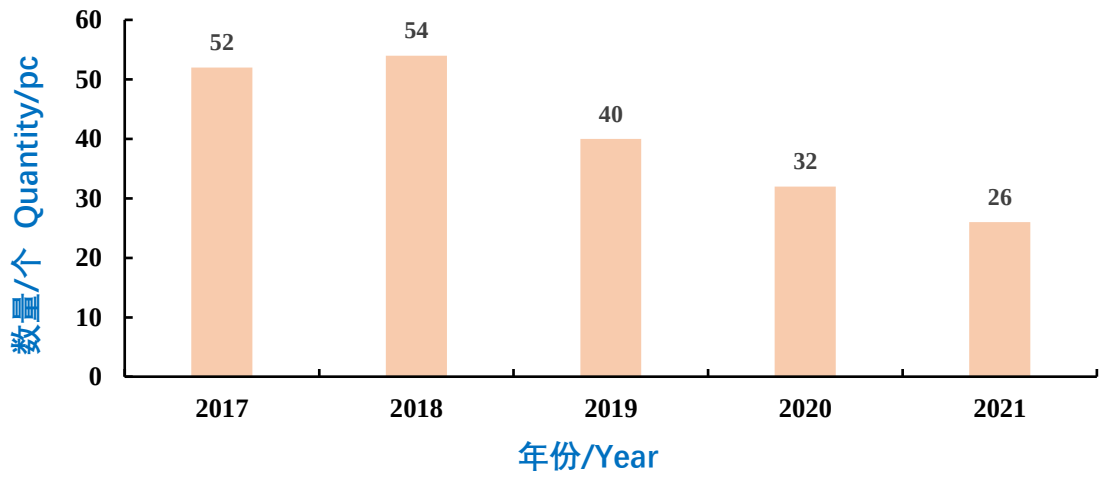


III. Monitoring of fishmeal quality
三、鱼粉质量监测

IQSTAP

Introduction to imported fishmeal in quality re-inspection step/ 进入质量复核检测环节的进口鱼粉的基本情况





Grade III fishmeal was the most (80%), followed by grade I fishmeal, which shows that the quality grade of registered imported fishmeal developed towards low grade.

三级鱼粉最多（80%），其次为一级鱼粉，说明进口登记鱼粉质量标准趋向于用低级别进行登记。

In recent 5 years, the quantity of fishmeal in quality re-inspection step gradually reduced. The reason may be related to the stability of the domestic imported fishmeal market and the difficulty of import in epidemic environment.

近5年，进入质量复核检测的鱼粉数量有逐年下降的趋势。分析原因，可能与国内进口鱼粉市场趋于稳定，及疫情之下进口工作难度增加有关。

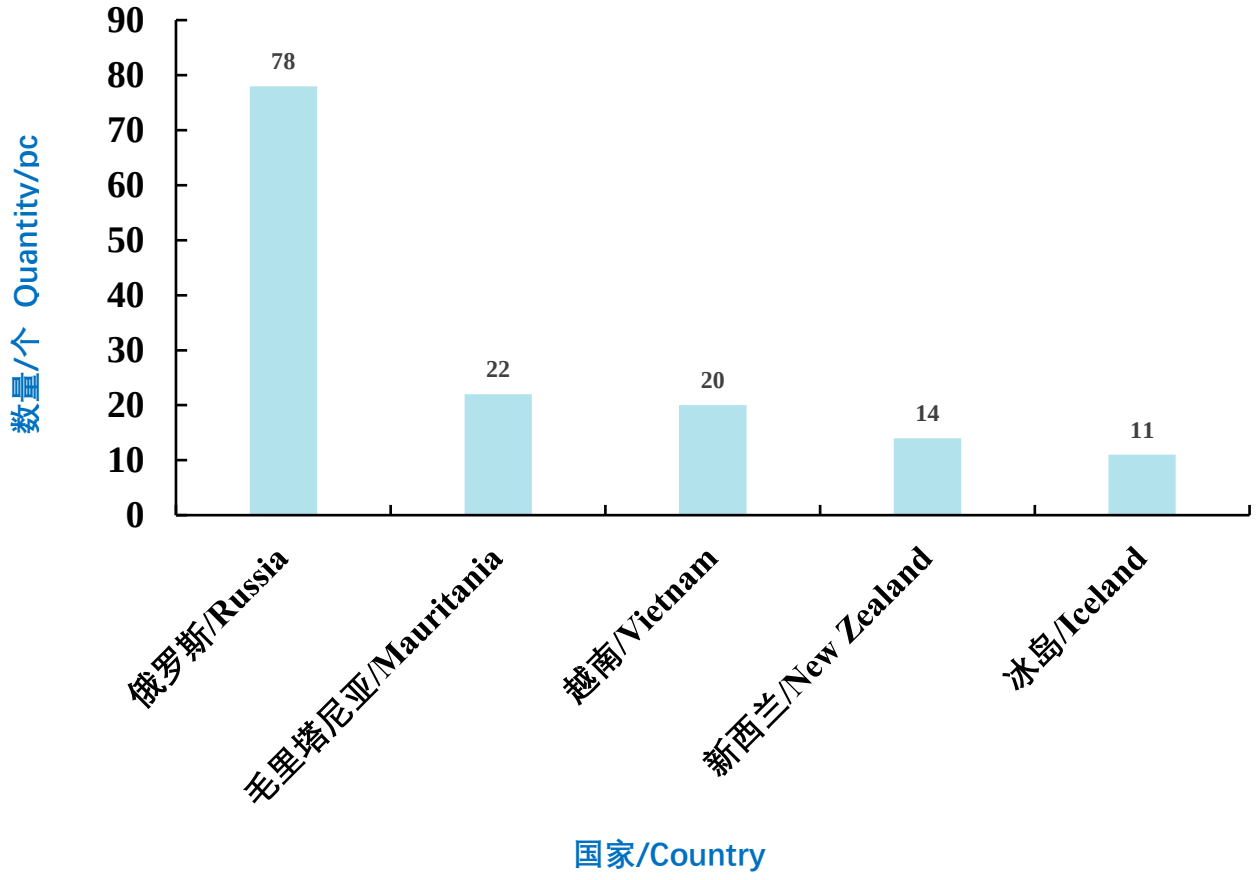
III. Monitoring of fishmeal quality
三、鱼粉质量监测

IQSTAP

Introduction to imported fishmeal in quality recheck test step
进入质量复核检测环节的进口鱼粉的基本情况

In recent 5 years, 204 fishmeal products in quality **recheck test** step were imported from 25 countries, including 78 **fishmeal products from Russia with highest quantity**, 22 and 20 fishmeal products from Mauritania and Vietnam, and 14 and 11 fishmeal products from New Zealand and Iceland.

近5年进入质量复核检测的204个鱼粉来自25个国家，其中来自**俄罗斯的鱼粉产品数量最多，**为78个，其次为毛里塔尼亚和越南，鱼粉产品数分别为22个和20个，新西兰和冰岛也较多，分别14个和11个。



III. Monitoring of fishmeal quality
三、鱼粉质量监测

IQSTAP

Fishmeal quality recheck test / 鱼粉质量复核检测情况

Introduction to quality recheck test from 2017 to 2021/ 2017-2021年质量复核检测整体情况

——The overall unqualified rate of imported feeds and feed additives in quality re-inspection step was about 14.7%, of which the unqualified rate of single feed was about 13.3%, higher than that of pet formula feed products (the unqualified rate was about 9.1%)

——进口饲料和饲料添加剂质量复核检测产品总体不合格率约为14.7%，其中单一饲料产品不合格率约为13.3%，高于宠物配合饲料产品（不合格率约为9.1%）；

——Among 204 fishmeal products were in quality recheck test, 27 products were unqualified, with the unqualified rate of 13.2%, close to the overall unqualified rate of single feed product.

——其中，进行质量复核检测的204个鱼粉，27个产品检测结果不合格，不合格率为13.2%，与单一饲料产品整体不合格率接近。

The fishmeal quality re- inspection was basically stable, which was related to the fixed fishmeal testing items and mature methods.
鱼粉产品质量复核检测总体稳定，这与鱼粉检测项目固定、方法成熟有关。

III. Monitoring of fishmeal quality
三、鱼粉质量监测

IQSTAP

Fishmeal quality recheck test / 鱼粉质量复核检测情况

Quality recheck test items for fishmeal from 2017 to 2021/ 2017-2021年进口鱼粉质量复核检测项目

——The quality recheck test items for imported fishmeal included 13 physical and chemical indicators in GB/T 19164-2003 Fishmeal and 14 hygiene indicators in GB 13078-2017 Hygienical Standard for Feeds, totalling 27 items (grinding particle size, microscopic examination and coliform group were added for meeting quality control requirements of some producers);

——鱼粉进口质量复核检测项目涵盖GB/T 19164-2003《鱼粉》中规定的13个理化指标，和GB 13078- 2017《饲料卫生标准》涉及的14个卫生指标，共27个检测项目（部分产品应生产厂家质量控制要求增加了粉碎粒度、镜检、大肠菌群等的检测）；

——The melamine hygiene item has been added since October 2019.

——鱼粉卫生指标检测项目自2019年10月起增加了三聚氰胺的检测。

III. Monitoring of fishmeal quality
三、鱼粉质量监测

IQSTAP

Fishmeal quality recheck test / 鱼粉质量复核检测情况

Test results of imported fishmeal from 2017 to 2021/ 2017年至2021年进口鱼粉检测情况

——27 fishmeal products that failed in quality re-inspection from 2017 to 2021 involved 32 unqualified items in 9 indicators, including 6 physical and chemical indicators- crude protein, crude fat, crude ash, VBN and salt, and 3 hygiene indicators - Cd, Cr, and total bacterial.

——2017-2021年27个质量复核检测不合格的鱼粉共涉及不合格项目32项次，涉及9项检测指标，包括粗蛋白质、粗脂肪、粗灰分、挥发性盐基氮、盐分等6项理化指标和3项卫生指标——镉、铬、细菌总数。

——The unqualified rate of crude ash was the highest (14 items), followed by crude protein (crude protein of 6 products was lower than the control value).

其中粗灰分检测不合格率最高，32个不合格项目中14个为粗灰分，其次是粗蛋白质，6个产品粗蛋白质检测不达产品控制值。

—Cd in three batches of samples of Grade III white fish meal from Argentina exceeded the standard;
产自阿根廷的三级白鱼粉，3批次样品的镉均超标；

—Cr in one batch of samples of Grade III fishmeal from Vietnam exceeded the standard;
来自越南的三级鱼粉，1批次铬超标；

—Total bacterial in 2 Grade III fishmeal products from Thailand exceeded the standard;
2个来自泰国的三级鱼粉细菌总数超标；

—Total bacterial in 1 Grade III white fish meal product from Russia exceeded the standard;
1个来自俄罗斯的三级白鱼粉细菌总数超标。

III. Monitoring of fishmeal quality
三、鱼粉质量监测

IQSTAP

Fishmeal quality re-inspection/ 鱼粉质量复核检测情况

Test results of imported fishmeal from 2017 to 2021/ 2017年至2021年进口鱼粉检测情况

——Among 204 fishmeal products, Pb, total As, HG, F and nitrite were within the standard; 46 fishmeal products were tested for organochlorine pesticide residues, and none of them exceeded standard.

——在204个鱼粉的检测中，铅、总砷、汞、氟、亚硝酸盐均未检测出超标；对46个鱼粉产品的有机氯农药残留进行检测，均未检出。

——Among the 14 fishmeal products with unqualified crude ash, 13 products were white fish meal, while only 1 product was red fish meal. Among 13 white fish meal products, 12 products were grade I white fish meal, accounting for 60% of total grade I white fish meal, and all of them were from Russia (14 grade I white fish meal products from Russia in total).

——在14个粗灰分检测不合格的鱼粉中，13个为白鱼粉，仅有1个红鱼粉，且13个白鱼粉中12个为一级白鱼粉，占一级白鱼粉总数的60%，且均来自俄罗斯（俄罗斯一级白鱼粉共14个）。

——The analysis reveals that the possible reason is that the crude ash in fishmeal is mainly from the fish bones, and the raw materials of white fish meal in Russia were from fish processing by-products, and the proportion of fish bones was high.

——经分析，可能是鱼粉中的粗灰分主要来源于鱼产品原料中的鱼骨，俄罗斯的白鱼粉原料使用鱼加工副产品，且鱼骨比重偏大。

III. Monitoring of fishmeal quality
三、鱼粉质量监测

IQSTAP

Fish oil quality recheck test / 鱼油质量复核检测情况

From 2017 to 2021, 31 fish oil products were in the quality recheck test step for imported feed. These products were mostly from Peru (12 products), followed by Mauritania (6 products), Vietnam (5 products), Russia, the Philippines and other countries.

2017-2021年共有31个鱼油产品进入我国进口饲料质量复核检测环节。其中秘鲁最多，为12个，其次为毛里塔尼亚，6个，越南次之，5个，此外还有来自俄罗斯、菲律宾等国家的鱼油。

Imported fish oil quality recheck test / 进口质量复核检测鱼油检测情况

Among 31 imported fish oil products from 2017 to 2021, 4 products were unqualified. All unqualified items were physical and chemical indicators, the unqualified items of EPA+DHA were highest (3×3 batches), and the unqualified items of iodine value, acid value, free fatty acids and peroxide value were 1×3 batches respectively.

2017-2021年的31个进口鱼油共有4个产品质量复核检测不合格，不合格检测项目全部为理化指标，其中EPA+DHA复核检测不合格数最多，为3×3批次，此外碘价、酸价、游离脂肪酸和过氧化值检测不合格各1×3批次。

III. Monitoring of fishmeal quality
三、鱼粉质量监测

IQSTAP

Fish soluble and fish soluble meal/ 鱼溶浆和鱼溶浆粉

——2017-2021年，另有6个鱼溶浆和1个鱼溶浆粉进入质量复核检测环节。

——其中3个鱼溶浆产品检测不合格，不合格项目分别为挥发性盐基氮、水分和粗脂肪。

——From 2017 to 2021, 6 fish soluble products and 1 fish soluble meal product were in the quality re-inspection step.

——3 fish soluble products were unqualified, the unqualified items are VBN, moisture and crude fat.

IV. Monitoring of illegal additives
四、违禁添加物监测

IQSTAP

Detection rate of illegal additives in fishmeal
鱼粉中违禁添加物检出率统计表

Year 年份	Monitoring batch/ 监测批次	Detection rate (%)/ 检出率（%）	Detection indicator/ 检出指标
2010		1.50	
2011	323	1.24	4 batches (both malachite green and leucomalachite green were detected out in 2 batches, and only leucomalachite green was detected out in 2 batches) 4批次（2批次同时检出孔雀石绿与隐性孔雀石绿，2批次只检出隐性孔雀石绿）
2012	327	0.61	The leucomalachite green was detected out in 2 batches 2批次检出隐性孔雀石绿
2013	343	0.87	The leucomalachite green was detected out in 3 batches and malachite green was detected out in 2 batches 3批次检出隐性孔雀石绿，2批次检出孔雀石绿
2014	289	0	Not detected out/ 未检出
2015	No monitoring/ 不再监测		

Monitoring data (2010-2015) from the Ministry of Agriculture
（2010 -2015，农业部监测数据）

V. Analysis of reasons
五、原因分析

IQSTAP

01

Excessive sand and insufficient crude protein/ 砂分超标、粗蛋白不足等问题的主要原因:

- Poor quality of raw materials for fishmeal
  一是生产鱼粉所用原料质量低劣
- Artificial adulteration (for example, mixing mud and feather meal in fishmeal);
  二是人为掺杂（如鱼粉中掺入泥土、羽毛粉等）
- Backward production process and old production equipment.
  三是鱼粉生产工艺落后、设备简陋、陈旧。

02

Excessive Cr/ 铬超标的原因：

- Mixing leather meal in fishmeal.
  在鱼粉中掺杂皮革粉所致。

03

Excessive salmonella/ 沙门氏菌超标的主要原因：

- Non-fresh materials and excessive moisture
  与采用了不新鲜原料生产产品和产品成品的水分超标有关；
- Loose control of production process and incomplete sterilization
  企业生产工艺控制不严格及灭菌不彻底。

PART THREE

03

Problems in the use of fishmeal

鱼粉使用的问题

I. Excessive microorganism in fishmeal
一、鱼粉中微生物超标情况

IQSTAP

鱼粉数据/ Fishmeal data（2016.07-2017.08）

01-salmonella/ 沙门氏菌

Detection rate 11.2% (sample size n=134, 15 positive samples)/ 检出率11.2%（样本数n=134，15个阳性）
Include: domestic fishmeal 30.8% (n=39, 12 positive samples), imported fishmeal 2.4% (n=84, 3 positive samples)
其中：国产鱼粉30.8%（n=39，12个阳性），进口鱼粉2.4%（n=84,3个阳性）

02-total bacteria/ 细菌总数

Excessive rate of total bacteria 2.2%/ 细菌总数超标率2.2%
Total bacteria in imported fishmeal was mostly lower than 2×104CFU/g, with excessive rate of 1.2% (n=84)/
进口鱼粉大部分细菌总数在2×104CFU/g以下，超标率1.2%（n=84）
Total bacteria in domestic fishmeal was mostly within 106～105CFU/g, with excessive rate of 5.1% (n=39)/
国产鱼粉大部分细菌总数在106～105CFU/g，超标率5.1%（n=39）

03-antioxidants, fungicides and bacteriostatic agents/ 抗氧化剂、杀菌剂与抑菌剂

Imported fishmeal: propionic acid 0.14～0.17%, antioxidant 3～5‰
进口鱼粉：可以检测出丙酸在0.14～0.17%，抗氧化剂3～5‰
Domestic fishmeal: no fungicides and bacteriostatic agents detected out, antioxidant 3‰
国产鱼粉：没有检测出杀菌剂和抑菌剂，抗氧化剂3‰

I. Excessive microorganism in fishmeal
一、鱼粉中微生物超标情况

IQSTAP

Total bacteria in fishmeal (cfu/g)
鱼粉中细菌总数统计表（cfu/g）

Proportion of distribution range/ 分布范围比例	Whole range/ 全部范围	$<2*10^4$	$2*10^4$～$2*10^5$	$2*10^5$～$2*10^6$	$>2*10^6$
Total sample size of fishmeal/ 鱼粉总样本数	134	60	46	22	6
Proportion/ 所占比例	-	44.8	34.3	16.4	4.5
Domestic fishmeal/ 国产鱼粉	39	0	17	20	2
Proportion/ 所占比例	-	0	43.6	51.3	5.1
Imported fishmeal/ 进口鱼粉	84	58	22	3	1
Proportion/ 所占比例	-	69.0	26.2	3.6	1.2
By- product meal, fish and shrimp meal/ 鱼排粉、鱼虾粉等	11	2	1	5	3
Proportion/ 所占比例	-	18.2	9.1	45.4	27.3

Monitoring data (Jul. 2016-Aug. 2017) from a group
（2016.07-2017.08，某集团监测数据）

I. Excessive microorganism in fishmeal
一、鱼粉中微生物超标情况

IQSTAP

Reason analysis/ 原因分析

Imported fishmeal/ 进口鱼粉

Fungicides and bacteriostatic agents were generally added in production, causing propionic acid content 0.14-0.17%;
普遍添加在生产中普遍添加杀菌剂和抑菌剂，其中丙酸含量在0.14-0.17%之间；

Difference
差　异

Domestic fishmeal/ 国产鱼粉

No fungicides and bacteriostatic agents were added in production, and only 3‰ antioxidant was added;
生产中没有添加杀菌剂和抑菌剂，只添加3‰的抗氧化剂；

	Imported fishmeal/ 进口鱼粉	Domestic fishmeal/ 国产鱼粉
Main reason/ 主要原因	Under the effect of bacteriostatic agents, salmonella and total bacteria in most products were qualified (more than 97%) 由于抑菌剂的作用，沙门氏菌和细菌总数大部分合格（97%以上）	Without sterilization and bacteriostasis, products were very easy to be polluted by pathogenic bacteria, resulting in high detection rate of salmonella 在没有杀菌和抑菌的条件下，非常容易被致病菌污染，造成沙门氏菌检出率高
Secondary reason/ 次要原因	——	The production was intermittent, causing difficulty in disinfection of production line; the period between the production period and the use period of fishmeal was 3~6 months, i.e. production in winter and use in summer; the feed producer had poor storage conditions and was easy to be polluted (some fishmeal was qualified in the factory inspection and unqualified in the use stage) 为间歇式生产，生产线消毒困难；鱼粉的生产周期与使用周期相差3～6月，冬季生产夏季使用；饲料企业储存条件差，容易被污染（部分鱼粉是进厂检测合格，使用阶段不合格）

II. Excessive Cr in fishmeal
二、鱼粉中铬（Cr）超标情况

IQSTAP

Misunderstanding/ 认识误区

The Cr content in animal protein materials is high, and the Cr content in fishmeal is high.

动物蛋白原料中铬含量高，鱼粉中铬含量高。

- **Fact: the Cr content in animal products is low, and the Cr content in marine fish is low, except for inkfish and squid (Cr content in squid paste is high, about 10～30 mg/kg).**

  真实情况：动物产品铬含量不高，海洋鱼类中铬含量不高，但是墨斗鱼、鱿鱼除外（鱿鱼膏中铬含量高10～30 mg/kg）。

- **"Leather meal" causes the result. (Source: leather industry leftovers and waste after extraction of leather gelatin with Cr content of 1500～3000 mg/kg. Leather meal has become the illegal feed material after release of No. 1773 Announcement of the Ministry of Agriculture on *Catalogue of Feed Ingreidents*)**

  "皮革粉"是元凶（来源：皮革工业下脚料、提取皮明胶后的废弃物，其中含铬1500～3000 mg/kg，在农业部1773公告《饲料原料目录》发布后，皮革粉已非合法饲料原料）。

  - ✓ **Although the leather meal is not included in *Catalogue of Feed Materials*, the product doesn't disappear in the market and is illegally added into the animal protein feeds (such as pork bone meal, fishmeal and feather meal).**

    皮革粉虽然未能列入《饲料原料目录》，但是其产品没有退出市场，被非法掺在动物蛋白饲料（如猪肉骨粉、鱼粉、羽毛粉）中。

  - ✓ **Excessive Cr in animal protein materials must be caused by mixing leather meal.**

    动物蛋白原料铬超标一定是掺皮革粉造成的。

III. Fishmeal adulteration
三、鱼粉掺假情况

IQSTAP

Inferior adulteration is already not the main cause of fishmeal quality (adulteration with protein essence, feather meal and leather meal is rare!)

低水平的掺假已经不是目前鱼粉质量的主要问题（用蛋白精、羽毛粉、皮革粉造假是少数的现象！）

- Latest adulteration means——technical adulteration: mix the low-end fishmeal into high-end fishmeal; mix the freshwater fish meal and non-fresh fishmeal into high-end fishmeal.
- 最新掺假手段的变化——技术造假：低档鱼粉掺到高端鱼粉中;把淡水鱼粉、新鲜度差的鱼粉掺入到高档鱼粉中是主流造假的方法。

  - ✓ Prepare with Pakistan fishmeal and freshwater fishmeal/ 用巴基斯坦、淡水鱼粉鱼粉调配: Lys3.78%, Thr1.99%, 6500-7000 yuan/ton (元/吨)
  - ✓ Mix with by-product fishmeal: poor freshness/加入部分鱼排粉：新鲜度差: Lys3.7～3.9%, 8000 yuan/ton (元/吨)
  - ✓ Prepare with steamed dried fishmeal and Pakistan fishmeal and add freshness(preservative) powder to reduce VBN.
    用蒸干鱼粉、巴基斯坦鱼粉调配并且加入保鲜粉降低VBN。
  - ✓ Adjust 3%-5% protein content with non protein nitrogen.
    用非蛋白氮调整3%-5%蛋白含量。
  - ✓ Adjust 2%-5% protein content with feather meal, and leather meal.
    用羽毛粉、皮革粉等原料调整2%-5%蛋白含量。

Sodium bicarbonate (bicarb)/
碳酸氢钠（小苏打）

III. Fishmeal adulteration
三、鱼粉掺假情况

IQSTAP

Amino acid content of different fish meal/ 不同类型鱼粉氨基酸含量对比表

Amino acid/ 氨基酸	High quality fishmeal/ 优质鱼粉	Adulteration fishmeal/ 掺假鱼粉	Steamed dried fishmeal/ 蒸干鱼粉	Pakistan fishmeal/ 巴基斯坦
Lys	4.98	3.73	4.34	3.79
Asp	5.58	4.21	5.23	4.40
Thr	2.59	1.98	2.36	1.99
Ser	2.14	1.64	1.96	1.71
Glu	9.52	7.29	9.93	8.36
Gly	3.23	2.55	3.65	4.14
Ala	3.68	2.87	3.67	3.57
Cys	0.72	0.55	0.55	0.60
Met	1.76	1.39	1.43	1.41
Val	3.20	2.47	2.76	2.47
Ile	2.86	2.15	2.52	2.13
Leu	4.53	3.42	4.15	3.50
Tyr	2.07	1.47	1.67	1.45
Phe	2.62	2.10	2.49	2.11
His	1.85	1.41	1.20	1.10
Arg	3.45	2.49	3.13	3.01
Pro	1.81	1.37	1.79	1.97
VBN	60	100	260	356

IV.Judgment of freshness of fishmeal
四、鱼粉新鲜度的判定情况

IQSTAP

At present, there are many methods to judge the freshness of fishmeal, but they all have shortcomings and need to be improved.

目前，存在多种判定鱼粉新鲜度的方法，但均存在不足，亟待改进。

- 感观判定：
  - 对个人经验要求较高
- 挥发性盐基氮（VBN）：行业普遍采用
  - 容易造假，导致结果失真（比如：用碳酸钠可以调节VBN）
- 尸胺、组胺（生物胺）：推荐使用，不易造假
  - 优化后的检测方法标准已发布实施（国家标准GB/T 23884-2021、团体标准T/CFIAS 6004-2022）
- 近红外光谱法检测
  - 缺乏稳定的通用模型

- Sensory judgement:
  - Highly depend on personal experience
- VBN: commonly used
  - Easy to cheat, resulting in false result (for example, VBN can be adjusted with sodium carbonate)
- Cephalamine and histamine (biogenic amine): recommended, free of cheating
  - The standards for optimal testing method (GB/T 23884-2021 and T/CFIAS 6004-2022) were released.
- NIRS
  - Lack of stable common model

V. Differences in definition of fishmeal
五、鱼粉定义差异情况

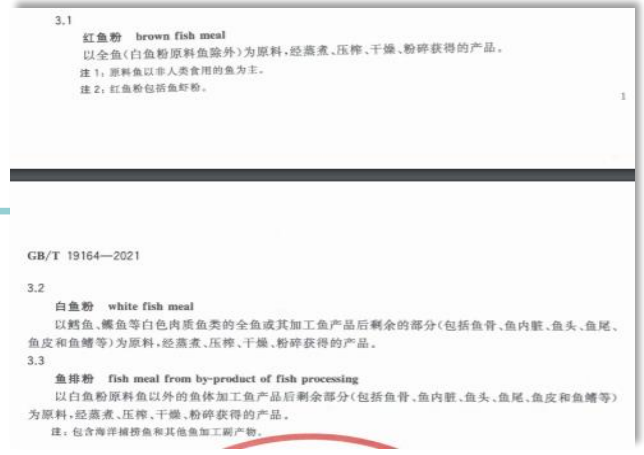
IQSTAP

Difference between regulations and standards/ 法规与标准存在差异

- **Definition of fishmeal in No. 1773 Announcement of the Ministry of Agriculture on *Catalogue of Feed Materials*：**
  农业部1773号公告《饲料原料目录》对鱼粉的定义：
  - **10.4.4 Fishmeal:** the product obtained by steaming, cooking, pressing, defatting, drying and grinding of the whole fish or the cut fish body. The fish soluble can be added during drying. No fish with contamination or diseases can be used. If the product material is from freshwater fish, the product shall be marked with “freshwater fish meal”.
  - **10.4.4 鱼粉：**全鱼或经分割的鱼体经蒸煮、压榨、脱脂、干燥、粉碎获得的产品。在干燥过程中可加入鱼溶浆。不得使用发生疫病和受污染的鱼。该产品原料若来源于淡水鱼，产品名称应标明“淡水鱼粉”。

  - **Mandatory indicators:** crude protein, crude fat, crude ash, lysine, and VBN.
  - **强制性指标：**粗蛋白质、粗脂肪、粗灰分、赖氨酸、挥发性盐基氮 。

- **Definition of fishmeal in GB/T 19164-2003/ 国家标准（GB/T 19164-2003）中鱼粉的定义 ：**
  - **Fishmeal:** the fishmeal for feed made from fish, shrimp, crab aquatic animals and their processing wastes through steaming, cooking, pressing, defatting, drying, grinding and other processes.
  - **鱼粉：**“以鱼、虾、蟹类水产动物及其加工的废弃物为原料，经蒸煮、压榨、脱脂、干燥、粉碎等工序制成的饲料用鱼粉。
  - **Notice:** a little shrimp or crab (less than 3%) is inevitable in fishmeal.
  - **注意：**鱼粉中含少许（3%以下）的小虾或蟹是属于不可避免的混杂。


3.1
红鱼粉 brown fish meal
以全鱼（白鱼粉原料鱼除外）为原料，经蒸煮、压榨、干燥、粉碎获得的产品。
注1：原料鱼以非人类食用的鱼为主。
注2：红鱼粉包括鱼虾粉。

GB/T 19164—2021

3.2
白鱼粉 white fish meal
以鳕鱼、鳐鱼等白色肉质鱼类的全鱼或其加工鱼产品后剩余的部分（包括鱼骨、鱼内脏、鱼头、鱼尾、鱼皮和鱼鳍等）为原料，经蒸煮、压榨、干燥、粉碎获得的产品。
3.3
鱼排粉 fish meal from by-product of fish processing
以白鱼粉原料鱼以外的鱼体加工鱼产品后剩余部分（包括鱼骨、鱼内脏、鱼头、鱼尾、鱼皮和鱼鳍等）为原料，经蒸煮、压榨、干燥、粉碎获得的产品。
注：包含海洋捕捞鱼和其他鱼加工副产物。

- ***Feed Material-Fishmeal* (2021) has the standardized definition of fishmeal based on the announcement.**
- **2021版《饲料原料 鱼粉》已对照公告内容，对鱼粉进行了规范定义。**

VI. Fishmeal label
六、鱼粉标签情况

IQSTAP

Nonstandard fishmeal labels/ 鱼粉标签存在大量不规范的问题

- The results of monitoring of imported products from 2012 to 2017 show that the qualified rate of labels of imported products was **lower than 70%**, especially imported fishmeal with the qualified rate lower than **30%!**

  在2012-2017年进口产品监测工作中发现，进口产品的**标签合格率低于70%**，主要以进口鱼粉为主，**合格率不到30%**！

- **Main problems/ 主要问题：**
  - **Inaccurate description of common name and product name.**
    通用名称和商品名称表述不准确。
  - **Inconsistent guaranteed value of composition analysis on feed label and in standards (common phenomenon. If the product is strictly judged based on label, it is unqualified).**
    饲料标签中成分分析保证值与所执行标准的规定不一致（普遍现象！如果严格按标签进行判断，产品不合格！）。
  - **Many import registration certificate numbers on one label.**
    同一个标签上标注多个进口登记证号 。
  - **Counterfeit import registration certificate number on the label.**
    标签上标注的进口登记证号冒用其他产品的编号。
  - **Inconsistent producer information on label and on registration certificate.**
    标签上标注的生产厂家信息与登记证上不符。
  - **No agency information on the label.**
    标签上缺少代理单位信息。

PART FOUR

04

Solutions and suggestions

解决方案及建议

I. Fishmeal safety risk factors
一、鱼粉安全风险考虑因素

IQSTAP

(1) Material source and environmental control/ 原料来源及环境控制

The materials shall be aquatic animals caught or bred in sea area of the exporting country and international waters, shall not be the aquatic animals sifted out or died because of animal epidemics, shall not contain other animal derived ingredients, and shall be free of pollution of animal derived products in the third country and be free of pollution during transportation and storage.

原料应来自于输出国海域、公海捕捞或者养殖的水生动物，不能使用因扑灭动物疫情而淘汰或者死亡的水生动物，不含其它动物源性成份，没有受到第三国动物源性产品的污染，并且在运输、存储过程中能够避免污染。

(2) Additives in production/ 生产中的添加剂

Most of the imported fishmeal is added with antioxidants to prevent the fat in the fishmeal from oxidizing, deteriorating, releasing heat or even causing spontaneous combustion. Therefore, the addition time, concentration and metabolism of antioxidants in fishmeal production process are worthy of discussion and profound research.

进口鱼粉中大多添加了抗氧化剂，避免鱼粉中的脂肪氧化变质放出热量甚至自燃。因此，鱼粉生产过程中添加剂的添加时间、浓度以及抗氧化剂代谢情况等均是值得探讨和深入研究的问题。

Reference: Research on the Factors Influencing the Quality and Safety of Imported Feed Fishmeal and Quality Grading (Mo Chen, et al.)
参考《进口饲用鱼粉质量安全影响因素分析及质量分级研究》（陈未等）

I. Fishmeal safety risk factors
一、鱼粉安全风险考虑因素

IQSTAP

(3) Storage and transportation/仓储及运输问题

The moisture in fishmeal is an important factor affecting the storage. The control of moisture content and the storage and transportation conditions is critical to ensure no spoilage and mildew in storage and transportation of fishmeal.
鱼粉中的水分是影响产品仓储的重要因素。保证鱼粉仓储运输过程中不发生腐败、霉变等，控制产品水分含量以及仓储运输条件非常关键。

(4) Fishmeal adulteration/鱼粉掺假问题

Fishmeal adulteration not only affects the product quality, but also, more importantly, causes continuous negative impact on downstream industries such as animal husbandry and aquaculture.
鱼粉掺假不仅影响产品品质，更重要的是会对畜牧及水产养殖等下游产业造成持续的负面影响。

(5) Product label/产品标签问题

The regulatory authorities should focus on the latest requirements of label management in a timely manner based on the characteristics of imported fishmeal, and mainly check the key information in the label, such as enterprise registration number, product standard, shelf life, and relevant index content, to ensure that the imported fishmeal meets the requirements of China.
监管部门应当针对进口鱼粉的特点，及时关注标签管理的最新要求，重点核查标签中的企业注册号、产品标准、保质期、相关指标含量等关键信息，确保进口鱼粉符合我国要求。

II. Solutions
二、解决方案

IQSTAP

- **(1) For the fact that the microorganism in domestic fishmeal exceeds the standard, the license conditions for fishmeal producers should be released as the evidences, and the domestic fishmeal producers should improve their production environment and reasonably add fungicides/bacteriostatic agents in the production process to ensure the storage of products.**

（1）针对国产鱼粉中微生物超标情况，尽快发布鱼粉生产企业许可条件，以使生产企业有依据，并要求国产鱼粉生产企业改善生产环境，在生产过程中合理添加杀菌剂/抑菌剂，保障产品的储存。

Prohibition of producing fishmeal on the ground
禁止鱼粉落地生产

- **Production environment permit conditions/ 生产环境许可条件**
  - **Disinfection and sterilization measures, ultraviolet lamp, rat proof, and production personnel disinfection**

    有消毒灭菌措施，紫外灯、防鼠、生产人员消毒
- **Production process/生产过程**
  - **Add bactericides and bacteriostatic agents/ 添加杀菌剂、抑菌剂**
  - **Prohibition of producing fishmeal on the ground/ 禁止鱼粉落地生产**
  - **Disinfection of production line to control the total bacteria and pathogenic bacteria/ 生产线消毒控制细菌总数和致病菌**
  - **Product storage/ 产品储存**
  - **Environment/ 环境**
  - **Temperature/ 温度**
  - **Prevention or control of total bacteria and pathogenic bacteria/ 防止或控制细菌总数和致病菌**

II. Solutions
二、解决方案

IQSTAP

➢ **(2) Further strengthen the supervision on the production and use of counterfeit and inferior fishmeal**

（2）针对假冒伪劣鱼粉的生产和使用情况，进一步强化监管

➢ **Feed quality monitoring plan**

- **Existing monitoring items: pathogenic bacteria, total bacteria, Cd, Pb, Cr, melamine**
- **Add: “counterfeit fishmeal” items (mainly targeted at eliminating “counterfeit fishmeal”);**
- **Whether to add the gizzerosine indicator?**

➢ **在饲料质量监测计划中**

- 现有监测项目：致病菌、细菌总数、Cd、Pb、Cr、三聚氰胺
- 增加：“假鱼粉”相关项目（以根治“假鱼粉”这个顽疾为主要目标）；
- 关于增加肌胃糜烂素等指标？

II. Solutions
二、解决方案

IQSTAP

- **(3) To eliminate the inconsistency between the former *Fishmeal* standard and the practical situation, a new standard *Feed Materials-Fishmeal* was released and was implemented since May 1, 2022.**
  （3）针对原《鱼粉》国家标准与实际情况脱节问题，已修订、发布《饲料原料　鱼粉》新标准，并于2022年5月1日开始实施。

- **The definition of fishmeal in former standard is inconsistent with practical situation.**
  - **Definition of fishmeal in GB/T 19164-2003 Fishmeal: "the fishmeal for feed made from fish, shrimp, crab aquatic animals and their processing wastes through steaming, cooking, pressing, defatting, drying, grinding and other processes".**
- **After implementation, the new standard should be disseminated for all parties.**

- **原鱼粉国标定义不符合目前实际情况**
  - 《鱼粉》（GB/T 19164-2003）中鱼粉的定义：“以鱼、虾、蟹类水产动物及其加工的废弃物为原料，经蒸煮、压榨、脱脂、干燥、粉碎等工序制成的饲料用鱼粉”。
- **新鱼粉标准实施后，应做好宣贯，便于各方使用**

III. Suggestions
三、建议

IQSTAP

Problem 1
问题1

The content of conventional nutrients in fishmeal is quite different. It is difficult to judge its biological value by the existing nutritional evaluation indicators, and it is also difficult to evaluate the biological value of fishmeal with simple nutritional indicators!
鱼粉常规营养成分含量差异很大，现有营养评价指标难以判定其生物学价值，鱼粉生物学价值难以用简单的营养指标进行评价!

Suggestion: the evaluation of biological potency is more suitable for fishmeal value rather than simple evaluation based on the laboratory test results of some indicators.
建议：生物学效价评价更适合鱼粉价值的评价，不能仅以部分指标的实验室检测结果进行单一评价。

Problem 2
问题2

Too high processing temperature will reduce the content of biogenic amine and histamine to very low value, while increase the content of gizzerosine with high toxicity and the fat oxidation products.
过高的加工温度会使得生物胺、组胺含量很低，而毒性高的肌胃糜烂素含量更高，油脂氧化产物更多。

Suggestion: change the fishmeal safety indicators.
建议：修改鱼粉安全性指标。

III. Suggestions
三、建议

IQSTAP

Problem 3
问题3

It is not scientific to judge the freshness of fishmeal, protein spoilage process and spoilage products only with TVBN.
鱼粉新鲜度评价，蛋白质腐败过程与腐败产物，仅根据TVBN进行判断不科学。

Suggestions: add the indicators of biogenic amines, such as putrescine, cadaverine and spermine.
建议：可增加主要生物胺，如腐胺、尸胺、精胺等指标。

Problem 4
问题4

For the category and grade of fishmeal products classified based on materials and origin, the fishmeal grades should not be classified with the conventional indicators. For example, EU classifies the grades with safety indicators as primary.
按照原料和产地的细分鱼粉产品种类及级别，鱼粉级别不应该按照常规指标划分，比如欧盟是以安全为首。

Suggestion: add the safety indicators.
建议：增加安全指标进行级别划定和规定。

III. Suggestions
三、建议

IQSTAP

Problem 5
问题5

The global fishmeal comes from five continents and four oceans. The fishmeal is made from dozens of raw fish species which vary greatly. It is not scientific to use one standard.

全球鱼粉来自五大洲四大洋，用于鱼粉生产的原料鱼有几十种之多，原料鱼差异极大，套用一个标准，不太科学。

Suggestion: set up other supporting standards if necessary!

建议：适当增加其他配套标准！

中国农业科学院农业质量标准与检测技术研究所

Institute of Quality Standard and Testing Technology for Agro-products of CAAS

Look forward to your suggestions! Thanks!
欢迎交流！谢谢！

电话/ Tel.: 010-82106583 /13671043533 (微信/WeChat)
传真/ Tax: 010-82106580
邮箱/ Email: fanxia@caas.cn
通讯地址/Add.:
No. 12, Nanda Street, Zhongguancun, Haidian District,
Beijing City (100081)
北京市海淀区中关村南大街12号 (100081)

China Academy of Agricultural Sciences