Food Analytical Testing to Comply with International Regulations for Food Safety

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Lab director





QCAP Partnership

QCAP participate in the food standards, food regulations, and the food control system based on the accumulated experience in food safety testing

Testing & Sampling
Harmonization & Impacts

Flow of Food Trade

Exporting COUNTRY

National Food Legislation

Testing by Lab A
(QA/QC Criteria, Test Methods, Validation, Accreditation)

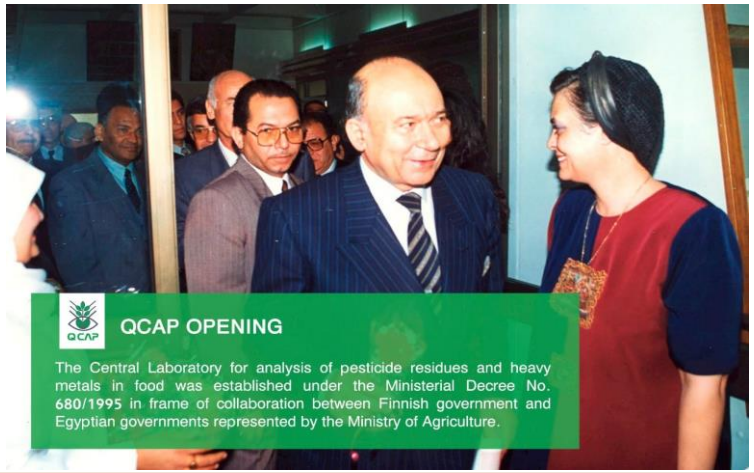
Importing COUNTRY

National Legislation

Testing by Lab B
(QA/QC Criteria, Test Methods, Validation, Accreditation)

Our history

The lab is **the main output of the collaboration between the Egyptian and Finnish Governments** ,"the Quality Control on Agriculture Products Project (QCAP)".



continuous co-operation for more than 27 years.

Our mission

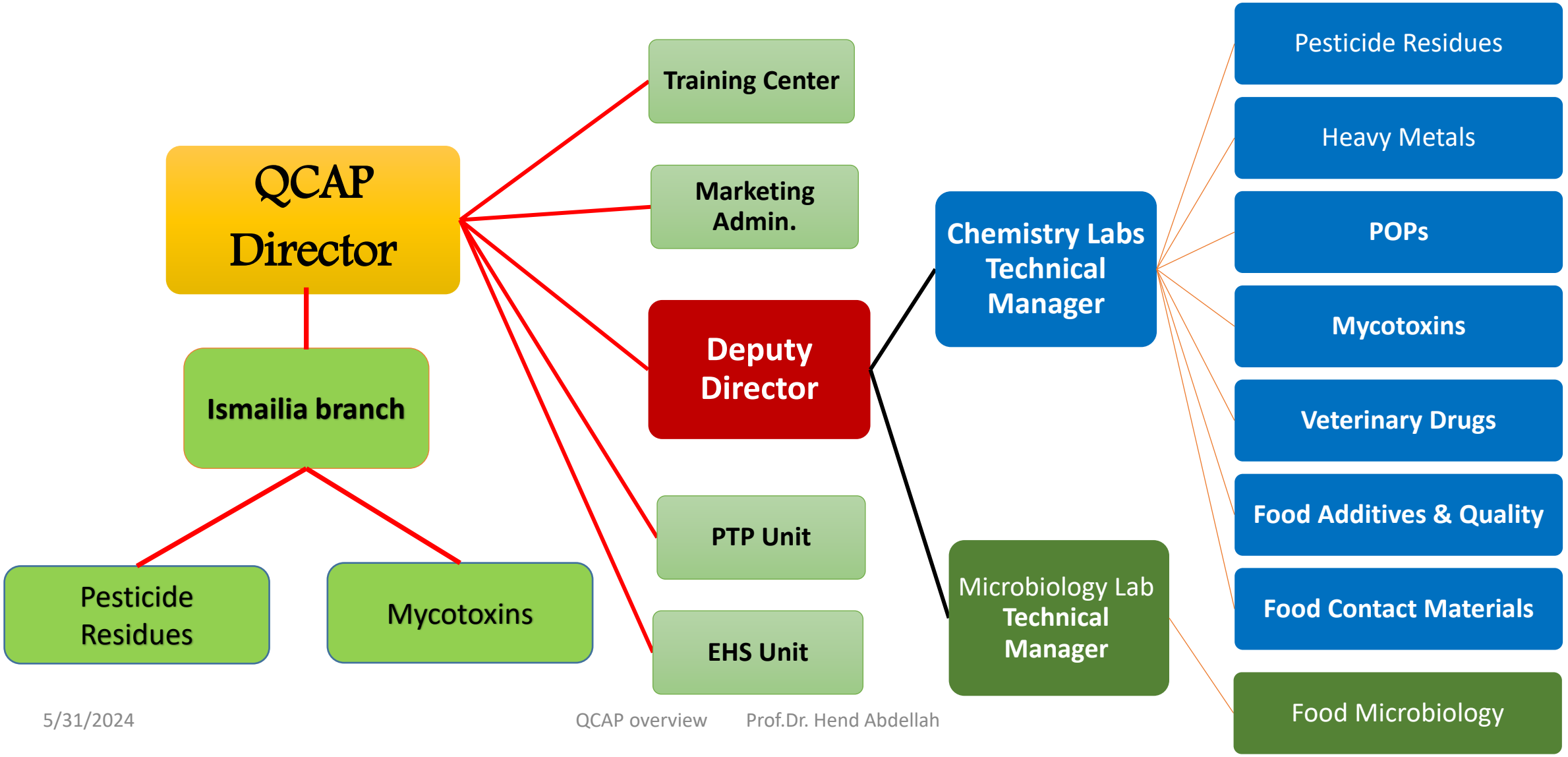
Maintaining the Health of Egyptian Consumers

Control and Encourage the Egyptian Exports & Imports

Scientific Research

Safe Food….
Healthy People

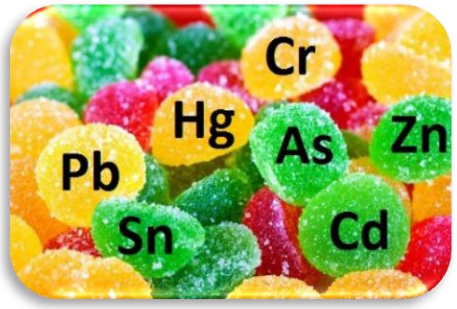
Organizational chart



Pesticides Residues

- This section use both LC-MS/MS and GC-MS/MS advance techniques for the residue analysis of a large number of pesticides (more than 570) in different food samples.
- There are also some specific methods for residues like ethephone,…

Heavy Metals

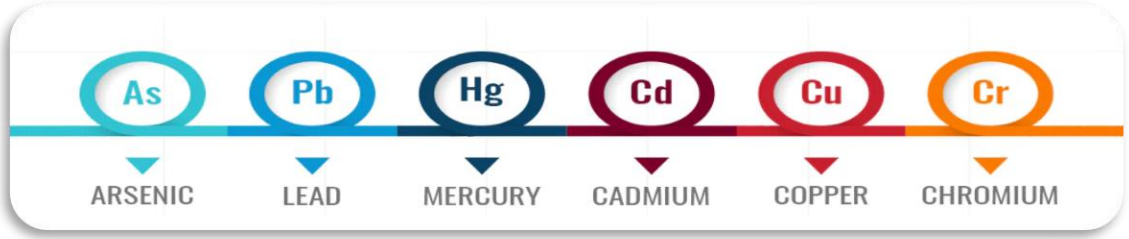


The efficiency of the Heavy Metals analysis was improved
by adapting number of different advanced techniques
More than **18 elements** in food and environmental samples

2 ICP-OES

2 ICP-MS

1 ICP-MS/MS



Mycotoxins

Mycotoxins

Aflatoxins (B1,B2, G1, G2)

Aflatoxin M1

Marine toxins

Don & Zon

Fumonisins

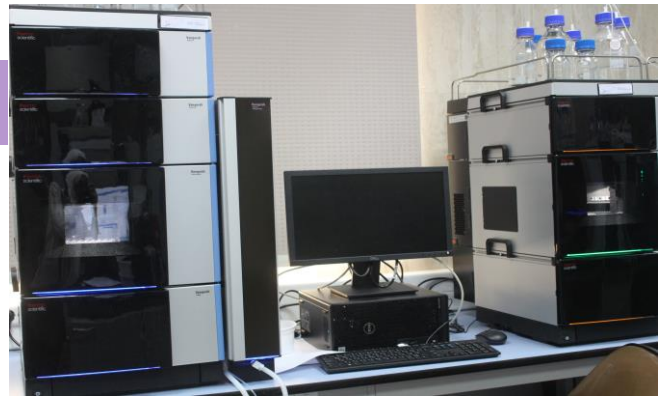
Patulin

Ochratoxin A

Ergot alkaloids

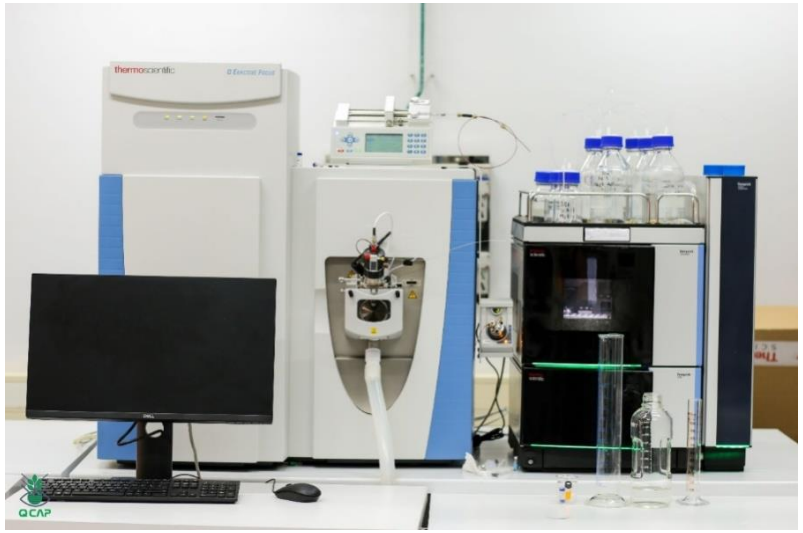
2 LC-MS/MS

4 HPLC



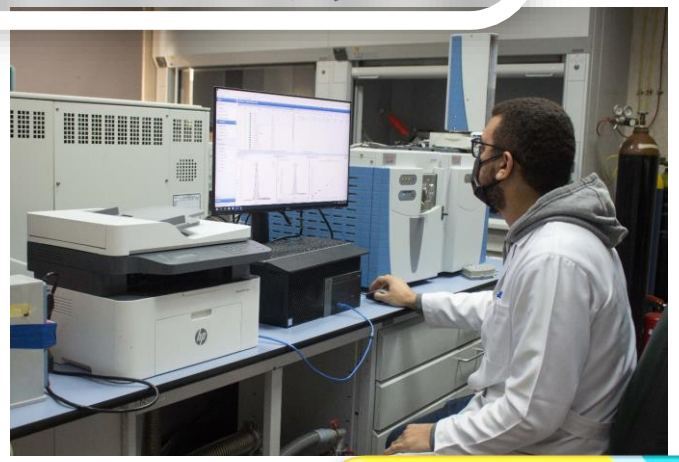
GC-MS/MS 1

Veterinary Drugs



Testing more than 45 veterinary drugs and Hormones using LC-MS/MS & High Resolution LC-MS

Food additives & Food Quality



- Synthetic sweeteners
- Synthetic food colors
- Anti-oxidents
- Preservatives
- Beta carotene
- Caffeine
- Lycopene
- Sulfur dioxide

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Food Quality

1.	Benzoates & Sorbates
2.	Acesulfame K, Aspartame, Saccharine
3.	Cyclamate
4.	Vit. A
5.	Vit. E
6.	Vit. D
7.	Vit B complex (1,2,3,5,6,7 and 12)
8.	HMF (Hydroxymethylfurfural)
9.	Honey Sugars
10.	Sulfite in dried fruits
11.	Acid Value
12.	Peroxide Value
13.	Ash
14.	Protein
15.	Synthetic colors
16.	Sudan Dyes(7 Dyes) in Hot chili
17.	Nitrite and Nitrate
18.	Antioxidants in oil
19.	Moisture
20.	pH
21.	Formaldehyde
22.	Bromate
23.	Histamine
24.	Free and bound 3-monochloropropane-1 2-diol
25.	Benzo(a)pyrene
26.	Curcumin (turmeric)

New

Food Contact Materials

QCAP is the 1st Egyptian Accredited lab in wide range of Food Contact Materials

Specific Migration: **Formaldehyde** in food simulants

Specific Migration: **Bisphenol-A** in aqueous extract food

Specific Migration: **PAHs & Phthalate esters** (PAEs) in Plastics & paper, & board

Specific Migration: **2,2-bis(4-hydroxyphenyl) propane (Bisphenol-A)** in an aqueous extract food

Specific Migration: **Pentachlorophenol** in Feed materials

Overall migration: **Polymeric coatings** on paper and board

Overall Migration: **Polymeric coatings** on metal substrates

Overall Migration: **fatty foodstuffs**

Overall Migration: **Article Filling**

Overall Migration: **fatty foodstuffs** (Olive Oil by total immersion)

Microbiology

More than 33 foodborne pathogen

Foodborne Viruses

Toxin producing bacteria

Meat Adulteration

GMO testing

POPs

Persistent Organic Pollutants POPs including **Dioxins, Furans, Dioxin like-PCBs**, and **indicator PCBs** are analyzed by **High Resolution Gas Chromatograph High Resolution Mass Spectrometry (HRGC/HRMS)**

POPs

Basel Convention | Rotterdam Convention | Stockholm Convention | Synergies

UN environment programme

STOCKHOLM CONVENTION

Protecting human health and the environment from persistent organic pollutants

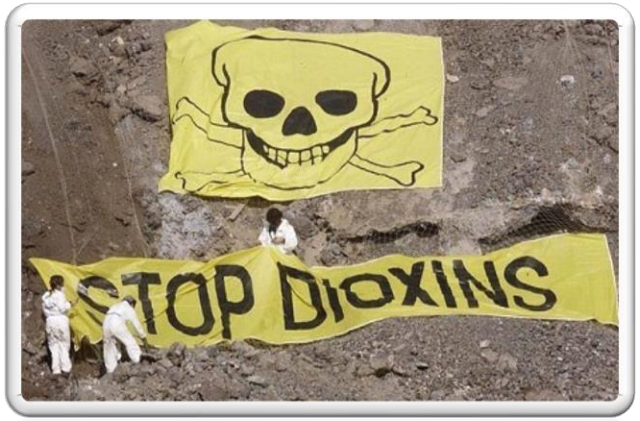
QCAP

POPs are:

- carbon-based organic chemical substances
- once released into the environment, they possess a particular combination of physical and chemical properties:

According to Stockholm convention May 2001 entered into force on 17 May 2004

- Remain intact for exceptionally **long periods of time** (many years)
- Become **widely distributed throughout the environment** as a result of natural processes involving soil, water and, most notably, air
- **Accumulate in the living organisms** including humans, and are found at higher concentrations at higher levels in the food chain
- **Toxic to both humans and wildlife**.



POPs

Basel Convention | Rotterdam Convention | Stockholm Convention | Synergies

UNEP STOCKHOLM CONVENTION

Protecting human health and the environment from persistent organic pollutants

9 Pesticides (organochlorines)

Aldrin

Chlordane

DDT

dieldrin

endrin

Heptachlor

Hexachlorobenzenemirex

toxaphene

Included in pesticide residues section

2 By-products (Dioxins)

polychlorinated dibenzo-p-**dioxins** (PCDD)

polychlorinated dibenzo**furans** (PCDF)

12 initial POPs are 3 categories

1 Industrial chemicals

polychlorinated biphenyls (PCBs) or **dioxin like-PCBs**

POPs Sources



Polychlorinated dibenzo-p-dioxins (PCDD)

- **unintentionally** due to **incomplete combustion**
- during the manufacture of **pesticides and other chlorinated** substances
- mostly burning of hospital waste, municipal waste, and hazardous waste, also from automobile emissions, peat, coal, and wood.
- Food (particularly from animals) is the major source of exposure for humans

Polychlorinated dibenzofurans (PCDF)

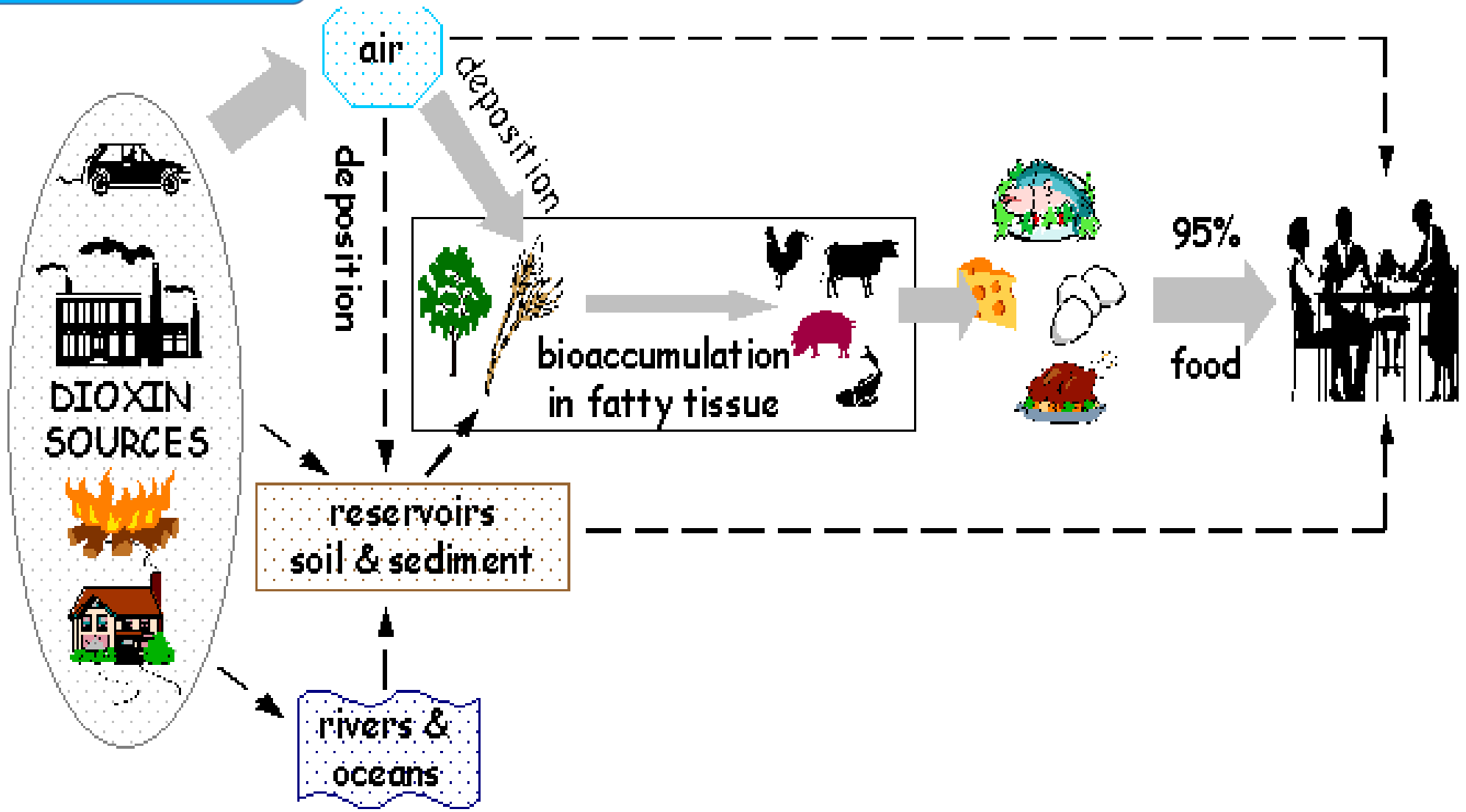
- **unintentionally** the same as dioxins
- during the production of PCBs
- detected in emissions from waste incinerators and automobiles
- Furans have also been detected in breast-fed infants

POPs Sources

Polychlorinated biphenyls (PCB)

- oily liquid at room temperature that is useful for **electrical utilities** and in other **industrial applications.**
- Used as **insulating and heat exchange fluids** in transformers and capacitors and other electric equipment
- applications such as additives in paint, carbonless copy paper, and plastics.
- 209 types of PCBs, 13 exhibit a dioxin-like toxicity

POPs Exposure



POPs Toxicity

International Agency for Research on Cancer

World Health Organization

Q CAP

Based on animal and human epidemiology data, tetrachlorodibenzo para dioxin TCDD was classified by IARC as a **known human carcinogen**

According to WHO's International Agency for Research on Cancer (IARC) in 1997 and 2012

Short-term exposure to high levels may result in

- skin lesions, such as chloracne
- patchy darkening of the skin
- altered liver function

Long-term exposure is linked to impairment of

- The immune system
- The developing nervous system
- The endocrine system and
- Reproductive functions.
- The most sensitive life stage is considered to be the fetus or neonate

POPs

WHO has established and regularly re-evaluated toxic **equivalency factors (TEFs)** for dioxins and related compounds

Each dioxin congener has **" toxicity equivalency factors (TEF)"** depending on the congener toxicity

The sum of the concentration of each congener multiplied by its TEF value is so called **"toxic equivalent (TEQ)"**

The final result expressed as TEQ

Congener	I-TEF	WHO 1998-TEF	WHO 2005-TEF
Polychlorinated dibenzo-p-dioxins			
2378-Cl_4DD	1	1	1
12378-Cl_5DD	0.5	1	1
123478-Cl_6DD	0.1	0.1	0.1
123678-Cl_6DD	0.1	0.1	0.1
123789-Cl_6DD	0.1	0.1	0.1
1234678-Cl_7DD	0.01	0.01	0.01
Cl_8DD	0.001	0.0001	0.0003

POPs Analysis

POPs analysis
one of the most critical and time consuming methods the results expressed as pg/g fat

QCAP was the 1st accredited lab in Egypt, Middle East and Africa to analyze POPs
Since 1999

POPs Analysis

The method includes extraction of fat from the sample followed by extensive clean-up process in order to eliminate all the co-extracted compounds and interferences

POPs Analysis Development

Decrease the analysis time from 10 days to 5 days

The only and 1st high tech. instrument in Egypt
DFS Magnetic Sector GC-HRMS System

POPs tested compounds

Dibenzodioxins:

#	Compound
1	2,3,7,8-tetra-CDD
2	1,2,3,7,8-penta-CDD
3	1,2,3,4,7,8-hexa-CDD
4	1,2,3,6,7,8-hexa-CDD
5	1,2,3,7,8,9-hexa-CDD
6	1,2,3,4,6,7,8-hepta-CDD
7	Octa-CDD

Dioxins

Dibenzofurans:

#	Compound
1	2,3,7,8-tetra-CDF
2	2,3,4,7,8-penta-CDF
3	1,2,3,7,8/1,2,3,4,8-penta-CDF
4	1,2,3,4,7,8/1,2,3,4,7,9-hexa-CDF
5	1,2,3,6,7,8-hexa-CDF
6	1,2,3,7,8,9-hexa-CDF
7	2,3,4,6,7,8-hexa-CDF
8	1,2,3,4,6,7,8-hepta-CDF
9	1,2,3,4,7,8,9-hepta-CDF
10	Octa-CDF

Furans

Dioxin like PCBs:

#	Compound	product Code
1	3,3'4,4'-TeCB	77
2	3,4,4',5-TeCB	81
3	3,3',4,4',5-PeCB	126
4	3,3',4,4'5,5'-HxCB	169
5	2,3,4,4'5-PeCB	105
6	2,3,4,4',5-PeCB	114
7	2,3',4,4',5-PeCB	118
8	2',3,4,4',5-PeCB	123
9	2',3,3',4,4',5-HxCB	156
10	2',3,3',4,4',5'-HxCB	157
11	2,3',4,4',5,5'-HxCB	167
12	2,3,3',4,4',5,5'-HpCB	189

Dl-PCBs

QCAP-NFSA Cooperation

In 2019 QCAP signed a cooperation Protocol with NFSA

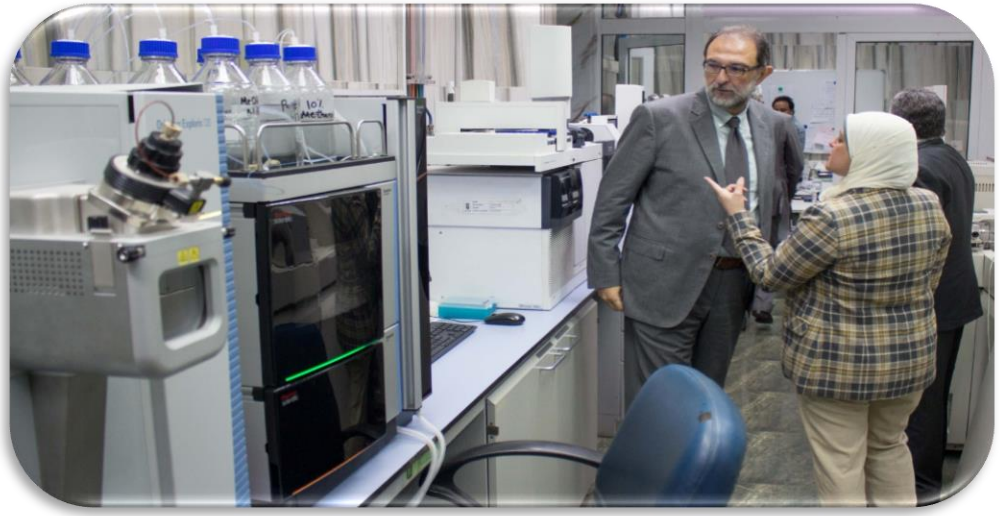
تعاقد بين

الهيئة القومية لسلامة الغذاء

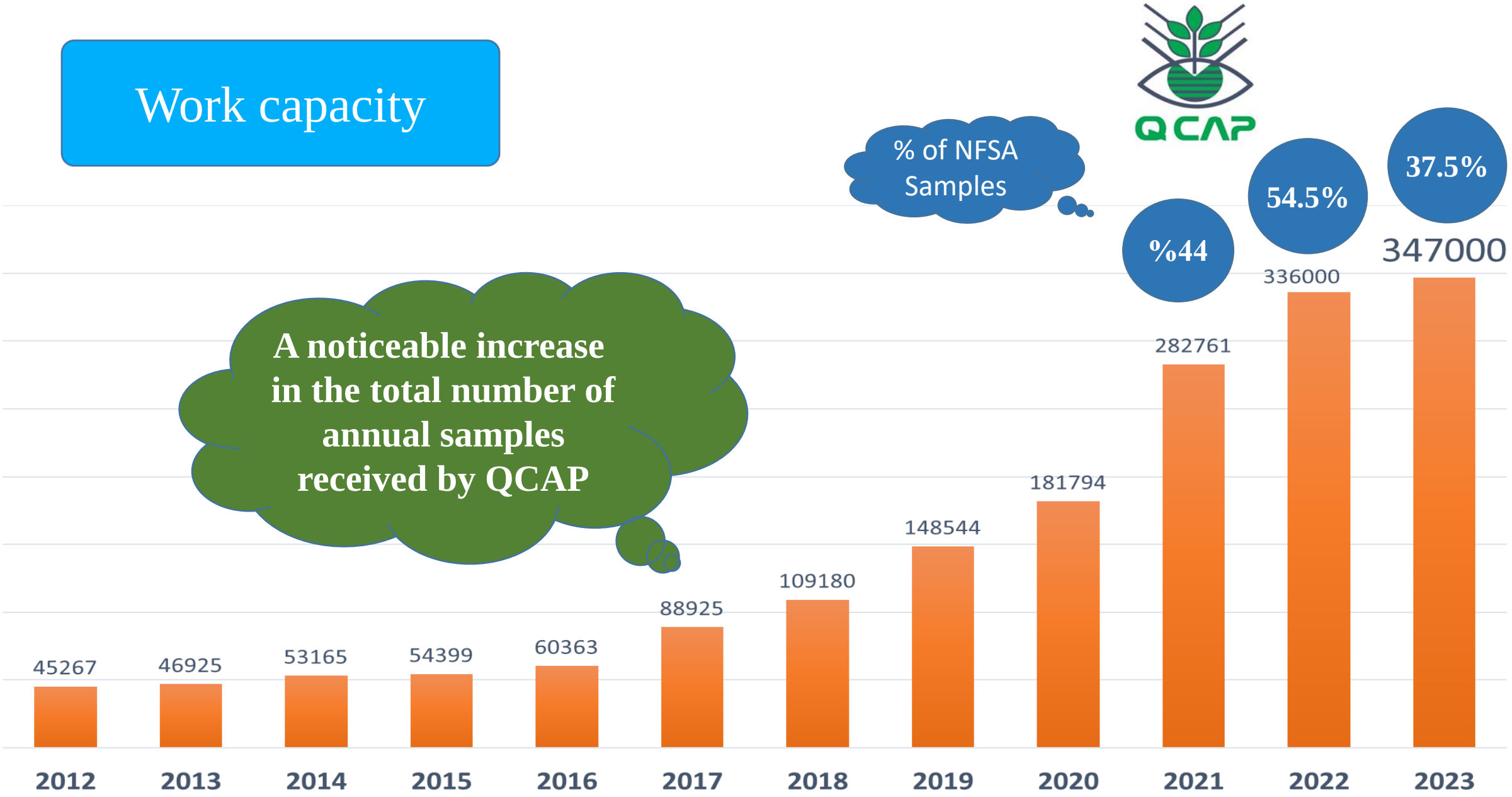
و المعمل المركزي لتحليل متبقيات المبيدات والعناصر الثقيلة في الأغذية

التابع لمركز البحوث الزراعية

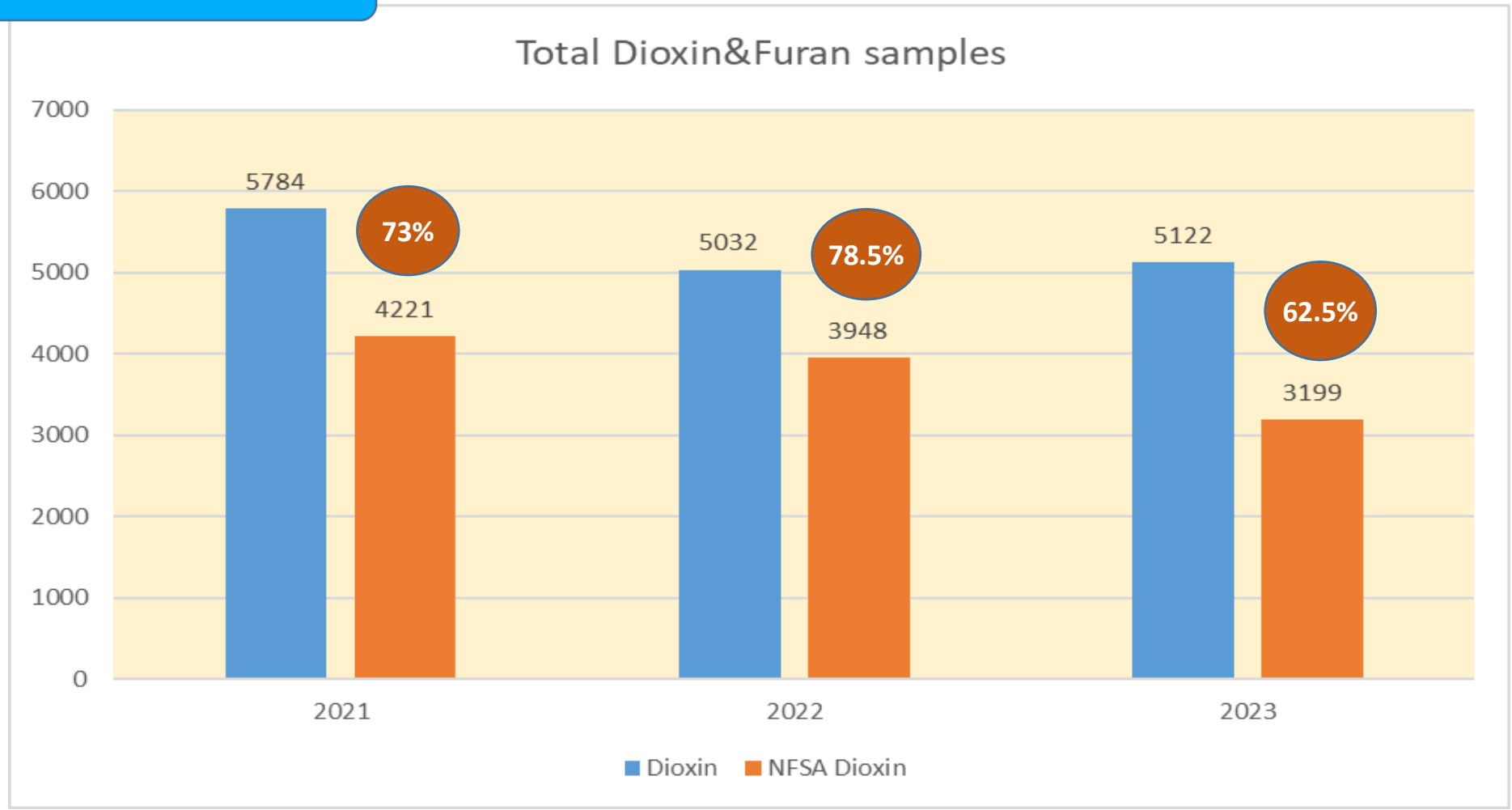
في شأن مجال تقديم خدمات فحوص واختبارات العينات الغذائية



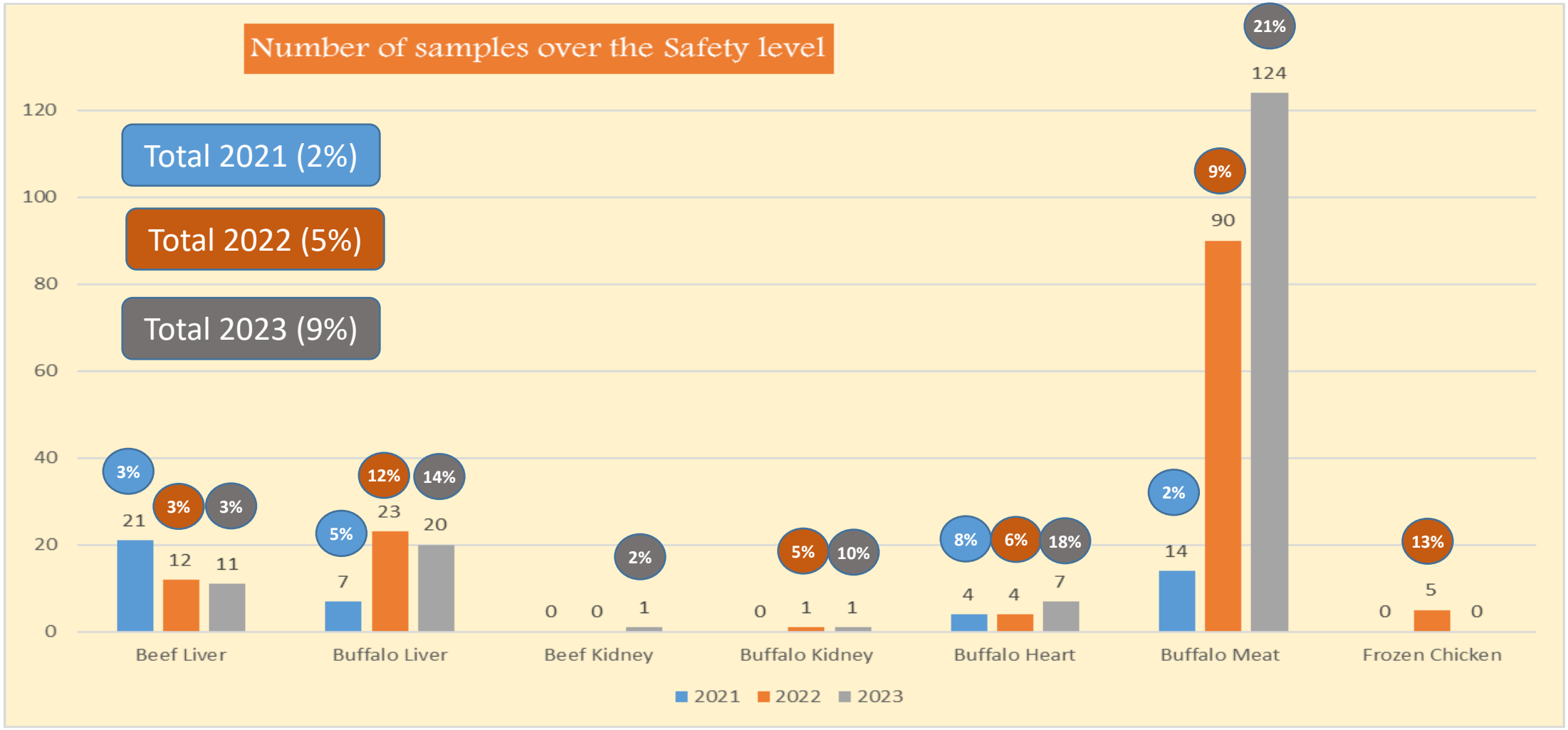
Work capacity



POPs Analysis



POPs Analysis



POPs Regulations

The Evaluations of the Joint FAO/WHO Expert Committee on Food Additives (JECFA):

provisional tolerable monthly intake **PTMI 70 pg/kg bw/month**, applied to intake of PCDDs, PCDFs and coplanar PCBs.

Commission Regulation (EU) 2023/915 on maximum levels for certain contaminants in food and repealing Regulation (EC) No 1881/2006

Meat and meat products of bovine, ovine and caprine animals except edible offal:

Sum of dioxins: 2,5 pg/g fat

Sum of dioxins and dioxin-like PCBs: 4,0 pg/g fat

Meat and meat products of poultry:

Sum of dioxins: 1,75 pg/g fat

Sum of dioxins and dioxin-like PCBs: 3,0 pg/g fat

Liver and derived products of bovine and caprine animals, pigs, poultry

Sum of dioxins: 0,30 pg/g wet weight

Sum of dioxins and dioxin-like PCBs: 0,50 pg/g wet weight

POPs Regulations

(3-E): الحدود القصوى للديوكسينات ومركبات ثنائي الفينيل متعددة الكلور Dioxins and PCBs[31]

Sum of PCB28, PCB52, PCB101, PCB138, PCB153 and PCB180 (ICES-6)[32]	Sum of dioxins and dioxin-like PCBs (WHO-PCDD/F-PCB-TEQ)[32]	Sum of dioxins (WHO-PCDD/F-TEQ)[32]	اسم المنتج (إنجليزى)	اسم المنتج (عربى)	المجموعة الغذائية (كود)
40 ng/g fat[33]	4.0 pg/g fat[33]	2.5 pg/g fat[33]	Meat and meat products of bovine animals and sheep	اللحوم ومنتجاتها من فصيلة الأبقار والأغنام	اللحوم (م 8)
40 ng/g fat[33]	3.0 pg/g fat[33]	1.75 pg/g fat[33]	Meat and meat products of poultry	اللحوم ومنتجاتها من فصيلة الدواجن	
40 ng/g fat[33]	1.25 pg/g fat[33]	1.0 pg/g fat[33]	Meat and meat products of pigs	اللحوم ومنتجاتها من فصيلة الخنازير	
3.0 ng/g wet Weight	0.50 pg/g wet Weight	0.30 pg/g wet Weight	Liver of terrestrial animals except for sheep and derived products thereof	كبدة الحيوانات الارضية باستثناء الأغنام والمنتجات المشتقة منها	الاحشاء (م 8)
3.0 ng/g wet weight	2.00 pg/g wet weight	1.25 pg/g wet weight	Liver of sheep and derived products thereof	كبدة الأغنام والمنتجات المشتقة منها	
75 ng/g wet weight	6.5 pg/g wet weight	3.5 pg/g wet weight	Muscle meat of fish and fishery products and products thereof[25][34], with the exemption of: - wild caught eel - wild caught spiny dogfish (*Squalus acanthias*)	اللحوم العضلية للأسماك ومنتجاتها والمنتجات السمكية باستثناء كل من[٢٥][٣٤]: – صيد ثعبان البحر البري – كلب البحر الشوكي الذي تم اصطياده من البرية	الأسماك ومنتجاتها (م 9)

الهيئة القومية لسلامة الغذاء

قرار مجلس إدارة رقم ٦ لسنة ٢٠٢٢

بشأن القاعدة الفنية الملزمة للحدود القصوى المسموح بها للملوثات الكيميائية بالغذاء

مجلس الإدارة

بعد الاطلاع على الدستور ؛

وعلى القانون رقم ٤٨ لسنة ١٩٤١ فى شأن قمع التدليس والغش وتعديلاته ؛

وعلى القانون رقم ١٠ لسنة ١٩٦٦ بشأن مراقبة الأغذية وتنظيم تداولها ؛

وعلى القانون رقم ١ لسنة ٢٠١٧ بإصدار قانون الهيئة القومية لسلامة الغذاء ؛

وعلى قرار السيد رئيس مجلس الوزراء رقم ٤١٢ لسنة ٢٠١٩ بإصدار اللائحة التنفيذية للهيئة القومية لسلامة الغذاء ؛

وعلى قرار وزير التجارة والصناعة رقم ٢٦٦ لسنة ٢٠١١ بشأن الإلزام بالإنتاج والتداول وفقا للمواصفات القياسية ؛

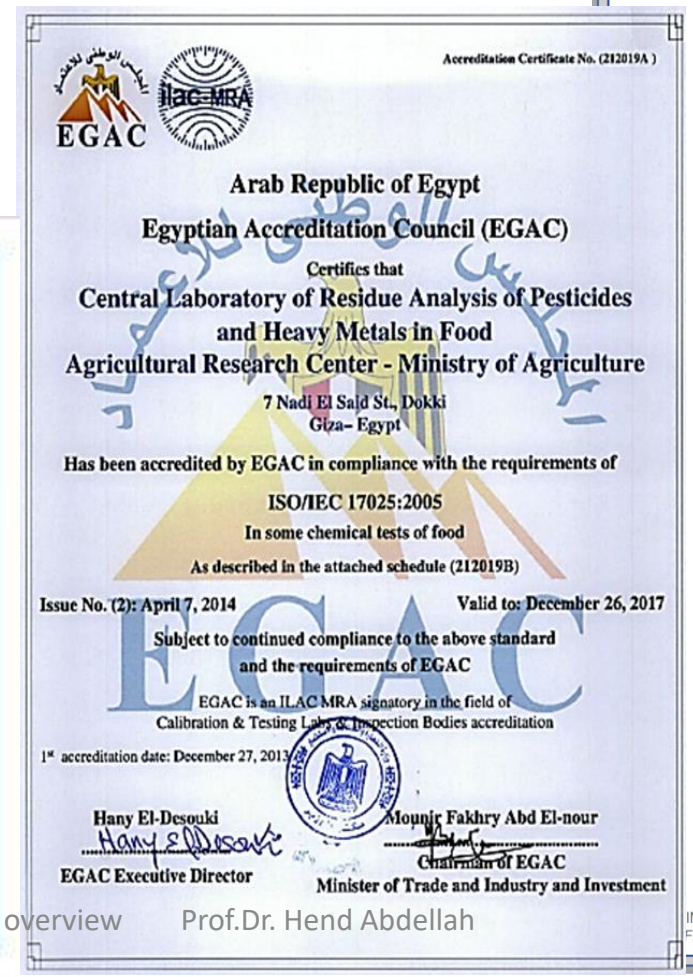
وعلى ما تم عرضه من قبل اللجنة الفنية المختصة بالهيئة ؛

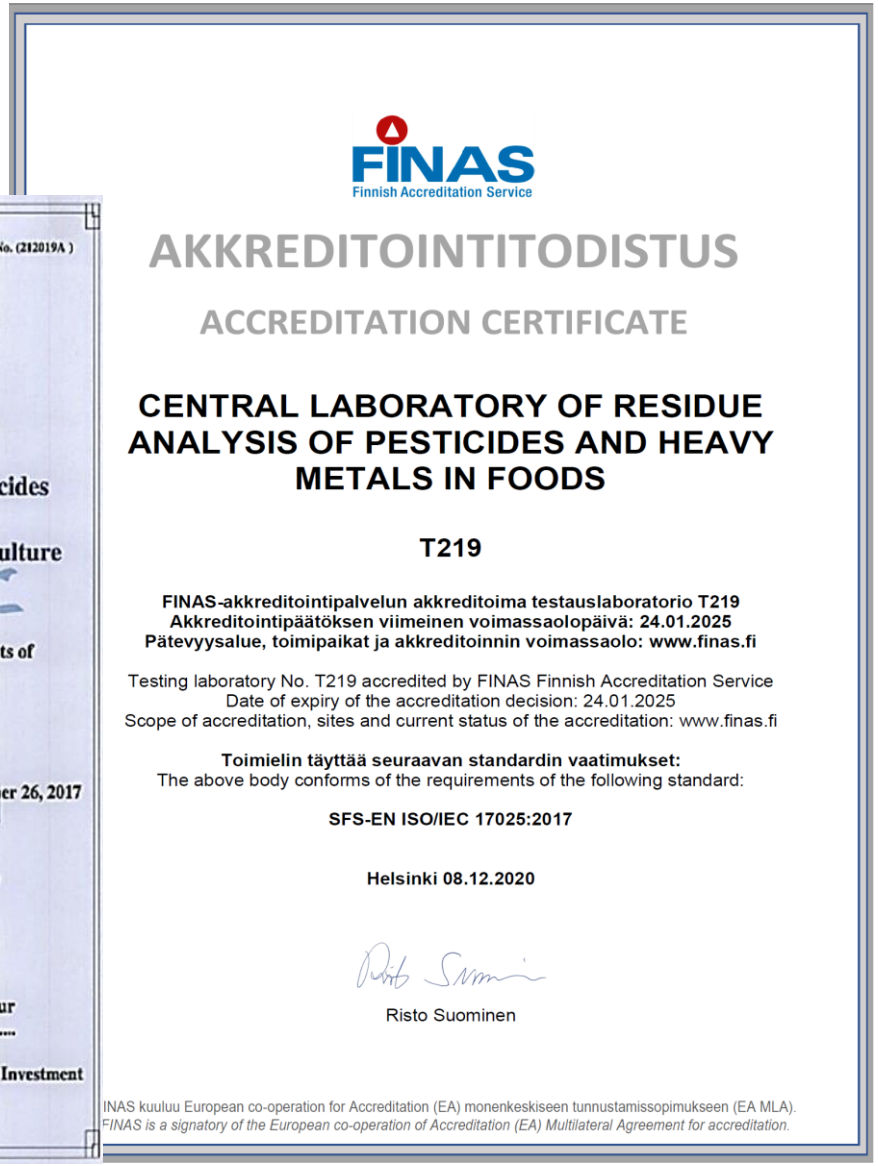
وعلى موافقة مجلس إدارة الهيئة القومية لسلامة الغذاء بجلسته المُنعقدة فى ٢٠٢٢/٣/٩ بشأن اعتماد القاعدة الفنية الملزمة للحدود القصوى المسموح بها للملوثات الكيميائية بالغذاء ؛

QCAP, Accreditation

Since 1996, QCAP Lab has been awarded the International Accreditation by the Finland accreditation body, Finnish Accreditation Service (FINAS) based on **ISO/IEC 17025;2017 Standard**.

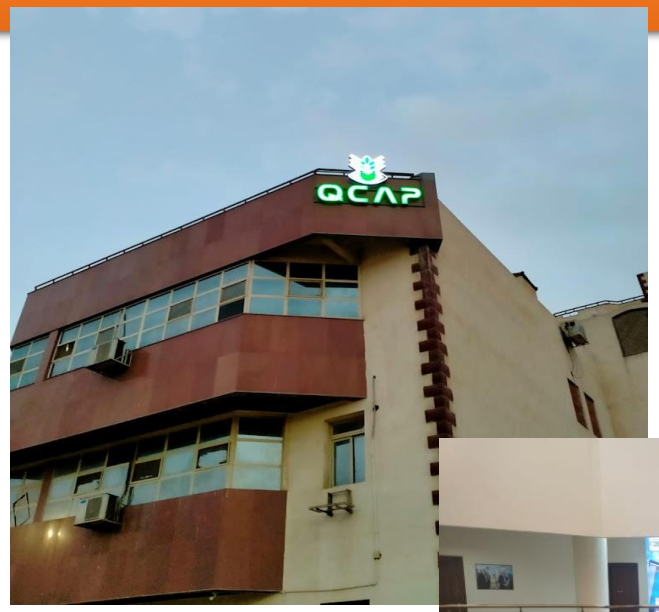
QCAP also accredited based on **ISO/IEC 17025;2017 Standard from both EGAC and A2LA**

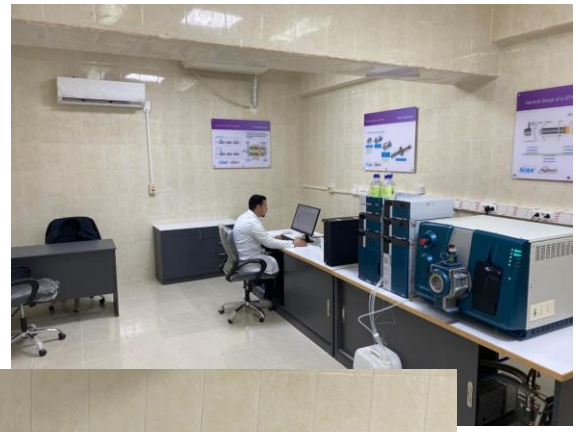




QCAP new branch

QCAP Ismailia





Central Laboratory of Residue Analysis of Pesticides and Heavy Metals in Food

THANK YOU

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