Cursos *e-learning* sobre Composição de Alimentos

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Doutor Ricardo Jorge

Sumário

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- Curso *e-learning* FAO/INFOODS
  - Conteúdo
  - Objetivos
  - Funcionalidades
- Cursos *e-learning* EuroFIR
  - Conteúdo
  - Objetivos
  - Funcionalidades
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Importância dos dados da Composição dos Alimentos

Sem dados da composição dos alimentos os países não podem:

- Avaliar a **ingestão de nutrientes** pelas suas populações de forma a estabelecer **necessidades** de determinados **nutrientes;**
- **Produzir rótulos** exatos (cálculo da informação no rótulo sobre os ingredientes é frequentemente produzida a partir de dados TCA/BDCA);
- Realizar **estudos epidemiológicos** sobre as relações entre a ingestão do nutriente e a doença;
- Promover **alimentos vegetais e animais** com **bons perfis nutricionais** através de programas de educação nutricional e incluí-los nos programas de melhoramento agrícola/animal;
- **Formular dietas** institucionais e terapêuticas nutricionalmente equilibradas;
- **Informar os consumidores** sobre **boas escolhas alimentares.**

Princípios de utilização correta de TCA/BDCA

Que princípios devem os utilizadores aplicar para uma utilização correta de TCA/BDCA?

Devem **conhecer a influência** da **descrição do alimento** e **definição dos componentes**, **unidades** e **método analítico** nos **diferentes valores** dos **nutrientes.**

Assim, **antes de utilizar qualquer dado** de uma **TCA/BDCA**, um **utilizador** deve **estudar cuidadosamente** a **documentação** dos dados.

Dados não documentados NÃO devem ser utilizados

Um **utilizador avançado** é capaz de **reconhecer** a **qualidade** dos **diferentes dados** e deve ser capaz de **compilar** e **documentar** uma base de dados incluindo o cálculo dos **valores dos nutrientes** de alimentos cozinhados e de pratos multi-ingredientes.

Composição dos Alimentos: o que realmente significa

Milho não á apenas "milho" em composição de alimentos.
Os teores dos nutrientes no milho variam com:

GENÉTICA
variedade ou cultivar

QUALIDADE dos **DADOS**
se os dados forem corretamente descritos, analisados e amostrados ex. plano de amostragem, dimensão da amostra, método analítico e desempenho do método; ou se forem corretamente descritos, calculados ou estimados

DESCRIÇÃO do **ALIMENTO**
cru, cozinhado, na espiga ou bagos, farinha, branco, amarelo

DEFINIÇÕES dos **COMPONENTES,**
métodos analíticos, unidades e formas de expressão

MÉTODOS DIFERENTES de **COMPILAÇÃO** e **DOCUMENTAÇÃO**

MÉTODOS de **CÁLCULO** das **RECEITAS**

Guias, normas, metodologias, ferramentas

O que é necessário para gerar, administrar e utilizar dados da composição de alimentos corretamente?

Necessitamos de **guias**, **normas**, **metodologias** e **ferramentas** e de pessoas capazes de as aplicar corretamente. Para desenvolver uma TCA/BDCA também são necessários **dados** de composição de **elevada qualidade**.

Formação

Onde é que os profissionais podem aprender sobre dados de composição de alimentos?

Bem, há diferentes formas:

- em universidades ou escolas
- cursos de formação internacionais de composição de alimentos
- guias sobre composição de alimentos da FAO/INFOODS e do EuroFIR

- **Curso *e-learning* FAO/INFOODS, sobre dados de composição de alimentos, setembro 2013**
- **Cursos *e-learning* EuroFIR, sobre composição geral e vitaminas, 2009**

Destinatários e Objetivos

Destinatários

- nutricionistas,
- dietistas,
- investigadores,
- epidemiologistas,
- analistas,
- especialistas em desenvolvimento de produtos
- fabricantes,
- técnicos de planeamento agrícola,
- especialistas em segurança alimentar,
- …

Objetivos

Disponibilizar **conhecimento relacionado** com **gestão**, **análise** e **atualização** de **bases** de **dados** de **composição** de **alimentos**.

Inclui também teoria sobre alimentos, nutrientes, química, amostragem, métodos analíticos, qualidade dos dados, nomenclatura, classificação e identificação.

Vantagens do *e-learning*

1. **Permite chegar** a um **público-alvo mais amplo** possibilitando o acesso de indivíduos dispersos geograficamente, é adequado para formação por conta própria e permite um estudo no local e hora mais conveniente para o utilizador

2. **Proporciona** uma base de ***e-learning*** utilizável **ao ritmo de cada um:**
   - tutoriais para aprendizagem com base em *pdf* e *Internet*
   - exercícios com várias opções / escolha múltipla

3. **Recupera-se** facilmente o **investimento:**
   - Custos de produção de um curso *e-learning* são muito mais baixos que os presenciais
   - *E-learning* pode chegar a milhares de indivíduos
   - *E-learning* em combinação com cursos presenciais reduz o tempo e custos dos *workshops*

FAO/INFOODS
Custo 120 000 €
(= custo de produção de um curso internacional FoodComp)

Curso *e-learning* FAO/INFOODS

- **14 lições em 5 unidades**
- Baseado no ***Food Composition Study Guide*** da **FAO/INFOODS** e outros documentos, ex. “Food composition data” de Greenfield e Southgate
- Cada lição inclui:
  - **Duração**
  - **Objetivos**
  - **Conteúdo interativo** para **utilização autónoma**, incluindo *pop-ups*, ligações a *web-sites* ou documentos PDF
  - **Exercícios** com comentários e correções das respostas
  - **Resumo**
  - **Recursos**

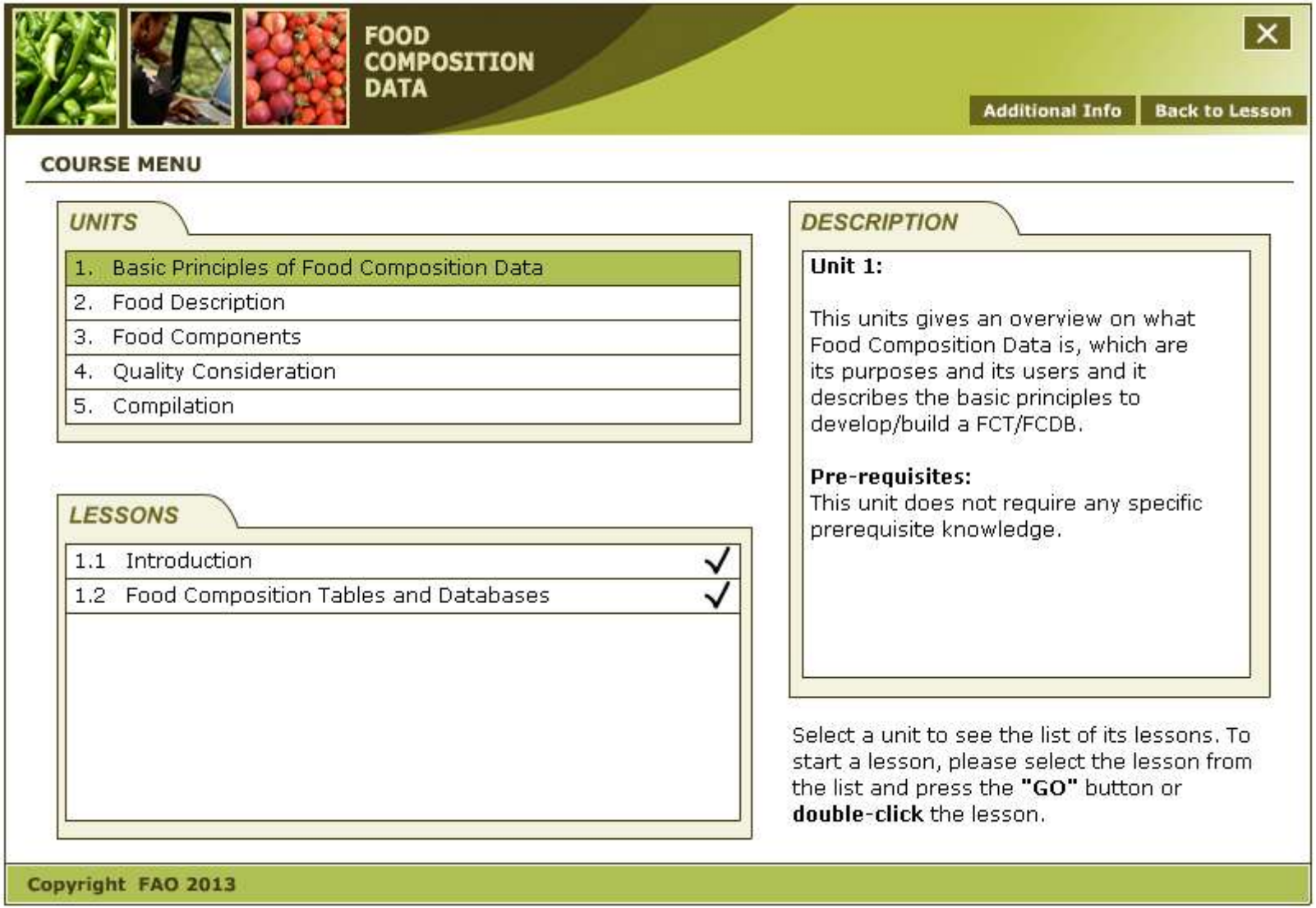
Visão geral do curso

O curso tem **5 unidades** através das quais o formando aprende a utilizar os dados da composição de alimentos corretamente:

- na **Unidade 1** os **objetivos** e **princípios básicos** de **TCAs/BDCAs.**
- na **Unidade 2** a influência e importância da **descrição** correta do **alimento.**
- na **Unidade 3** a importância da **definição** correta do **componente**, **método analítico**, **expressão, unidade** e **denominador** no valor quantitativo do nutriente.
- na **Unidade 4** a diferenciação da **qualidade** de dados diferentes tendo em consideração a biodiversidade.
- na **Unidade 5** a **compilação** e **documentação** da base de dados incluindo o cálculo dos valores dos nutrientes de alimentos cozinhados e pratos multi-ingredientes.

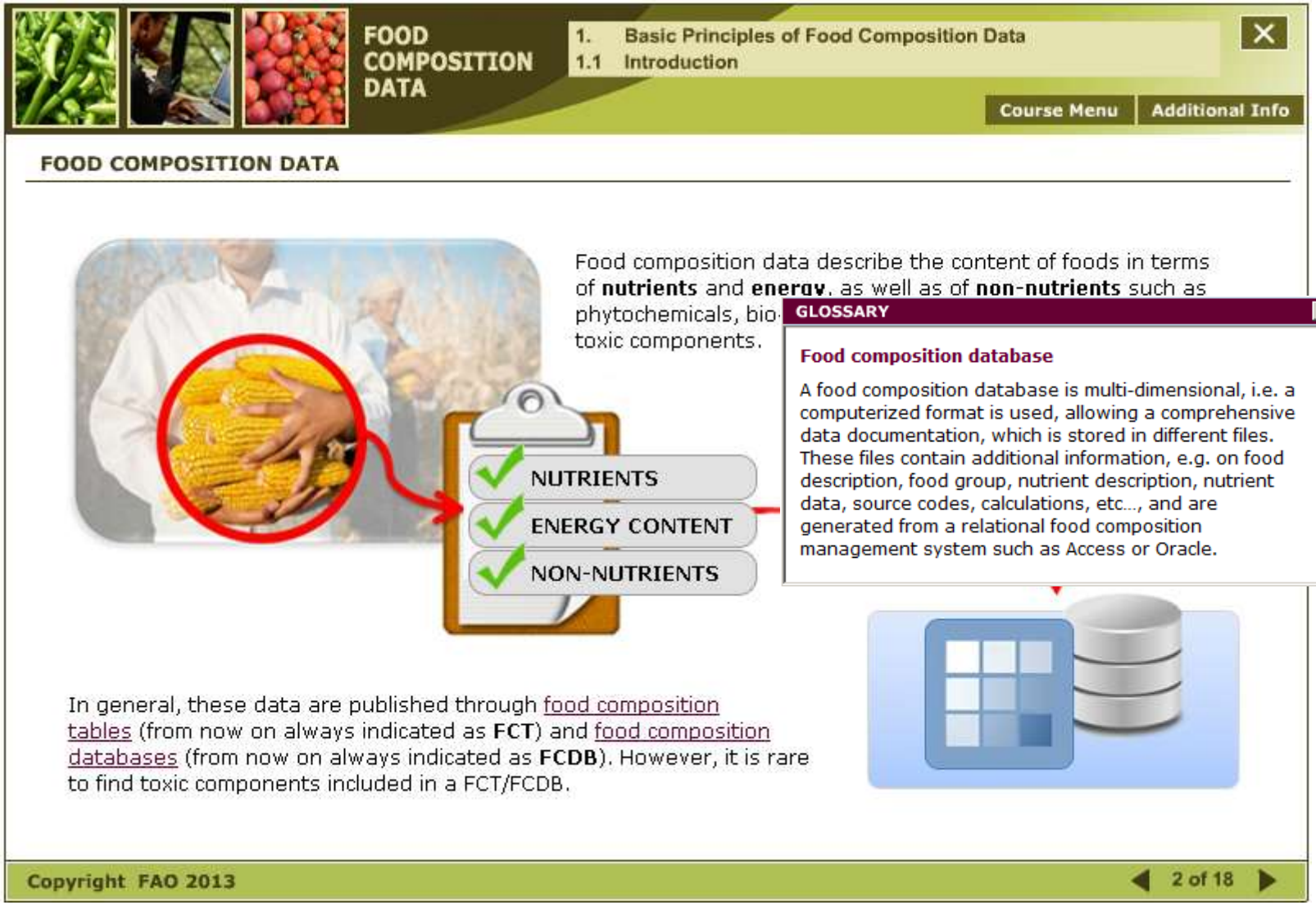
Visão global e estrutura do curso

Menu do curso

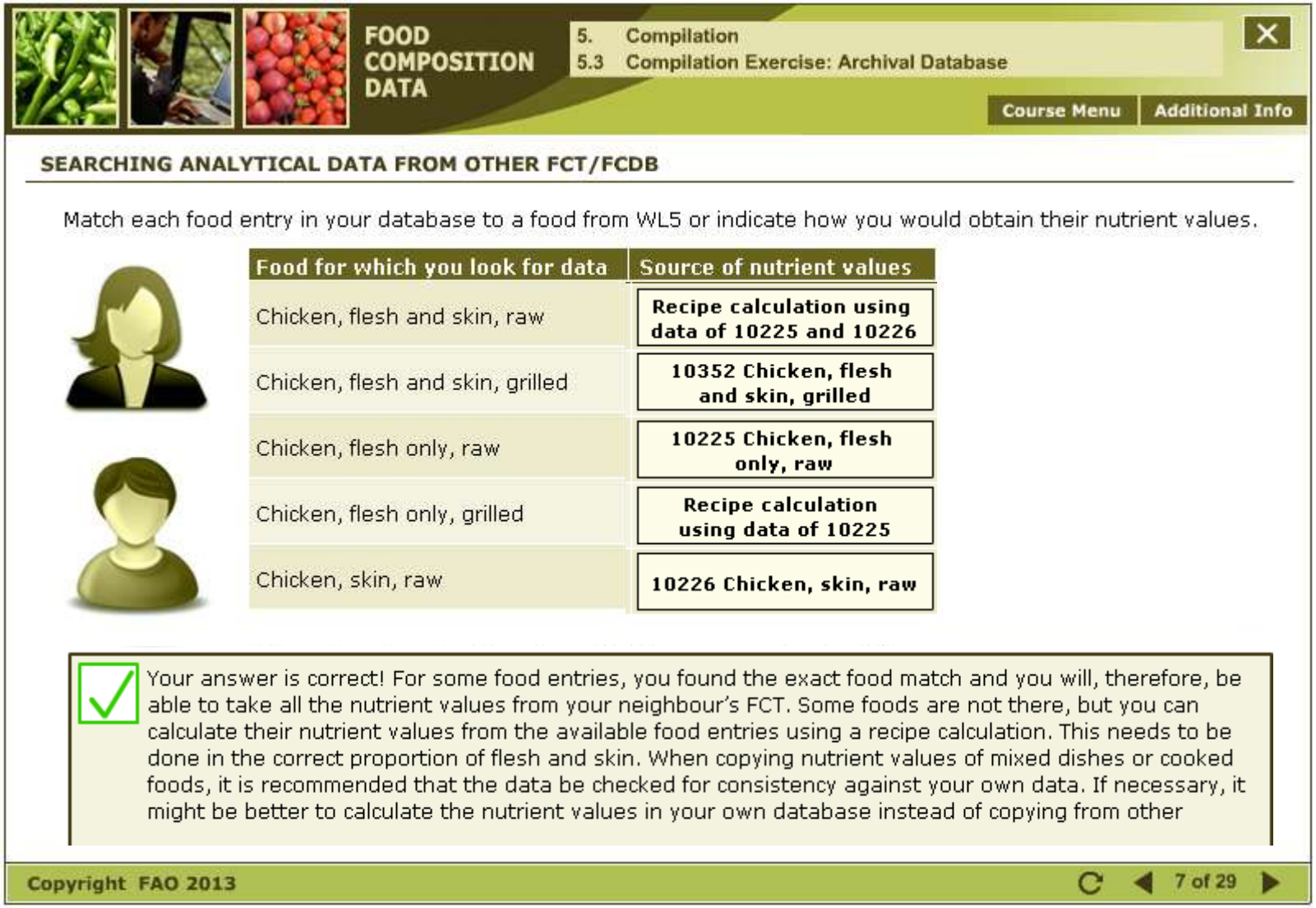


Objetivos da aprendizagem

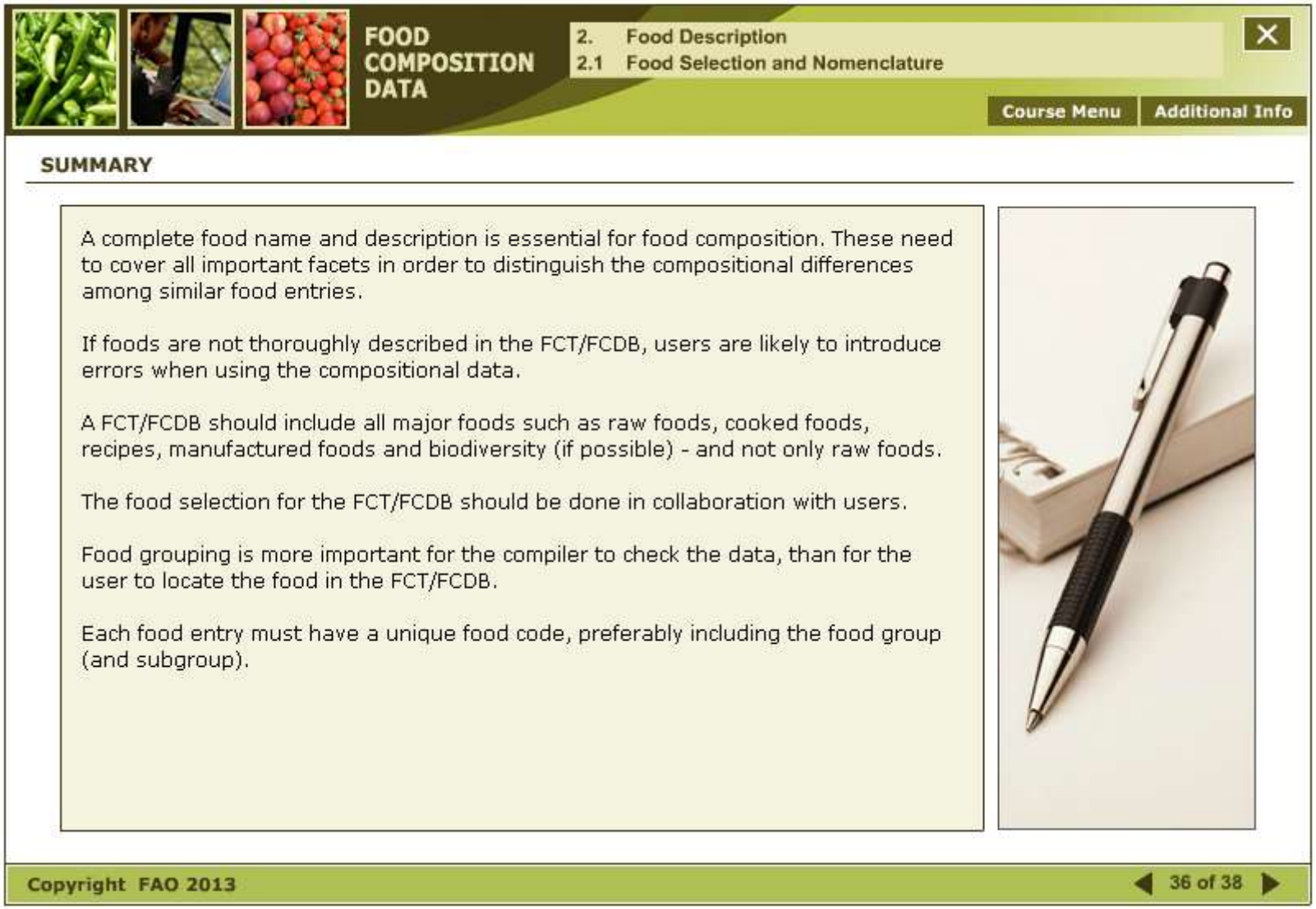
Conteúdo da lição



Exercícios interativos



Síntese


FOOD COMPOSITION DATA
2. Food Description
2.1 Food Selection and Nomenclature
Course Menu
Additional Info
SUMMARY
A complete food name and description is essential for food composition. These need to cover all important facets in order to distinguish the compositional differences among similar food entries.
If foods are not thoroughly described in the FCT/FCDB, users are likely to introduce errors when using the compositional data.
A FCT/FCDB should include all major foods such as raw foods, cooked foods, recipes, manufactured foods and biodiversity (if possible) - and not only raw foods.
The food selection for the FCT/FCDB should be done in collaboration with users.
Food grouping is more important for the compiler to check the data, than for the user to locate the food in the FCT/FCDB.
Each food entry must have a unique food code, preferably including the food group (and subgroup).
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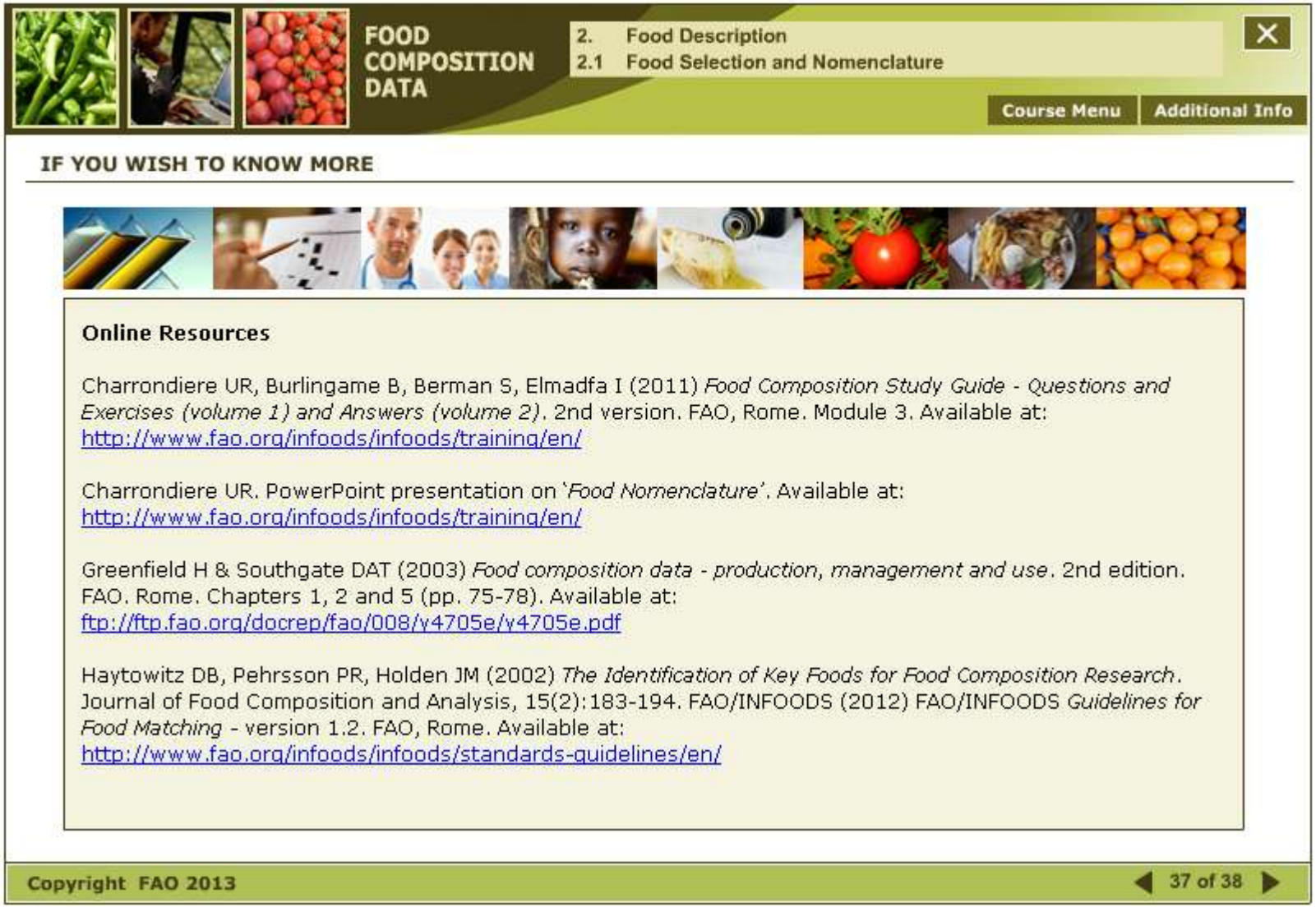
Recursos


FOOD COMPOSITION DATA
2. Food Description
2.1 Food Selection and Nomenclature
Course Menu
Additional Info
IF YOU WISH TO KNOW MORE
Online Resources
Charrondiere UR, Burlingame B, Berman S, Elmadfa I (2011) Food Composition Study Guide - Questions and Exercises (volume 1) and Answers (volume 2). 2nd version. FAO, Rome. Module 3. Available at: http://www.fao.org/infoods/infoods/training/en/
Charrondiere UR. PowerPoint presentation on 'Food Nomenclature'. Available at: http://www.fao.org/infoods/infoods/training/en/
Greenfield H & Southgate DAT (2003) Food composition data - production, management and use. 2nd edition. FAO. Rome. Chapters 1, 2 and 5 (pp. 75-78). Available at: ftp://ftp.fao.org/docrep/fao/008/y4705e/y4705e.pdf
Haytowitz DB, Pehrsson PR, Holden JM (2002) The Identification of Key Foods for Food Composition Research. Journal of Food Composition and Analysis, 15(2):183-194. FAO/INFOODS (2012) FAO/INFOODS Guidelines for Food Matching - version 1.2. FAO, Rome. Available at: http://www.fao.org/infoods/infoods/standards-guidelines/en/
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Divulgação

- Gratuito
- Versão *online* disponível no site INFOODS http://www.fao.org/infoods/infoods/training/en/
- Pedido do CD para o *site* acima

Módulos *e-learning* EuroFIR

EuroFIR
European Food Information Resource

http://www.eurofir.org/e-learning

Destinatários

Compiladores e utilizadores de informação sobre composição de alimentos que pretendam aprofundar conhecimentos sobre os princípios, pontos fortes e limitações dos métodos utilizados para determinar:

Análise de nutrientes
(composição macronutrientes)
Introdução
Gorduras e ácidos gordos
Hidratos de carbono e fibra
Proteínas e amino ácidos
Elementos minerais

Vitaminas (composição micronutrientes)
Introdução
Vitaminas em alimentos - diferentes formas e características
Métodos – visão global
Vitaminas hidrossolúveis - Análise de vitaminas B_2, B_1, B_6, folatos e vitamina C
Vitaminas lipossolúveis - Análise de vitaminas A, D e E
Resumo

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Análise de nutrientes

EuroFIR
European Food Information Resource

Nutrient-Analysis for non-chemists

Save and close | Glossary

- Introduction
  - Welcome
  - Learning goals
  - Food composition databases
  - Nutrient analysis
  - Data quality
  - Overview cases
- Case 1: Fats & fatty acids
- Case 2: Carbohydrates & fibres
- Case 3: Proteins & amino acids
- Case 4: Elements

Welcome to the EuroFIR module: Nutrient-Analysis for non-chemists

Audience:
This module is intended for non-chemists who are involved in Food Composition DataBase (FCDB) programs or users of FCDBs who want to know more about the principles, strengths and limitations of analysis methods frequently used to determine macronutrient composition of foods. **Enjoy your study!**

Case 1
Fats & fatty acids

Case 2
Carbohydrates & dietary fiber

Case 3
Proteins & amino acids

Case 4
Elements

Authors:
- M.C. Busstra, PhD. Division of Human Nutrition, Wageningen University, The Netherlands
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Development and visual design by:
- Topshare international BV, Wageningen, The Netherlands

Copyright:
- EuroFIR Network of Excellence.

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We would like to thank Lucy Elburg (Wageningen University, Division of Human Nutrition) for her valuable comments and assistance.

Introdução – metas do curso

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Nutrient-Analysis for non-chemists

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  - Nutrient analysis
  - Data quality
  - Overview cases
- Case 1: Fats & fatty acids
- Case 2: Carbohydrates & fibres
- Case 3: Proteins & amino acids
- Case 4: Elements

Introduction > Learning goals

Case 1
Fats & fatty acids

Case 2
Carbohydrates & dietary fiber

Case 3
Proteins & amino acids

Case 4
Elements

- To understand the principles, characteristics, strength and limitations of frequently used methods for measuring macronutrient composition of foods.
- To interpret laboratory results of food analysis and determine if these data are of sufficient quality to include them in a FCDB.
- To communicate with laboratory workers about analysis methods and results.

Outline of the module:
General introduction (study time 30 min - 1 hour)
This gives a short introduction to Food Composition Data and data quality.

Cases *(study time 2 – 8 hour per case, depending on your prior knowledge)*
The main part of this module consists of several cases. Each case focuses on the analysis of a specific (macro) nutrient.

In the cases you will find several interactive exercises and questions which help you to understand the contents of the module. They are not intended as a kind of exam. So feel free to play around with the exercises and feel not depressed if you give wrong answers, but use your mistakes to learn from. For some exercises you need to use food composition data. Therefore it is recommended to have a food composition database at hand while studying the cases.

Glossary
The glossary contains additional explanations and definitions of several concepts mentioned in the case.

Additional study material
It is recommended to use the book 'Food composition data, production, management and use' of Greenfield and Southgate as reference. In the cases you will be referred to specific chapters of this book.
English part 1 [pdf 364Kb]

Introdução – qualidade dos dados

EuroFIR European Food Information Resource

Nutrient-Analysis for non-chemists

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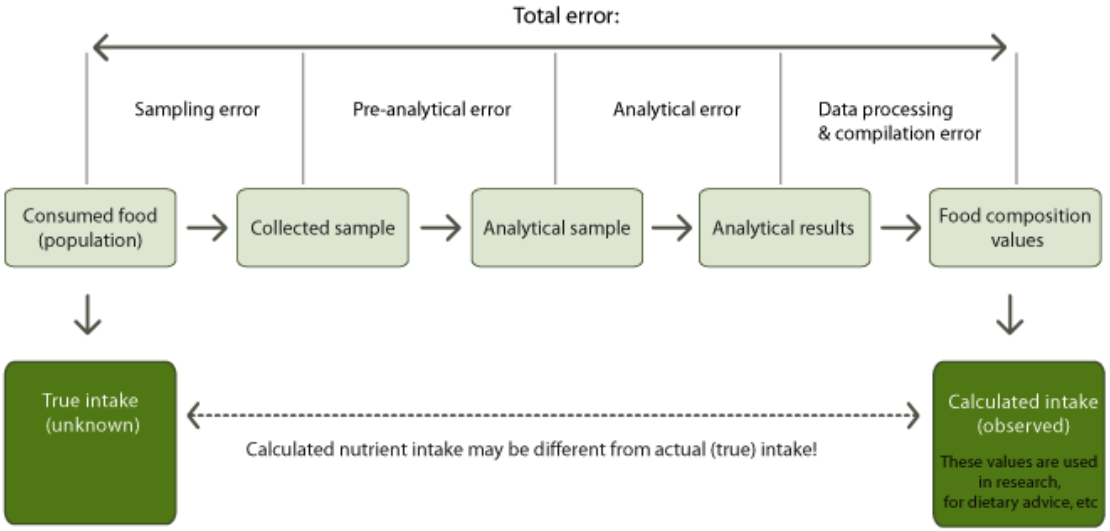
- Case 3: Proteins & amino acids
- Case 4: Elements

Introduction > Data quality > Page (1/3)

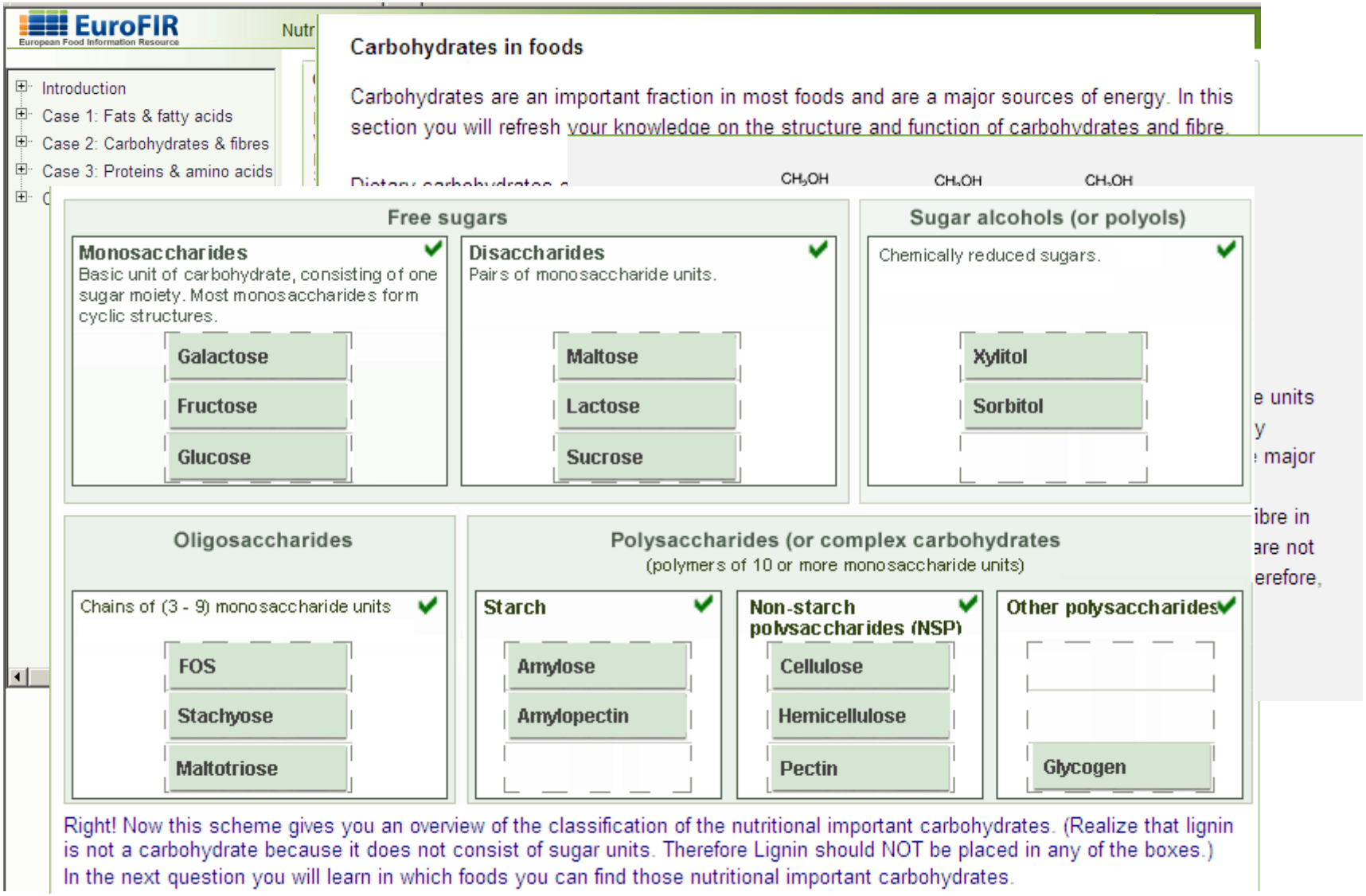
The following examples illustrate why insight into the quality of the data in a FCDB is important.

In the scheme below you can see that because of errors in food composition databases, the true (but unknown) nutrient intake of a population may differ from the nutrient intake that is observed (calculated) using food composition data.

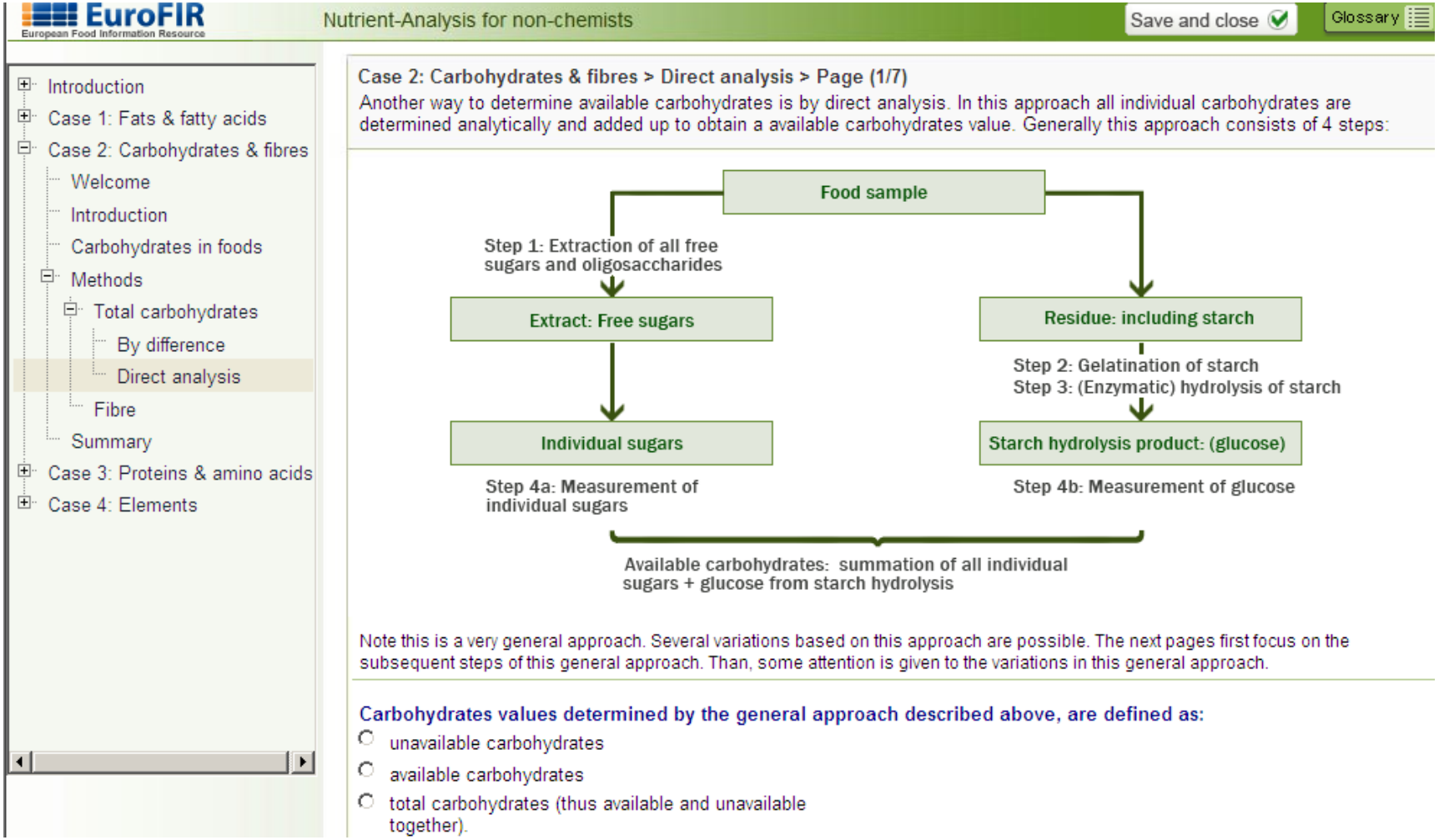


Go to the next page to study examples of the consequences of errors in FCDB on
(1) epidemiological research results,
(2) individual dietary advice and
(3) public health decisions.

Hidratos de carbono - exercícios



Hidratos de carbono - métodos



Hidratos de carbono - síntese

Case 2: Carbohydrates & fibres > Summary > Page (1/2)

Summary and additional literature

This case covered the general principles of carbohydrate and fibre analyses. Carbohydrates can be divided into several classes which each have their characteristic chemical and nutritional properties. To measure all the individual carbohydrate classes a broad range of methods should be used. Not all methods were covered in detail in this case. The literature below can be used to get more detailed insight into classification and analysis of carbohydrates.

Overview of carbohydrate analysis methods that are often used for FCDBs:

- Greenfield and Southgate. Food composition data, production, managements and use. Chapter 7 page 111-120

Overview papers on classification and measurement of carbohydrates:

- Cummings, JH and Stephen, AM. Carbohydrate terminology and classification. European Journal of Clinical nutrition (2007); 61 (Suppl 1), S5-S18
- Englyst, KN et al. Review: Nutritional characterization and measurement of dietary carbohydrates. European Journal of Clinical nutrition (2007); 61 (Suppl 1), S19-S39
- Monro, J and Burlingame, B. Carbohydrates and related food components: INFOODS tagnames, meaning and uses. Journal of food composition and analysis 9. 100-1108 (1996)
- Carbohydrates in human nutrition. FAO Food and nutrition paper (1997)

For a complete overview of carbohydrate analysis and detailed technical procedures:

- D.A.T Southgate. Determination of food carbohydrates. Second edition, Elsevier Applied Science, London, 1991.

Análise de vitaminas

- Welcome
- Outline
- Introduction
- Vitamins in foods
- Methods
- Water-soluble vitamins
- Fat-soluble vitamins
- Summary

Welcome to the case on vitamins

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Cornelia Witthöft (PhD) of Swedish University of Agricultural Sciences, Uppsala
Paul Finglas (PhD), Institute of Food Research, Norwich

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Vitaminas

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Vitamins > Outline

Vitamins

Vitamins are organic compounds that are required in small amounts in the diet to maintain essential body functions because humans cannot synthesize these compounds, or not in sufficient quantities.
In this case we focus on vitamin analysis. The aim is to provide you with an enhanced understanding of how vitamin content values reported in food composition databases are established.

NOTE: all of the methods for vitamin analysis discussed in this case are recommended by the European Committee for Standardization (CEN).

Chapters

1. Introduction

2. Vitamins in foods
   In this section you will learn about different forms and characteristics of vitamins as they appear in foods.

3. Methods
   Overview of the methods and procedures used to analyse vitamins in foods.

4. Water-soluble vitamins
   Analysis of vitamin B2, B1, B6, folate, and vitamin C.

5. Fat-soluble vitamins
   Analysis of vitamin A, D and E.

6. Summary

Vitamina E (1)

EuroFIR Vitamin analysis for non-chemists

Save and close | Glossary

Vitamin E *By HPLC*

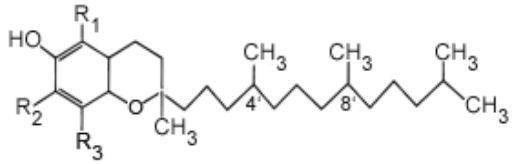
Vitamin E is the collective term for 8 fat-soluble compounds with similar biological activity as alpha-tocopherol.

Present in foods as:
- α-, β-, γ- and δ-tocopherol
- their unsaturated α-, β-, γ- and δ-tocotrienols.

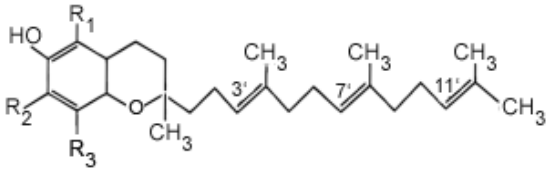
Sensitive to:
light, oxidation, heat, metals, free radicals.

Vitamin E is stable to heat and alkali (used during saponification) in the absence of oxygen.

Tocopherols



Tocotrienols



Trivial name	Ring position			Vitamin E activity
	R1	R2	R3	
α-tocopherol	CH_3	CH_3	CH_3	1.0
β-tocopherol	CH_3	H	CH_3	0.4
γ-tocopherol	H	CH_3	CH_3	0.08
δ-tocopherol	H	H	CH_3	0.01

Vitamin E is measured as α-, β-, γ- and δ-tocopherol.

The total vitamin E activity can be calculated by taking the sum of the individual tocopherols, taking into account the individual vitamin activity of each.

***Note** that there is no consensus between different FCDB on the value and use of these individual activity factors.*

Vitamina E (2)

EuroFIR Vitamin analysis for non-chemists

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  - vitamin D
  - vitamin E
    - Page (1/3)
    - Page (2/3)
    - Page (3/3)
- Summary

Vitamins > vitamin E > Page (2/3) Analytical process

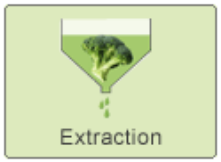
Steps in the analysis of vitamin E

Depending on the food source, vitamin E samples are saponified or directly extracted and injected onto the HPLC column.

Saponification

Extraction of oils

Oils (and fats with low water content) containing vitamin E can directly be injected into an HPLC column after dilution with n-hexane or another solvent. (this procedure applies only to samples containing unesterified tocopherols)


Extraction

Extraction of other foods

1. Saponification

The food matrix and ester bonds are broken down by alkaline hydrolysis.

2. Solvent extraction

Extract vitamin E from the saponified sample by means of a suitable solvent or solvent mixture (e.g. diethyl ether, petroleum or toluene).

Then the extract is evaporated and redissolved in a solvent suitable for the HPLC system.

Vitamina E (3)

EuroFIR Vitamin analysis for non-chemists

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  - vitamin D
  - vitamin E
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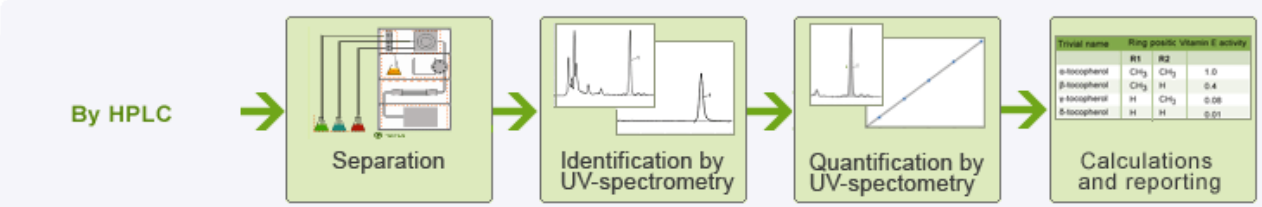
Vitamins > vitamin E > Page (3/3) — Analytical process

Determination of vitamin E



Foods may be fortified with vitamin E. Food manufacturers then use esterified alpha-Tocopherol. It is used because esterified tocopherols are more stable than the parent compounds.

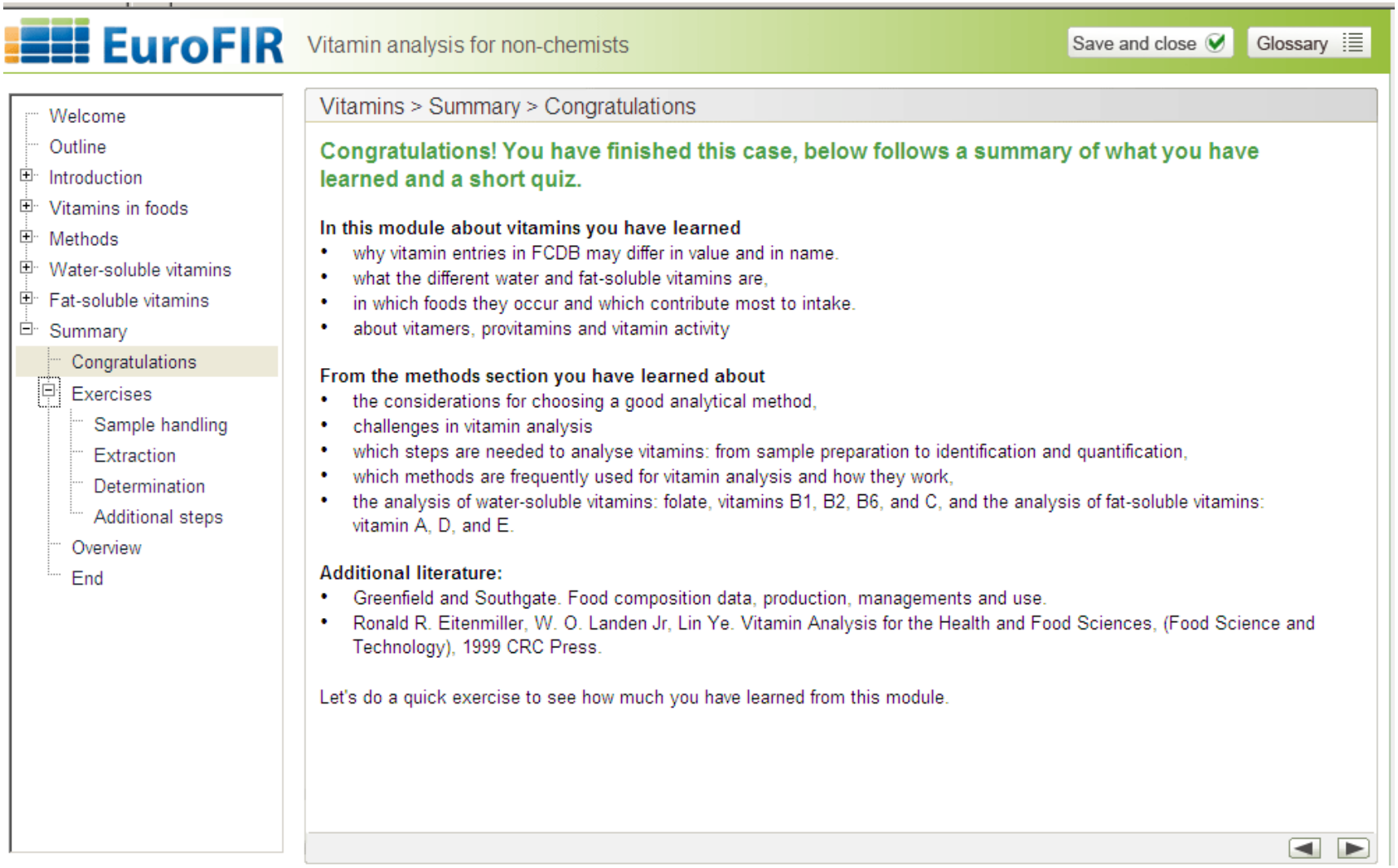
A laboratory bought an oil from the supermarket and analyzed it for vitamin E content. The lab diluted the sample with n- hexane, and directly injected it into the HPLC column. The tocopherols were subsequently measured. The label of the oil claimed that it contained 140 mg vitamin E/100 g. The lab only found 70 mg vitamin E/100 g.

37. Which of the following statements are true?

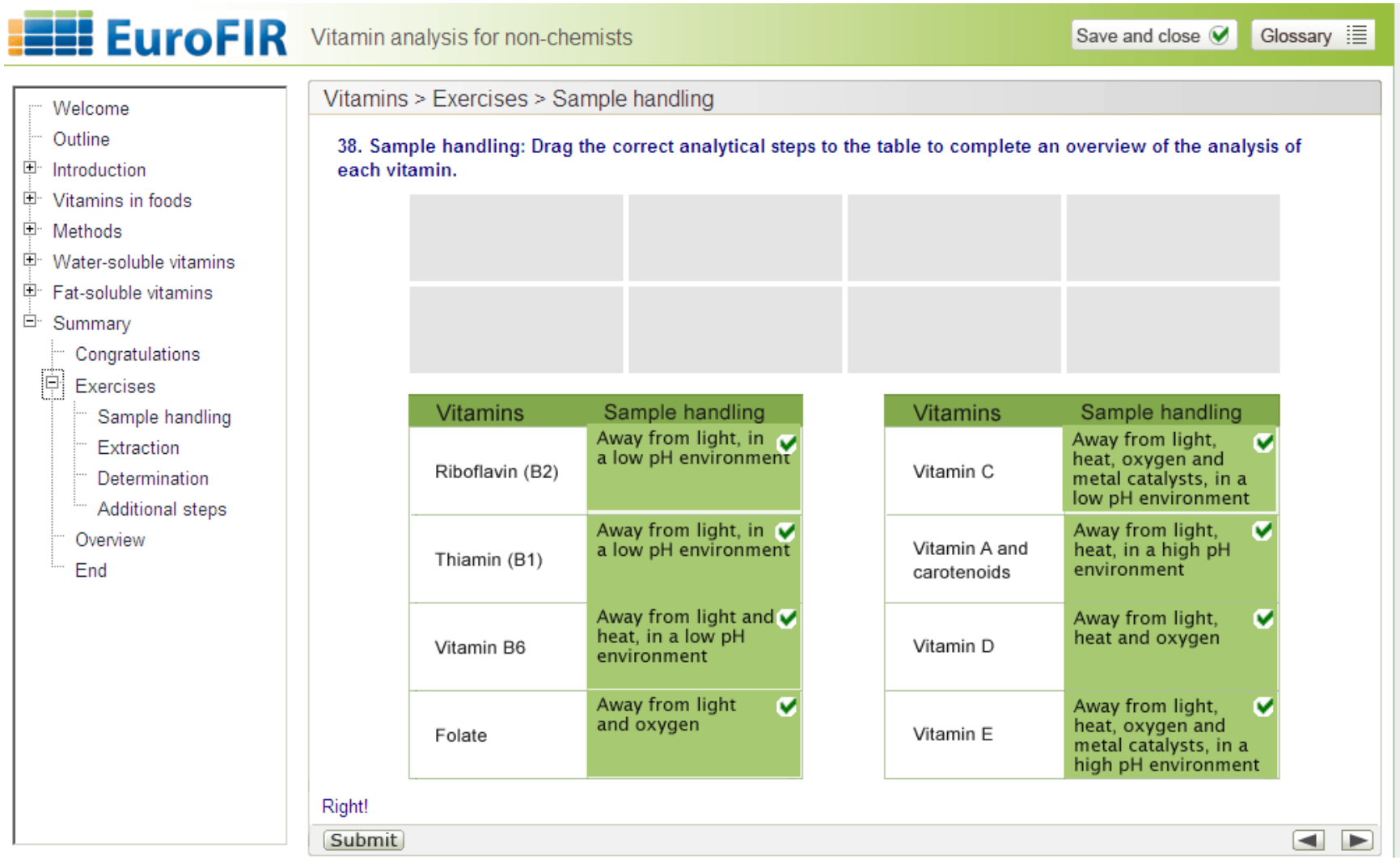
- ☐ The label is wrong
- ☐ The oil probably contains esterified tocopherols
- ☐ An error was made in the lab, so the analysis should be repeated with the same method
- ☐ The oil should have been saponified before extraction

Submit

Vitaminas - resumo



Vitaminas – manuseamento amostras



Conclusões

Os cursos de *e-learning* são um precioso auxiliar:

- em ambiente laboral, para todos os envolvidos, direta ou indiretamente, em questões relacionadas com a composição dos alimentos;
- em universidades, para permitir que as futuras gerações tenham conhecimentos básicos sobre composição de alimentos.

Valorização da importância, disponibilidade e utilização correta dos dados da composição de alimentos.

Obrigada pela vossa atenção!