Higiene e Segurança Alimentar

Segurança em casa e em serviços alimentares

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Difícil aplicar HACCP

- programas simplificados baseados em HACCP
- "Guidance to governments on the application of HACCP in small/less developed food businesses"
- http://www.fao.org/3/a-a0799e.pdf

2

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Casa

- OMS - “Cinco chaves para uma alimentação mais segura”
- https://cdn.who.int/media/docs/default-source/food-safety/five-keys-to-safer-food-poster/5keys-portuguese.pdf?sfvrsn=5d2a6447_2

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Pré-requisitos para Casa e Serviços de Alimentação

- organização das instalações
  - localização, arquitectura e organização dos espaços
  - FAO, OMS e autoridades têm guias específicos

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Pré-requisitos para Casa e Serviços de Alimentação

- controlo das matérias primas
  - obtidas a partir de fontes credíveis

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Pré-requisitos para Casa e Serviços de Alimentação

- higiene pessoal
  - muita manipulação manual
    - importância da lavagem; uso de luvas
  - redução de resíduos

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Pré-requisitos para Casa e Serviços de Alimentação

- manutenção e limpeza de equipamento
  - equipamentos usados para diversos alimentos
    - risco de contaminação cruzada
  - procedimentos padrão de manutenção e limpeza

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Análise de perigos em Casa e Serviços de Alimentação

- planos para grupos de produtos
  - mais simples do que para produtos individuais
  - usar planos para mesmas etapas aplicadas a diversos alimentos

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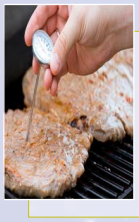

Análise de perigos em Casa e Serviços de Alimentação

- exemplo de agrupamentos
  - etapas de preparação comuns
  - diferentes opções após cozinhar

TABLE 30.3 Examples of Common Processing Steps and the Flow of Food from Receipt to Consumer (Top to Bottom of Table) during Preparation in Food Service, Retail and the Home and Food Groupings

	Food Groups			
Process Steps	**Fresh – Serve**	**Cook – Serve**	**Cook – Chill (short/ extended shelf-life)**	**Cook – Freeze**
Receive	+[a]	+	+	+
Store	+	+	+	+
Prepare	+	+	+	+
Cook[c]	–[b]	+	+	+
Cool	–	–	+	+
Assemble, fill (aseptic or non-aseptic),[c] seal, label	–	+/–	+	+
Chill	+/–	–	+	+
Freeze	+/–	–	+	+
Store/distribute	–	–	+	+
Reheat	–	–	+	+
Hot hold	–	+/–	+/–	+/–
Serve/sell	+	+	+	+
Examples	Raw oysters, sashimi, green salads, cut fruits, sliced cooked meats, cheese, meat (to be cooked by customer)	Fried chicken, hamburgers, cooked eggs, hot vegetables, stir-fries, noodle dishes	Pre-cooked meals, meats, sauces, soups, entrées, desserts, pizzas	

[a] + *Process included.*
[b] – *Process not included.*
[c] – *The product may be cooked at this step or pasteurized in packs after filling.*

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Análise de perigos em Casa e Serviços de Alimentação

- particular atenção com alimentos preparados para pessoas mais vulneráveis
  - hospitais, lares, …
- planos especiais para pessoas com intolerâncias e alergias

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Factores de risco em Casa e Serviços de Alimentação

- tratamento térmico inadequado
- armazenamento inapropriado (tempo/temperatura)
- falta de controlo das medidas de higiene
- limpeza e higienização de equipamento inadequadas
- não separação de alimentos crus e cozinhados

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Monitorização em Casa e Serviços de Alimentação

- gestores, supervisores e trabalhadores
  - conhecer o seu papel e como documentar e informar acções
  - também responsáveis por acções correctivas
  - número de envolvidos depende de dimensão do serviço

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Segurança Alimentar

HACCP

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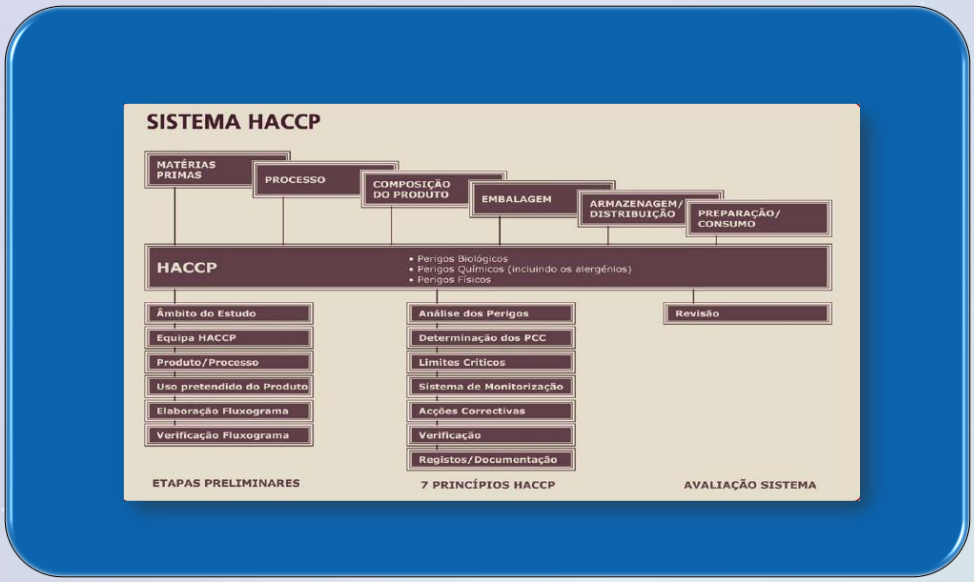

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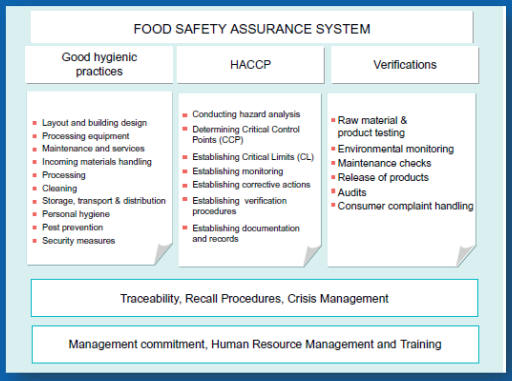

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Sistema HACCP

- **definição Comissão *Codex Alimentarius***
  - **identifica, avalia e controla perigos significativos para a segurança alimentar**
- **método mundial de referência**
- **implementado em conjunto com pré-requisitos**
  - **Boas Práticas de Higiene**

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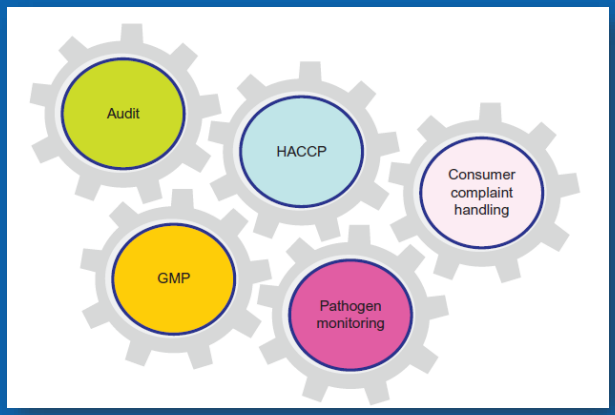
Sistema HACCP

- **abordagem integrada**



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Sistema HACCP

- **alimentos seguros para astronautas**
  - **NASA, US Army, Pillsbury Co.**
- **promovido por organizações internacionais**
  - **OMS, ...**
- **aplicado voluntariamente**
- ***Codex* reconhece validade em 1993**
  - **orientações para aplicação**
  - **referência internacional em 1995**

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Sistema HACCP

- estados membros da Organização Mundial do Comércio alinham legislação pelo *Codex*
  - excepto se provarem que *Codex* não fornece suficiente protecção
- princípios de HACCP integrados na maioria das legislações nacionais e nos padrões ISO 22000

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Sistema HACCP

- não reactivo, mas preventivo
- aplicado em 2ª linha, após aplicação de condições de higiene
  - seguido de verificação final, em última linha

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Sistema HACCP

- proactivo
  - identificação de perigos, mesmo que não se tenham verificado falhas prévias
  - útil em novas operações
- flexível
  - medidas de controlo adaptáveis a alterações no processo
- dirige recursos para pontos mais críticos
- aplicável em toda a cadeia alimentar

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Sistema HACCP

- supera maioria das limitações das abordagens tradicionais
  - inspecções
  - ensaios do produto final

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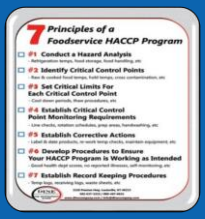
Sistema HACCP



- conduzir análise de perigos
- determinar PCCs
- estabelecer limites críticos
- estabelecer sistema de monitorização do controlo dos PCCs
- estabelecer acções de correcção para quando monitorização indicar que PCC está fora de controlo
- estabelecer procedimentos de verificação para confirmar que o sistema HACCP está a funcionar eficazmente
- estabelecer documentação sobre todos os procedimentos e registos apropriados sobre aplicação do sistema

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Sistema HACCP

- aplicação
  - 12 passos segundo orientações do *Codex*
  - formação dos diversos intervenientes
  - pré-requisitos
  - validar decisões

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Sistema HACCP

- pré-requisitos
  - empenho dos orgãos de gestão
    - recursos humanos e financeiros
  - práticas adequadas de higiene em toda a cadeia
    - ISO 22000:2018
  - investigação científica
    - dados técnicos e científicos e experiência
      - toxicologia e epidemiologia
      - epidemiologia de m.o.
      - ecologia de m.o.
      - mecanismo de formação de contaminantes

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Sistema HACCP

- pré-requisitos
  - métodos analíticos validados
  - dados sobre os níveis de ocorrência
    - avaliação da probabilidade de ocorrência dos riscos
  - determinação de níveis aceitáveis
    - autoridades
    - associações industriais

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Sistema HACCP

- estudo HACCP
  - análise de perigos e medidas de controlo
- plano HACCP
  - implementação do estudo
    - descrição dos PCCs e medidas adoptadas
  - pode existir um único plano para todo o processo ou planos para partes do processo

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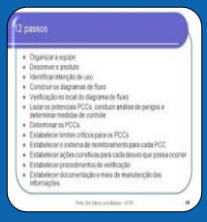
Sistema HACCP



- passos necessários à aplicação
  - juntar a equipa
    - processo multidisciplinar
    - coordenador
    - técnicos, peritos, cientistas, juristas,...
    - equipa decide âmbito do estudo
      - perigos
      - parte da cadeia alimentar a que se aplica

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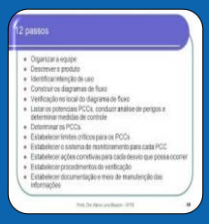
Sistema HACCP



- passos necessários à aplicação
  - descrição do produto
    - armazenamento da matéria-prima
    - passos de transformação
    - transporte e distribuição
    - utilização pelos consumidores

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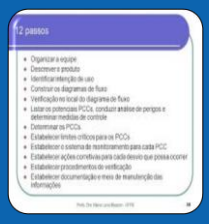
Sistema HACCP



- passos necessários à aplicação
  - identificação da utilização pretendida
    - doméstica, restauração, ...
    - posterior transformação
    - processos culinários
    - tipo de consumidores-alvo
    - região/país

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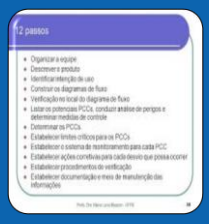
Sistema HACCP



- passos necessários à aplicação
  - elaborar um fluxograma
    - principais etapas e condições (T, pH, tempo, ...)
      - toda a cadeia alimentar
    - incluir percursos de água, ar e pessoas
    - ter em conta outras actividades desenvolvidas na instalação/edifício

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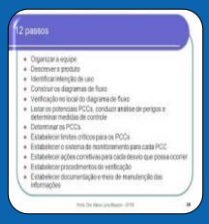
Sistema HACCP



- passos necessários à aplicação
  - verificação do fluxograma no local
    - verificar se não existem omissões
  - análise de perigos
    - listar todos os perigos potenciais
    - quais devem ser incluídos no plano
    - conhecer registos de segurança anteriores
      - surtos, contaminações
      - factores de risco
      - erros e suas causas

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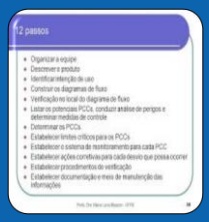
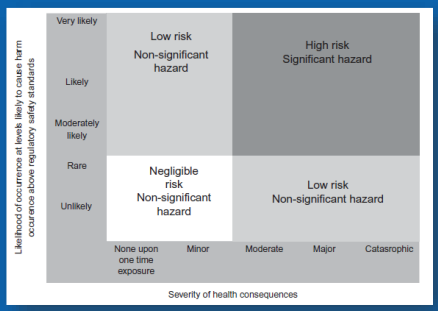
Sistema HACCP



- passos necessários à aplicação
  - na análise de perigos ter em conta
    - probabilidade de ocorrência
    - consequências para a saúde



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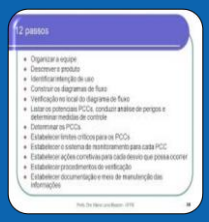
Sistema HACCP



- passos necessários à aplicação
  - perigos significativos controlados por PCCs
  - perigos não significativos monitorizados
    - garantir que risco é baixo

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- **Exemplo:**
  - **molho à base de tomate**
  1. **não se conhecem condições de produção no fornecedor de tomate**
     - ***Salmonella* é perigo significativo**
     - **cozedura do molho é medida de controlo**
       - **PCC**
  2. **fornecedor de tomate é auditado e tem garantia de segurança**
     - **risco baixo e perigo não significativo**
     - **fornecedor tem que ser auditado periodicamente**
     - **tomates periodicamente analisados para *Salmonella***
  3. **utilização de tomate de conserva**
     - **risco negligenciável**
     - **reduzida necessidade de testar**

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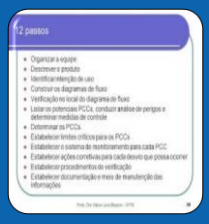
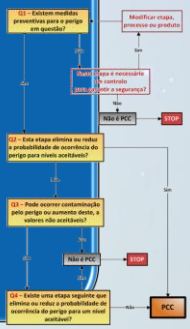
Sistema HACCP



- passos necessários à aplicação
  - **determinar PCCs**
    - **etapa em que pode existir monitorização eficaz**
    - **se um perigo significativo não puder ser monitorizado, é necessário modificar processo**
    - **utilizar árvore de decisão**



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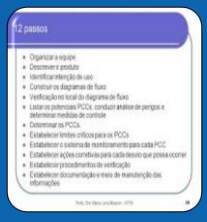
Sistema HACCP



- passos necessários à aplicação
  - estabelecer limites críticos
    - controlos físico-químicos
      - pH, a_w, temperatura, tempo/fluxo, concentração de sal, pressão
    - controlos com ensaios
      - limites máximos de resíduos
      - teores máximos de contaminantes
    - podem existir limites fora dos PCCs

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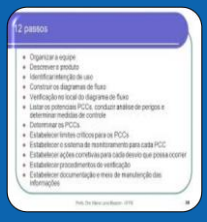
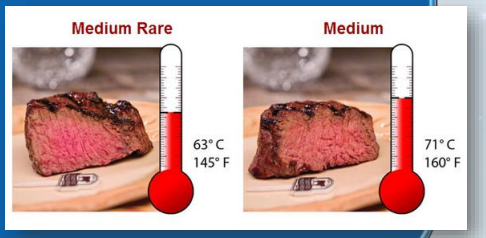
Sistema HACCP



- passos necessários à aplicação
  - limites críticos em casa e serviços de alimentação
    - mudanças de cor ou textura



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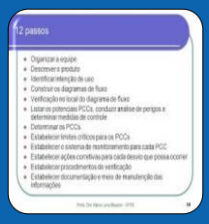
Sistema HACCP



- passos necessários à aplicação
  - estabelecer monitorização para cada PCC
    - medidas químicas, físicas ou visuais relativas aos limites críticos
    - frequência adequada à manutenção do controlo dos PCCs
    - monitorização não é exclusiva dos PCCs

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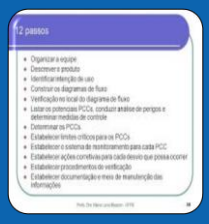
Sistema HACCP



- passos necessários à aplicação
  - estabelecer acções de correcção
    - resolver desvios quando monitorização indica perca de controlo
    - problema detalhadamente analisado
    - resolução deveria ser definitiva

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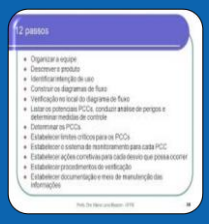
Sistema HACCP



- passos necessários à aplicação
  - estabelecer procedimentos de verificação
    - avaliações suplementares à monitorização dos PCCs
      - garantir cumprimento do plano HACCP

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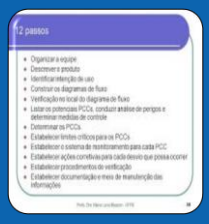
Sistema HACCP



- passos necessários à aplicação
  - actividades de verificação
    - ensaios/auditorias da matéria-prima
    - monitorização ambiental relativa a limpeza e higiene
    - calibração dos equipamentos de monitorização e outros
    - auditoria das operações
      - confirmar aplicação de programas de requisitos e sistema HACCP

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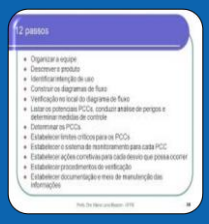
Sistema HACCP



- passos necessários à aplicação
  - actividades de verificação
    - revisão dos registos e dados de monitorização
      - confirmar que parâmetros estão sob controlo e dentro dos limites
    - ensaios do produto final
      - verificar implementação adequada e eficácia do sistema
    - verificar existência de queixas dos consumidores
    - verificar formação das pessoas envolvidas nos pré-requisitos e HACCP

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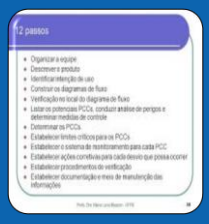
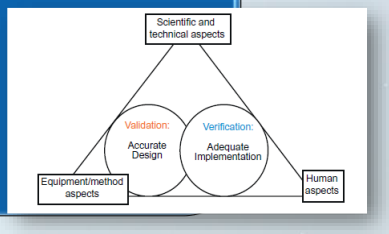
Sistema HACCP



- passos necessários à aplicação
  - validação
    - demonstrar que elementos do plano HACCP são eficazes
    - considerar
      - dados técnicos e científicos
      - adequação do equipamento usado
      - pessoal que implementa as decisões



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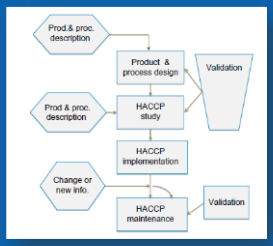
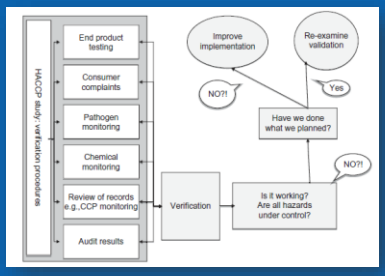
Sistema HACCP

- **validação *vs.* verificação**





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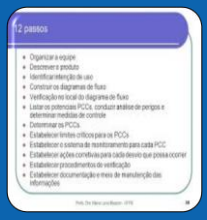
Sistema HACCP



- **passos necessários à aplicação**
  - **estabelecer documentação e registos**
    - **ajudam a manter o plano e rever decisões**
    - **demonstração das análises de perigos efectuadas**
    - **demonstração da manutenção dos controlos**
    - **ajudam na investigação de acidentes**

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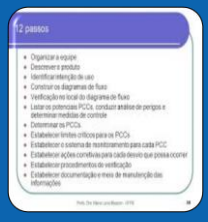
Sistema HACCP



- passos necessários à aplicação
  - exemplos de documentação
    - procedimentos e requisitos sobre boas práticas de higiene
    - estudo HACCP, plano HACCP e dados de validação
    - especificações do produto e processamento
    - indicações para fornecedores, transportadores, ...
    - relatórios de auditorias a fornecedores, transportadores e distribuidores

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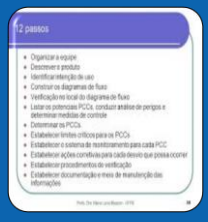
Sistema HACCP



- passos necessários à aplicação
  - exemplos de documentação
    - registos da monitorização dos PCCs, procedimentos e possíveis medidas de correcção
    - actividades de verificação e de validação
    - registos de investigação e acompanhamento de acções de correcção e/ou não cumprimento
    - registos de treino do pessoal
    - revisões periódicas do estudo HACCP e do plano HACCP

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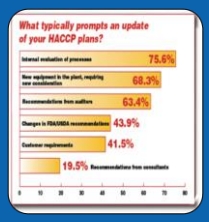
Sistema HACCP



- manutenção
  - revisão periódica do estudo HACCP
    - verificação da manutenção do sistema
    - actualização dos registos

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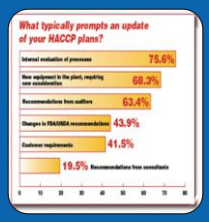
Sistema HACCP



- situações que deverão levar a reavaliação do estudo e do plano
  - alterações nos fornecedores
  - alterações no produto ou embalagem
  - alterações na linha de produção, equipamento e material
  - alterações de pessoal
  - alterações a nível ambiental
  - alterações no transporte e distribuição
  - alterações nos consumidores-alvo e modo de utilização

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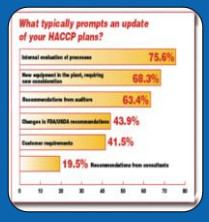
Sistema HACCP



- **situações que deverão levar a reavaliação do estudo e do plano**
  - **surgimento de novos patogénicos ou contaminantes químicos**
  - **alterações legais no local de venda**
  - **alterações na tecnologia, capacidade analítica e equipamento de monitorização**
  - **relatos de incidentes, surtos ou erros em outras indústrias ou sobre dados previamente desconhecidos**

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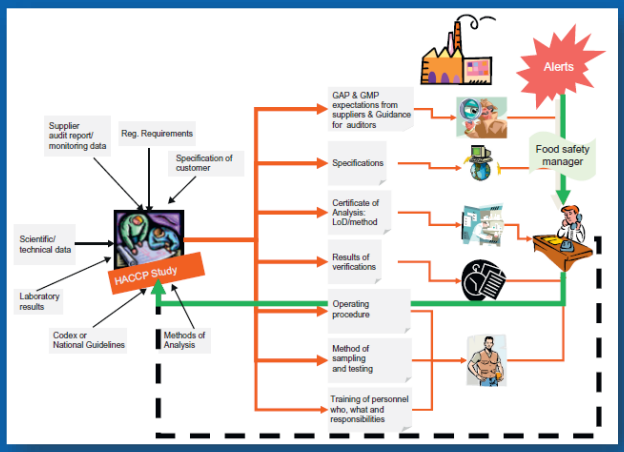
Sistema HACCP



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Sistema HACCP

- avaliação
  - realizada por auditores e outros profissionais
  - não usar apenas listas de controlo, mas também avaliação crítica

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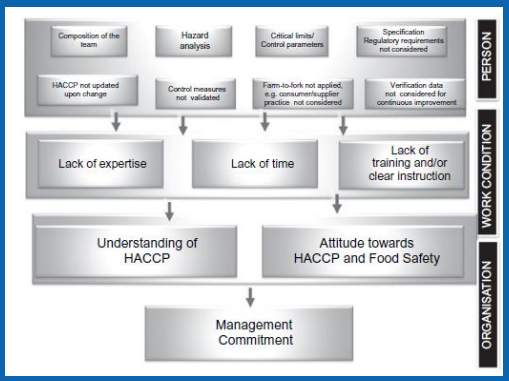
Sistema HACCP

- possíveis causas de falhas



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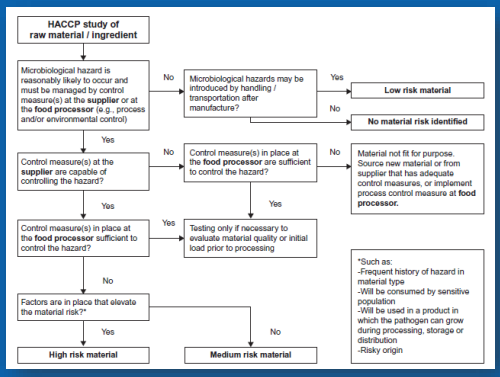
Sistema HACCP

- perigos microbiológicos
  - exemplo de árvore de decisão para matéria-prima



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Sistema HACCP

- perigos químicos
  - contaminantes ambientais
  - toxinas naturais
  - contaminantes formados durante processamento
  - contaminantes da embalagem
  - aditivos
  - agro-químicos
  - contaminantes acidentais
  - adulterantes
  - terrorismo/sabotagem

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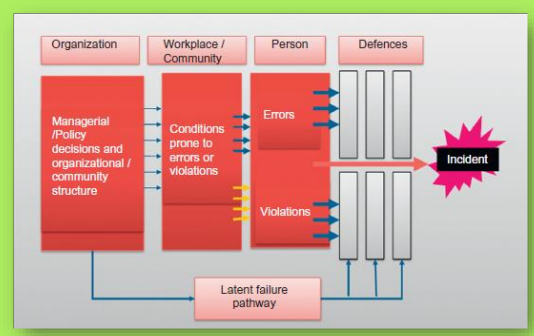
Possíveis causas de incidentes



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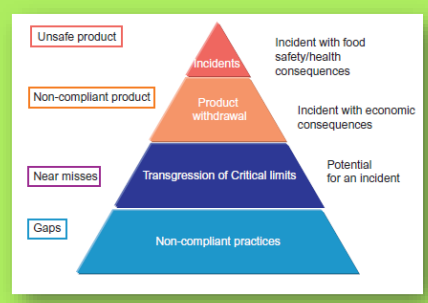
Redução do risco de incidentes



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Avaliação de sistemas de gestão de Segurança Alimentar

- auditorias
- inspecções
- avaliações internas
- avaliações externas
  - agências reguladoras
  - instituições independentes

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Avaliação de sistemas de gestão de Segurança Alimentar

- competências dos avaliadores
  - técnica
  - investigação e avaliação
  - competências inter-pessoais
  - fornecer informação verídica
  - conhecer requisitos básicos de higiene
  - conhecimento da legislação
  - conhecimento dos produtos e processos
  - conhecimento do sistema HACCP e sua aplicação
  - conhecer cultura da empresa e pessoal

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Avaliação de sistemas de gestão de Segurança Alimentar

- procedimentos de avaliação
  - planeamento
    - operações, frequência e âmbito
  - avaliação de documentos
  - avaliação no local
  - processo de avaliação
  - relatório e seguimento

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Avaliação de sistemas de gestão de Segurança Alimentar

- listas de verificação (*checklists*)
  - vantagens
    - funcionam como ajuda de memória
    - ajudam a focar os objectivos
    - funcionam como registo
    - asseguram que a avaliação é completa
    - asseguram consistência entre diferentes avaliadores
    - ajudam a comparar avaliações
    - asseguram transparência
    - criam confiança no processo de avaliação
    - ajudam na criação de bases de dados

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Avaliação de sistemas de gestão de Segurança Alimentar

- **listas de verificação (*checklists*)**
  - **limitações**
    - **mal desenhadas ou mal usadas, podem limitar iniciativa e sentido crítico da avaliação**
    - **não usar a lista sem sentido crítico**
    - **conter tópicos desnecessários ou irrelevantes ou omitir pontos críticos**

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TABLE 38.3 An Example of Checklist for the Assessment of the HACCP System

Preparatory activities	What evidence is there of management commitment to HACCP use? *HACCP team* – Who was on the team? – Are all disciplines relevant to the product in question represented? – What is the likely knowledge level of the individuals (evidence of training, qualifications, experience, etc.)? – Has external expertise been sought where necessary? – What is the decision-making leverage of the HACCP team leader? *HACCP system* – How does the system fit with the overall food safety management system? – Is HACCP included in the food safety policy? – Has the scope been clearly defined? – Are previous records of safety (e.g. incidents) known to the team? – Has the product been properly described? – Are intrinsic control measures identified? *Process flow diagram (PFD)* – Is the PFD comprehensive? – How was the PFD verified for accuracy and by whom? – Are all raw materials and process/storage activities included in the flow diagram? – Are there rework opportunities and have they been included? – Is the PFD correct? – Have changes been made since the PFD was drawn up? – How is the HACCP team notified of changes to the process or product parameters? – How were the changes recorded and approved? – Were any changes discussed with the HACCP team before implementation?
Principle 1 "Conducting a hazard analysis"	How was the hazard analysis conducted? – Have all raw materials (including rework) been included? – Have all process steps been considered? – Have the potential hazards been specifically identified by type/source or have they been generalized? – How did the team assess the likelihood of occurrence? – What information sources were utilized? – Where potential hazards have been considered as insignificant have these been validated? Have appropriate control measures (CMs) been identified for each hazard? – Will the CMs control the hazards to an acceptable level and how was this validated? – Have regulatory requirements been considered in making these decisions? – Are all the CMs in place at the plant level?
Principle 2 "Determining the Critical Control Points"	How were the CCPs identified? – By expert judgment? – By the use of a decision tree (has the decision tree been used correctly?)? – By the use of consultants? – Have all necessary CCPs been identified? – Did each identified hazard undergo a systematic consideration? – How are the hazards which are not controlled by CCPs addressed?

(*Continued*)

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Principle 3 "Establishing Critical Limits"	How were the critical limits established? – Have critical limits been established for each CCP? – What validation exists to confirm that the critical limits control the hazards identified? – Is there evidence (experimental data, literature references, etc.)? – How do they differ from operational limits?
Principle 4 "Establishing a system to monitor the control of the CCP"	Have realistic monitoring schedules been established? – Do they cover all CCPs? – Has the reliability of monitoring procedures been assessed where appropriate? – What is the status of monitoring equipment? – Is it evidenced as being in place and calibrated appropriately? – Are the CCP log sheets being used at all CCPs? – Have CCP log sheets been filled out correctly? – Is there any evidence that procedures are not being followed consistently? – Does the frequency of monitoring adequately confirm control? – Are the sampling plans statistically valid? – Are statistical process control records being used to demonstrate that the process is in control on a day-to-day basis? – Check that records agree with stated activities. Are monitoring personnel properly identified and trained? – How was the training undertaken? – Are the monitoring records being reviewed by designated appropriate reviewers? Are violations of CCPs investigated and root cause analysis made?
Principle 5 "Establishing the corrective action to be taken when monitoring indicates that a particular CCP is not under control"	– Have the corrective actions been properly defined so that control is regained? – What evidence is there to demonstrate that this is being done in the event of a CCP deviation? – Has corrective action been recorded and how is the effectiveness being verified? – How has the authority for corrective action been assigned? – How are non-conforming products controlled and is this clearly recorded? – Are there clear disposition actions listed?
Principle 6 "Establishing procedures for verification to confirm that the HACCP system is working effectively"	– Have verification procedures been clearly and appropriately established? – How are these procedures communicated through the business? – Have responsibilities for verification procedures been allocated? – Are they being carried out effectively? – Are all CCPs covered by the verification program? – Are hazards considered as non-significant validated through verification programs? – Is there a formal system to trigger amendments? – Are control parameters being achieved? – Have process capability studies been carried out? – How are the data from HACCP being used to improve the system? – Are prerequisite support systems included within the verification program? – How is consumer complaint data being used within the verification system? – Is there a regular review of CCP failure and product dispositions?

(*Continued*)

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Principle 7 "Establishing documentation concerning all procedures and records appropriate to these principles and their application"	What format is being used to document the system? – Does the documentation cover all of the HACCP system operation, including: (1) the description of the product and its intended use, (2) the process flow diagram with the location of CCPs and related parameters available, (3) the HACCP worksheets on which are mentioned the hazards, the control measures, the CCPs, the critical limits, the monitoring procedures and the corrective actions, (4) data used for validation of hazard analysis, critical limits and monitoring parameters, corrective and verification activities, (5) the list of verification activities, (6) the results of monitoring and verification of the HACCP plan, and (7) the appropriate records necessary to ensure adequacy of prerequisite programs, particularly those used for validation of hazard analysis? – How is the documentation controlled with regard to update and issue, etc.? – Are the records accessible and are they clearly identified by unique reference numbers? – Are all documents accurate and current? – How is change control managed?
Implementation	Have the HACCP plan and the prerequisites for HACCP been implemented? – Personnel are trained in managing CCPs and know what to do when the CCPs are violated. – Personnel involved in verification activities and prerequisite activities are aware of the significance of their work for supporting the HACCP system and of the importance of reporting any non-compliance.

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Futuro da Segurança Alimentar

- alterações no estilo de vida
- mulheres a trabalhar fora de casa
- produção em massa e globalização de alimentos
- viagens
  - exposição a novos alimentos e novos perigos
- evolução de padrões alimentares
- saúde pública e bem estar
- envelhecimento populacional

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Futuro da Segurança Alimentar

- novos patogénicos
  - mais bactérias, vírus, priões
- alteração na distribuição de patogénicos
  - problemas sociais, alterações climáticas e de ecossistemas
- patogénicos resistentes a antibióticos
- medidas de controlo adicionais
- outros perigos químicos
  - melamina, adulterações, ...
- perigos físicos
  - raios X, ...

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TPC

Futuro da Segurança Alimentar

- **avanços tecnológicos**
  - **robots**
  - **campos eléctricos pulsados, muito altas pressões, …**
  - **monitorização electrónica, contínua e em tempo real de PCCs**
  - **equipamento laboratorial de análise**
  - **métodos rápidos para análise microbiológica**
  - **melhores sistemas de comunicação**

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Segurança Alimentar

HACCP – Estudos de caso

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Produção primária - ovos

- perigo principal – *Salmonella enteritidis*
- perigos químicos – pesticidas, medicamentos, contaminantes ambientais
- casca – barreira física e química
- clara – actividade antimicrobiana

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Produção primária - ovos

- galinhas podem ter contaminação por *S. enteritidis* nos ovários
  - transmissão a ovos
  - transmissão cruzada a outras galinhas
- locais de criação de pintos são PCC

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Produção primária - ovos

- boas práticas de gestão para controlo de *S. enteritidis*
  - controlo de acessos
    - roupa protectora
    - lavagem de mãos
    - restringir contactos externos

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Produção primária - ovos

- boas práticas de gestão para controlo de *S. enteritidis*
  - qualidade da água
    - controlar qualidade da água regularmente
    - não colocar fonte de água junto de efluentes e dejectos
    - monitorizar pH
    - eventualmente usar Cl

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Produção primária - ovos

- boas práticas de gestão para controlo de *S. enteritidis*
  - saneamento na quinta
    - limpeza e desinfecção de edifícios e equipamentos
    - limpeza e desinfecção de sistemas de alimentação e linhas de água

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Produção primária - ovos

- boas práticas de gestão para controlo de *S. enteritidis*
  - controlo de pragas
    - roedores, insectos e animais selvagens
  - vacinação

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Produção primária - ovos

- boas práticas de gestão para controlo de *S. enteritidis*
  - análise de *S. enteritidis*
    - amostras recolhidas e analisadas regularmente
  - rações
    - garantias dos fornecedores
    - condições adequadas de armazenamento

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Produção primária - ovos

- remoção de aves mortas
  - novos métodos permitem estabilização das carcaças para as transportar para outra instalação, com reduzido risco de contaminação por patogénicos
- armazenamento e remoção de resíduos
  - remoção frequente e higiénica
  - manutenção de resíduos a pH elevado e a_w baixo ajuda a reduzir *Salmonella*

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Produção primária - ovos

- recepção de galinhas
  - chegam com 18 semanas
    - alojados no interior estão mais ao abrigo de contaminação que se criadas no exterior
  - indução da muda de penas ajuda a prolongar período produtivo
    - dependendo do método usado pode contribuir para aumentar ou reduzir *Salmonella*

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Produção primária - ovos

- recolha dos ovos
  - pode ser rápida ou demorar algumas horas
    - lavagem
    - inspecção visual
    - classificados
    - mantidos a baixa temperatura 2 – 3 dias
    - impedir condensação à superfície

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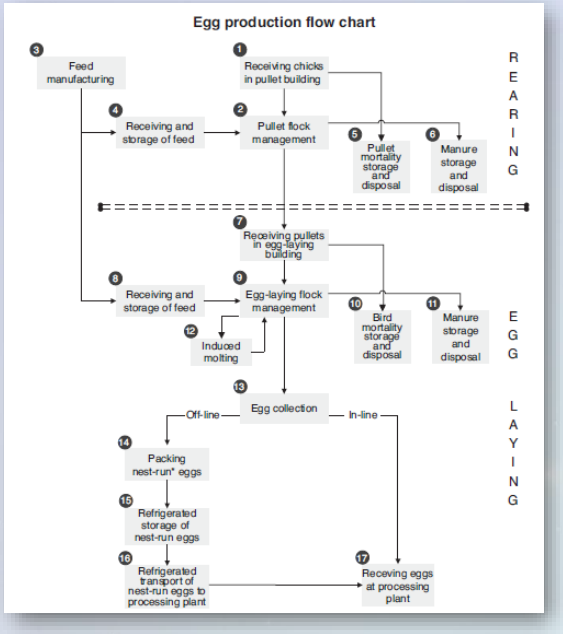

Wallace, Sperber, Mortimore, p. 276

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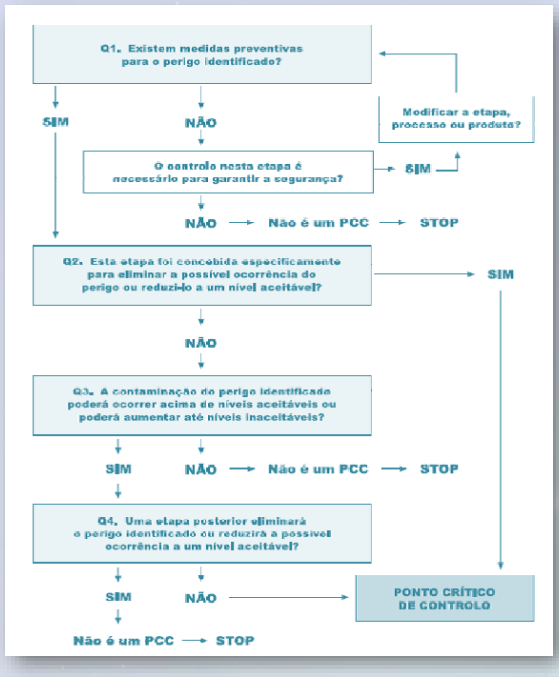

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Hazard analysis and control measure identification

Process step	Hazard	Control measure	Q1	Q1a	Q2	Q3	Q4	CCP	Justification for the decision
1. Receiving chicks in the pullet building	**Biological** 1. Presence of *Salmonella* Enteritidis in baby chicks	Agreed specifications Use approved suppliers (National Poultry Improvement Plan source) Certificate of Analysis	Yes		No	Yes	No	Yes	• SE-infected chicks at day-old are likely to produce SE-positive eggs *Chickens exposed to SE shortly after hatching can apparently remain infected until maturity, at which time they might produce contaminated eggs or spread the infection to other susceptible, previously unexposed hens*[2] *Birds infected at 1 day of age also experience reduced ability to respond to vaccination*[3]
	2. Introduction of SE by people (e.g. hatchery driver and service personnel)	Best management practices: Visitors policy Biosecurity policy	Yes		No	No	–	No	• Policy discourages visits to poultry units and reduces the opportunity for introduction of SE • Requirement for hairnets, coveralls and foot covers protects poultry from contamination on clothing and footwear • Hand-washing and disinfection prevent introduction of contamination from hands
2. Pullet flock management	**Biological** 1. Cross-contamination with SE from dirty equipment and building	Cleaning and disinfection SE vaccination	Yes		No	Yes	Yes	No	• Controlled by cleaning and disinfection of pullet buildings and equipment • The prevalence of SE in pullet flocks is relatively low compared to layer flocks; *data from PEQAP and CEQAP databases show that the environmental prevalence of SE in pullet houses ranges from 0 to 1.5%*[4]. *FDA estimates that 0.75% of pullet houses test environmentally SE positive* • Vaccination reduces the risk of production of infected eggs by infected flocks[5] *Vaccination with either inactivated (killed) or live, attenuated preparations has a long history of application for reducing the susceptibility of poultry to Salmonella infections and for, thereby, protecting human consumers against food-borne disease transmission*[6]

Q1: existem medidas de controlo?
Q1a: o controlo nesta etapa é necessário?

Q2: a etapa é concebida especificamente para eliminar ou reduzir a possibilidade de ocorrer um perigo?

Q3: a contaminação do perigo identificado poderá ocorrer acima de níveis aceitáveis ou poderá aumentar até níveis inaceitáveis?

Q4: uma etapa posterior eliminará o perigo identificado ou reduzirá a possível ocorrência a um nível aceitável?

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Process step	Hazard	Control measure	Q1	Q1a	Q2	Q3	Q4	CCP	Justification for the decision
	2. Introduction of SE by people (e.g. farm or service personnel and visitors)	BMP – employee biosecurity Visitor policy Biosecurity policy	Yes		No	No	–	No	• Company policies and practices discourage visits to poultry units and reduce the opportunity for introduction of SE • Requirement for hairnets, coveralls and foot covers protects poultry from exposure to SE contamination on clothing and footwear • Hand-washing and disinfection prevent exposure to SE contamination from hands
	3. Introduction of SE by pets, stray poultry, wildlife and pests	BMPs for pets, stray poultry, wild birds/wildlife pest control programme	Yes		No	No	–	No	• Restricting access to animals that may carry SE in or/and on their bodies in poultry buildings protects pullets from SE contamination
3. Feed manufacturing	**Biological** 1. Introduction of SE in poultry feed	Agreed specification Use approved suppliers Letter of guarantee Dust control Pest control Moisture control Use approved *Salmonella* inhibitors (organic acid, formaldehyde-based products)	Yes		No	No	–	No	• SE is not likely to contaminate finished layer feed *Testing for SE in finished layer feed at mills has almost never yielded positive results*[7] • Monitor feed ingredients for the presence of SE • Use of *Salmonella* inhibitors in the feed ration will reduce the levels of *Salmonella* in feed
	2. Presence of mycotoxins	Agreed specification Use approved suppliers Surveillance Moisture control	Yes		No	No	–	No	• Incoming loads are tested for mycotoxin levels • Loads with high mycotoxin levels are rejected
	Chemical 1. Presence of dioxins	Agreed specification Use approved suppliers	Yes Yes		No No	No No	– –	No No	• Dioxins are not reasonably likely to occur[8]
	2. Presence of veterinary drugs	Letter of guarantee Agreed specification Use approved suppliers	Yes		No	No	–	No	• GMP – equipment cleanout procedures at the feed mill • No eggs produced at the rearing facilities are destined for human consumption
	3. Presence of pesticides	GMPs – equipment cleanout Agreed specification Use approved suppliers Letter of guarantee Chemical control Pest control							• FDA pesticide monitoring reports show a low incidence of pesticides above the regulatory guidance in feed ingredients (3.6% of the samples tested showed residue levels above the regulatory guidance[9])
4. Receiving and storage of feed	**Biological** 1. Cross-contamination of feed with SE	Sanitation standard operating procedure (SSOP)	Yes		No	No	–	No	• Controlled by cleaning and disinfection programme; feed storage is cleaned and disinfected regularly
	2. Cross-contamination of feed with mycotoxins	SSOP Controlled dry storage	Yes		No	No	–	No	• Feed is protected from rain and moisture
5. Pullet mortality storage and disposal	**Biological** 1. Growth of pathogens, including SE	BMP for storage and disposal of bird mortality	Yes		No	No	–	No	• Pullet mortality is removed from poultry house daily and stored for disposal in an enclosed container
	2. Spread of pathogens, including SE by pests	Pest control programme	Yes		No	No		No	• Controlled by pest control programme
6. Manure storage and disposal	**Biological** 1. Growth of enteric pathogens, including SE in manure	BMP for manure removal	Yes		No	No	–	No	• Manure is removed frequently or treated to reduce microbial loads
	2. Spread of pathogens, including SE by pests	Pest control programme	Yes		No	No		No	• Controlled by pest control programme

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Process step	Hazard	Control measure	Q1	Q1a	Q2	Q3	Q4	CCP	Justification for the decision
7. Receiving pullets in the egg-laying building	**Biological** 1. Presence of SE in pullets	Agreed specifications Use approved suppliers Surveillance Certificate of Analysis Pest control Cleaning and disinfection	Yes		No	No	–	No	• All birds are obtained from sources with a working *Salmonella* prevention and control programme • Flocks are vaccinated either with inactivated (killed) or live, attenuated preparations to reduce the susceptibility of poultry to *Salmonella* infections • Test results will confirm SE-negative status of the flock
	2. Introduction of SE by people (service crew)	Best management practices Visitors policy Biosecurity policy	Yes		No	No	–	No	• Policy discourages visits to poultry units and reduces the opportunity for introduction of SE • Requirement for hairnets, coveralls and foot covers protects poultry from contamination on clothing and footwear • Hand-washing and disinfection prevent introduction of contamination from hands
8. Receiving and storage of feed	**Biological** 1. Cross-contamination of feed with SE	SSOP SSOP	Yes		No	No	– –	No	• Controlled by cleaning and disinfection programme • Feed storage is cleaned and disinfected regularly
	2. Cross-contamination of feed with mycotoxins	Controlled dry storage	Yes		No	No		No	• Feed is protected from rain and moisture
9. Egg-laying flock management	**Biological** 1. Cross-contamination with SE from dirty equipment and poultry building	Cleaning and disinfection SE vaccination	Yes		No	Yes	Yes	No	• Dirty surfaces or application of low levels of disinfectant will allow survival of SE organisms • Vaccination reduces the risk of production of infected eggs by infected flocks[11]
	2. Introduction of SE by people (e.g. farm or service personnel and visitors)	BMP – employee biosecurity Visitor's policy Biosecurity policy	Yes		No	No	–	No	• Company policies and practices discourage visits to poultry units and reduce the opportunity for introduction of SE • Requirement for hairnets, coveralls and foot covers protects poultry from exposure to SE contamination on clothing and footwear • Hand-washing and disinfection prevent exposure to SE contamination from hands
	3. Introduction of SE by pets, stray poultry, wildlife and pests	BMPs for pets, stray poultry, wild birds/wildlife pest control programme	Yes		No	No	–	No	• Pests carry SE in and on their bodies; restricting access to animals that may carry *Se* in or/and on their bodies in poultry buildings protects egg-laying hens from SE contamination
	4. Introduction of SE in the water	BMP – water sanitation Surveillance	Yes		No	No	–	No	• Water chlorination or acidification reduces SE contamination
10. Bird mortality storage and disposal	**Biological** 1. Growth of pathogens, including SE	BMP for storage and disposal of bird mortality	Yes		No	No	– –	No	• Hen mortality is removed from poultry building daily and stored for disposal in an enclosed container
	2. Spread of SE by pests	Pest control programme	Yes		No	No		No	• Controlled by the pest control programme
11. Manure storage and disposal	**Biological** 1. Growth of enteric pathogens, including SE in manure	BMP for manure removal	Yes		No	No	– –	No	• Manure is removed frequently or treated to reduce microbial loads
	2. Spread of pathogens, including SE by pests	Pest control programme	Yes		No	No		No	• Controlled by the pest control programme

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Process step	Hazard	Control measure	Q1	Q1a	Q2	Q3	Q4	CCP	Justification for the decision
12. Induced molting	**Biological** 1. Shedding of SE in the environment	Non-feed withdrawal molt SE vaccination	Yes		No	Yes	Yes	No	• Use of non-feed withdrawal methods does not increase the incidence of SE in eggs[12] • Risk is reduced if the flock is vaccinated prior to molt
13. Egg collection	***None identified***								
14. Packing nest-run eggs	**Biological** 1. Presence of *Salmonella* organisms on dirty packaging materials	Agreed specification SSOP	Yes		No	No	–	No	• Surface egg contamination will be controlled at the egg-washing step at the processing plant • Egg flats and other egg-handling materials to be cleaned and sanitised
15. Storage of refrigerated nest-run eggs	**Biological** 1. Growth of SE in eggs	Temperature control	Yes		No	No	–	No	• Shell eggs are refrigerated at an ambient temperature at or below 45°F to prevent microbial growth[13] and yolk membrane degradation • Prompt refrigeration of eggs reduces the likelihood for SE to grow to dangerous levels[14] • Bacterial growth is prevented if the eggs are processed under the 36-hour limit for unrefrigerated holding[15]
16. Transport of refrigerated nest-run eggs to the processing plant	**Biological** 1. GROWTH of SE in and on eggs	Temperature control	Yes		No	No	–	No	• Shell eggs are refrigerated at an ambient temperature at or below 45°F to prevent microbial growth and yolk membrane degradation • Bacterial growth is prevented if the eggs are processed under the 36-hour limit for unrefrigerated holding
17. Receiving eggs at the processing plant	**Biological** 1. Presence of SE inside the egg (off-line egg production)	Temperature control	Yes		No	No	–	No	• Low risk of illness because of low occurrence and concentration in shell eggs • Contract-grown flocks are vaccinated to reduce the risk of *Salmonella* contamination and follow biosecurity practices • Outside egg purchases are received at an ambient temperature at or below 45°F
	Biological 2. Presence of SE inside the egg (in-line egg production)	Temperature control	Yes		No	No	–	No	• Low risk of illness because of low occurrence and concentration in shell eggs • Shell eggs are refrigerated at an ambient temperature at or below 45°F to prevent microbial growth and yolk membrane degradation
	3. Surface eggshell contamination with *Salmonella* sp.	Egg washing	Yes		No	No	–	No	• *Salmonella* present on shell is controlled by the alkaline egg-washing step in the processing plant

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HACCP control chart

Process step	CCP No.	Hazard to be controlled	Control measure	Critical limits	Monitoring			Corrective action	
					Procedure	Frequency	Responsibility	Procedure	Responsibility
Receiving chicks in the pullet building	1	*Salmonella* Enteritidis	Approved suppliers Agreed specifications Certificate of Analysis Surveillance	No SE-positive chick box paper tests.	Check NPIP form or letter documenting NPIP source Check Certificate of Analysis for evidence of compliance Sample[16] 1 in 10 chick box papers and submit to laboratory for SE testing. 9 CFR 147.12 (a)(4)	Every delivery	Ownership or farm manager	Reject delivery if chicks are from an unknown source If test result is SE-positive, depopulate flock immediately Clean and disinfect building and equipment Test the environment prior to restocking	Ownership or farm manager

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Processamento – refeições preparadas

- plano HACCP
  - equipa
    - gestor técnico (chefe de equipa)
    - gestor de produção
    - eng. supervisor
    - supervisor de produção
    - consultor técnico

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Processamento – refeições preparadas

- plano HACCP
  - aplicação
    - perigos microbiológicos, físicos e químicos
      - incl. alergénios e compostos causadores de intolerância
    - todos os processos, desde recepção da matéria-prima até armazenamento em frio do produto final

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Processamento – refeições preparadas

- plano HACCP
  - descrição do produto
    - refeições preparadas para consumir a frio ou a quente
    - matéria-prima
      - lacticínios, pescado, frango, peru, vaca, carneiro, porco e *bacon*
        - fornecedores aprovados
        - alergénios usados mas controlados

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Processamento – refeições preparadas

- plano HACCP
  - descrição do produto
    - todas as refeições são pasteurizadas, depois congeladas, armazenadas e distribuídas congeladas
      - tempo de prateleira verificado por ensaios durante a produção e confirmação microbiológica
    - embalagens de metal e CPET para microondas
      - rotulagem adequada

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Processamento – refeições preparadas

- plano HACCP
  - utilização pelo consumidor
    - população em geral
    - produtos podem conter alergénios
      - mencionados no rótulo
    - produtos podem ser consumidos frios ou após aquecimento
    - conservar sob refrigeração antes de usar

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Processamento – refeições preparadas

- plano HACCP
  - má utilização pelo consumidor
    - temperatura não adequada
    - consumo após tempo de prateleira

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Processamento – refeições preparadas

- plano HACCP
  - pré-requisitos
    - instalação
      - junto a outras indústrias alimentares
      - instalações construídas propositadamente
    - controlo das operações
      - perigos, higiene, materiais, embalagem, água, gestão e supervisão, documentos e registos, procedimentos de recolha de produto

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Processamento – refeições preparadas

- plano HACCP
  - pré-requisitos
    - manutenção e saneamento
      - programas de limpeza
      - controlo de pragas
      - gestão de resíduos
    - higiene pessoal
      - estado de saúde, doenças e feridas, limpeza pessoal, uniformes, comportamento de trabalhadores e visitantes

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Processamento – refeições preparadas

- plano HACCP
  - pré-requisitos
    - transporte
      - requisitos gerais, uso e manutenção
    - informação sobre o produto e percepção pública
      - identificação dos lotes, rotulagem e educação dos consumidores
    - programas de treino, formação e supervisão

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Processamento – refeições preparadas

- plano HACCP
  - análise de perigos
    - avaliação alto/baixo de entre lista de perigos potenciais
    - probabilidade de ocorrência e gravidade do efeito
      - considera-se perigo significativo quando ocorrência provável e provoca efeito adverso
        - avaliação "alto" para ambos os casos

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Processamento – refeições preparadas

- plano HACCP
  - revisão
    - plano revisto anualmente
    - actualizado quando necessário
    - realizar estudo HACCP antes de lançamento de novo produto, processo ou matéria-prima

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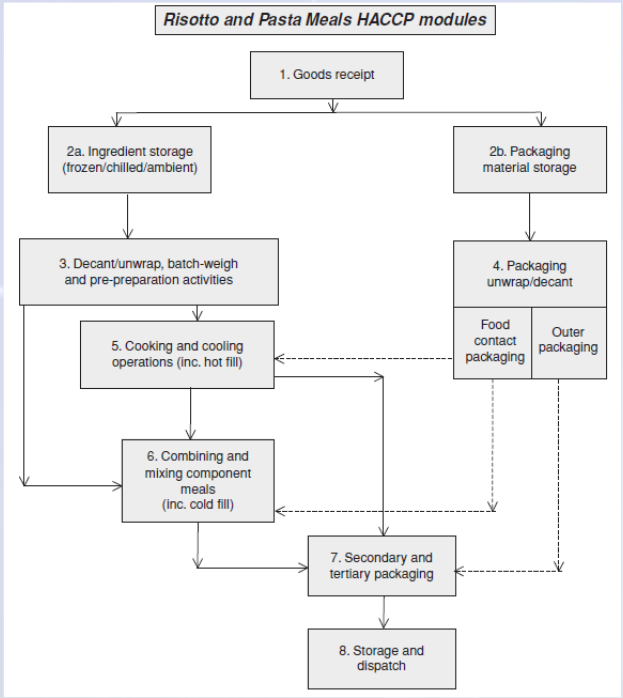
Risotto and Pasta Meals HACCP modules
1. Goods receipt
2a. Ingredient storage (frozen/chilled/ambient)
2b. Packaging material storage
3. Decant/unwrap, batch-weigh and pre-preparation activities
4. Packaging unwrap/decant
Food contact packaging
Outer packaging
5. Cooking and cooling operations (inc. hot fill)
6. Combining and mixing component meals (inc. cold fill)
7. Secondary and tertiary packaging
8. Storage and dispatch
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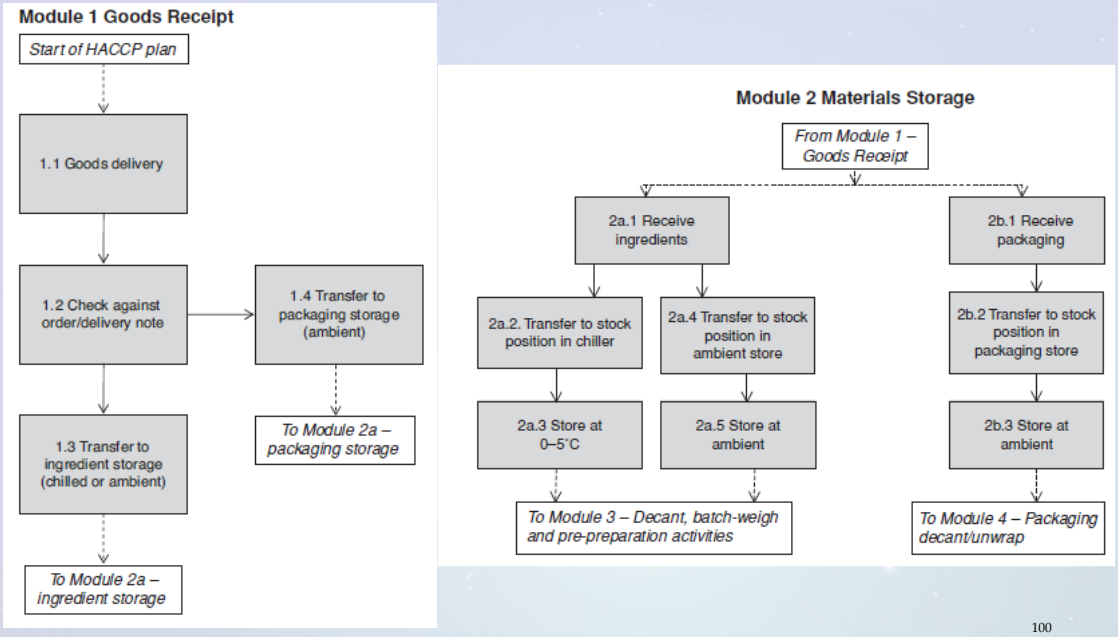
Module 1 Goods Receipt
Start of HACCP plan
1.1 Goods delivery
1.2 Check against order/delivery note
1.4 Transfer to packaging storage (ambient)
1.3 Transfer to ingredient storage (chilled or ambient)
To Module 2a – packaging storage
To Module 2a – ingredient storage
Module 2 Materials Storage
From Module 1 – Goods Receipt
2a.1 Receive ingredients
2b.1 Receive packaging
2a.2. Transfer to stock position in chiller
2a.4 Transfer to stock position in ambient store
2b.2 Transfer to stock position in packaging store
2a.3 Store at 0–5°C
2a.5 Store at ambient
2b.3 Store at ambient
To Module 3 – Decant, batch-weigh and pre-preparation activities
To Module 4 – Packaging decant/unwrap
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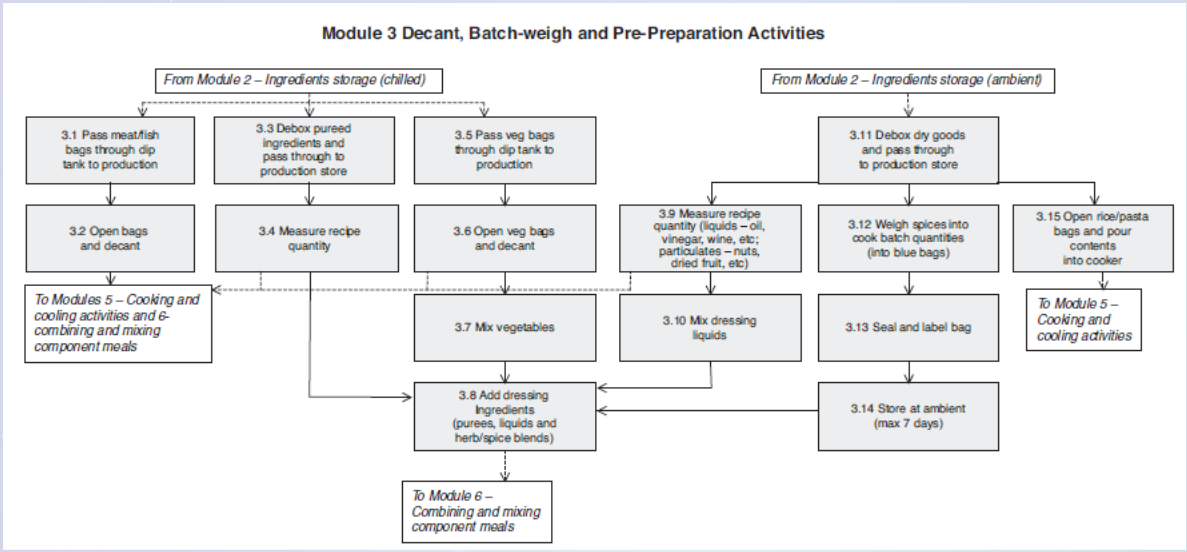

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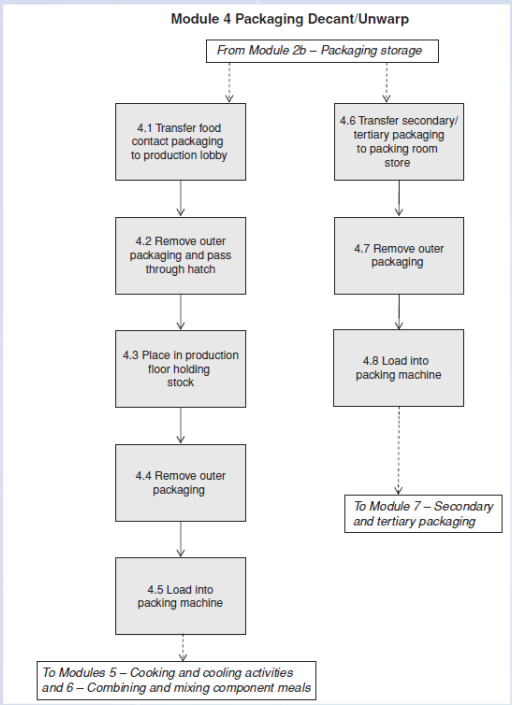

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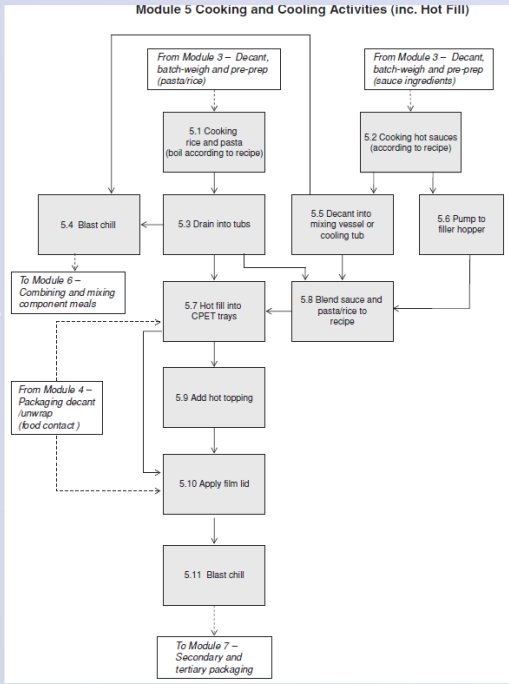

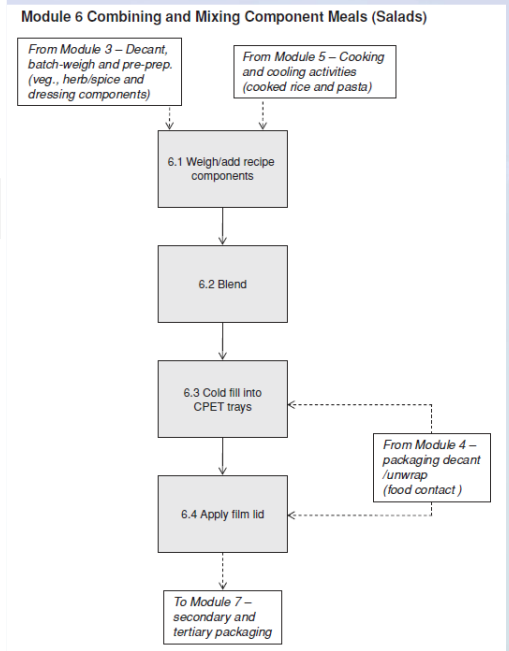

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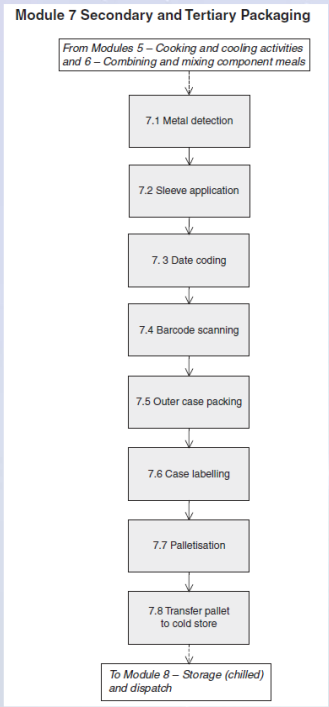

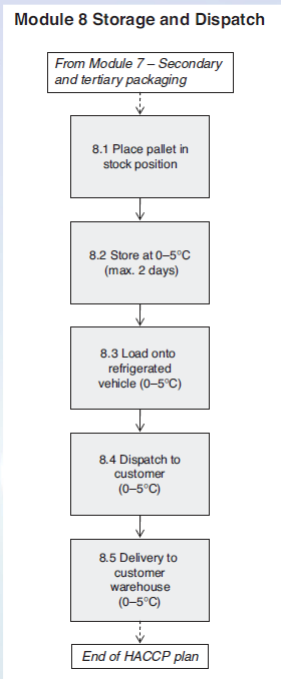

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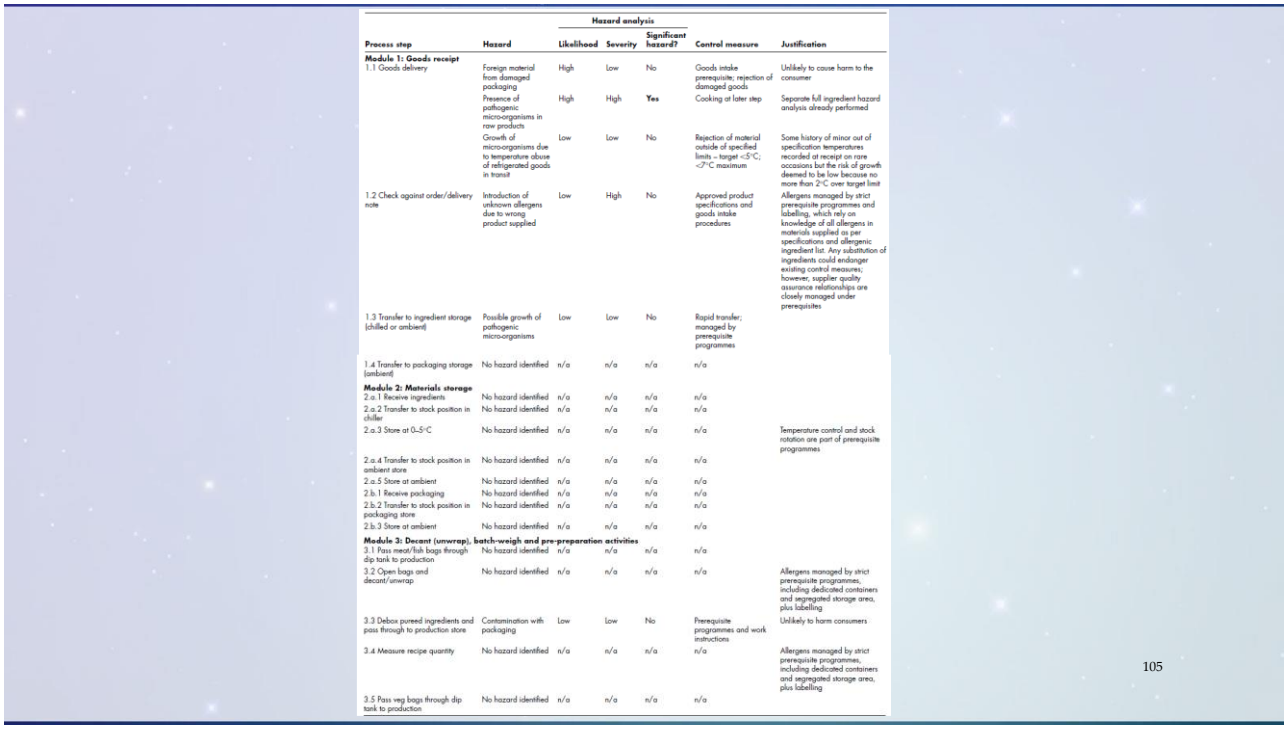

Process step	Hazard	Hazard analysis: Likelihood	Severity	Significant hazard?	Control measure	Justification
Module 1: Goods receipt						
1.1 Goods delivery	Foreign material from damaged packaging	High	Low	No	Goods intake prerequisite; rejection of damaged goods	Unlikely to cause harm to the consumer
	Presence of pathogenic micro-organisms in raw products	High	High	**Yes**	Cooking at later step	Separate full ingredient hazard analysis already performed
	Growth of micro-organisms due to temperature abuse of refrigerated goods in transit	Low	Low	No	Rejection of material outside of specified limits – target <5°C; <7°C maximum	Some history of minor out of specification temperatures recorded at receipt on rare occasions but the risk of growth deemed to be low because no more than 2°C over target limit
1.2 Check against order/delivery note	Introduction of unknown allergens due to wrong product supplied	Low	High	No	Approved product specifications and goods intake procedures	Allergens managed by strict prerequisite programmes and labelling, which rely on knowledge of all allergens in materials supplied as per specifications and allergenic ingredient list. Any substitution of ingredients could endanger existing control measures; however, supplier quality assurance relationships are closely managed under prerequisites
1.3 Transfer to ingredient storage (chilled or ambient)	Possible growth of pathogenic micro-organisms	Low	Low	No	Rapid transfer; managed by prerequisite programmes	
1.4 Transfer to packaging storage (ambient)	No hazard identified	n/a	n/a	n/a	n/a	
Module 2: Materials storage						
2.a.1 Receive ingredients	No hazard identified	n/a	n/a	n/a	n/a	
2.a.2 Transfer to stock position in chiller	No hazard identified	n/a	n/a	n/a	n/a	
2.a.3 Store at 0–5°C	No hazard identified	n/a	n/a	n/a	n/a	Temperature control and stock rotation are part of prerequisite programmes
2.a.4 Transfer to stock position in ambient store	No hazard identified	n/a	n/a	n/a	n/a	
2.a.5 Store at ambient	No hazard identified	n/a	n/a	n/a	n/a	
2.b.1 Receive packaging	No hazard identified	n/a	n/a	n/a	n/a	
2.b.2 Transfer to stock position in packaging store	No hazard identified	n/a	n/a	n/a	n/a	
2.b.3 Store at ambient	No hazard identified	n/a	n/a	n/a	n/a	
Module 3: Decant (unwrap), batch-weigh and pre-preparation activities						
3.1 Pass meat/fish bags through dip tank to production	No hazard identified	n/a	n/a	n/a	n/a	
3.2 Open bags and decant/unwrap	No hazard identified	n/a	n/a	n/a	n/a	Allergens managed by strict prerequisite programmes, including dedicated containers and segregated storage area, plus labelling
3.3 Debox pureed ingredients and pass through to production store	Contamination with packaging	Low	Low	No	Prerequisite programmes and work instructions	Unlikely to harm consumers
3.4 Measure recipe quantity	No hazard identified	n/a	n/a	n/a	n/a	Allergens managed by strict prerequisite programmes, including dedicated containers and segregated storage area, plus labelling
3.5 Pass veg bags through dip tank to production	No hazard identified	n/a	n/a	n/a	n/a	

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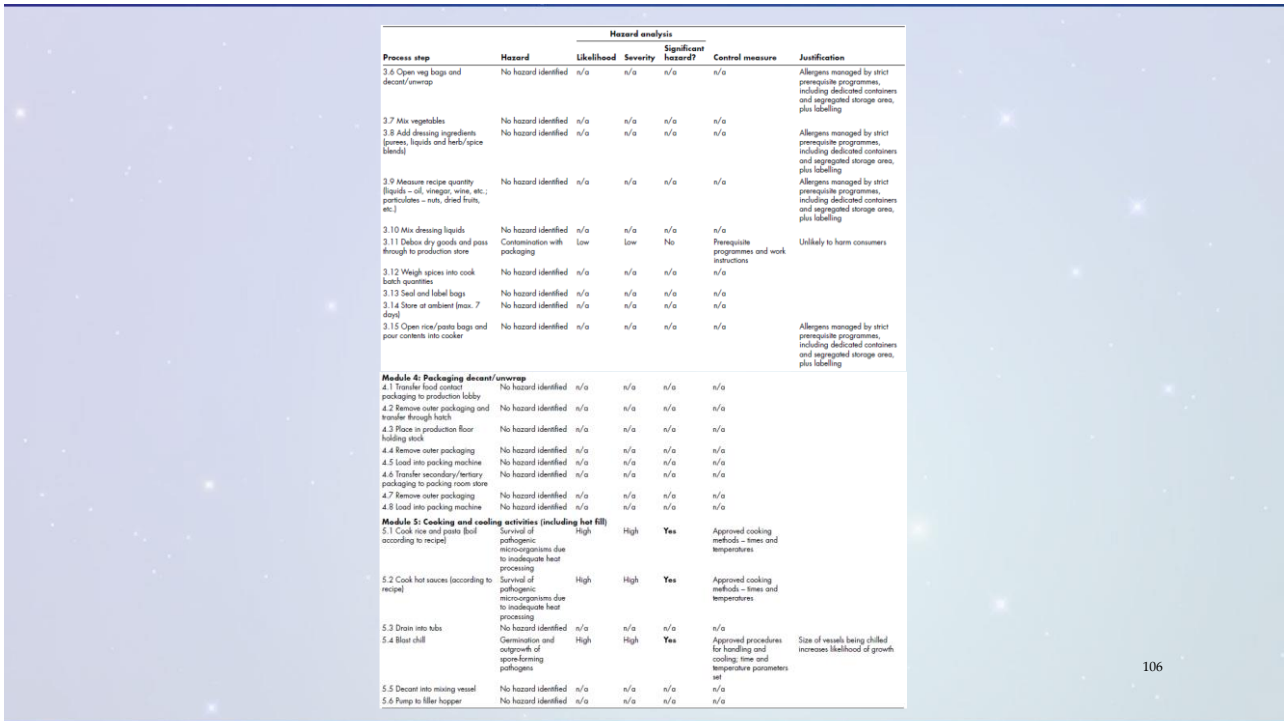

Process step	Hazard	Hazard analysis: Likelihood	Severity	Significant hazard?	Control measure	Justification
3.6 Open veg bags and decant/unwrap	No hazard identified	n/a	n/a	n/a	n/a	Allergens managed by strict prerequisite programmes, including dedicated containers and segregated storage area, plus labelling
3.7 Mix vegetables	No hazard identified	n/a	n/a	n/a	n/a	
3.8 Add dressing ingredients (purees, liquids and herb/spice blends)	No hazard identified	n/a	n/a	n/a	n/a	Allergens managed by strict prerequisite programmes, including dedicated containers and segregated storage area, plus labelling
3.9 Measure recipe quantity (liquids – oil, vinegar, wine, etc.; particulates – nuts, dried fruits, etc.)	No hazard identified	n/a	n/a	n/a	n/a	Allergens managed by strict prerequisite programmes, including dedicated containers and segregated storage area, plus labelling
3.10 Mix dressing liquids	No hazard identified	n/a	n/a	n/a	n/a	
3.11 Debox dry goods and pass through to production store	Contamination with packaging	Low	Low	No	Prerequisite programmes and work instructions	Unlikely to harm consumers
3.12 Weigh spices into cook batch quantities	No hazard identified	n/a	n/a	n/a	n/a	
3.13 Seal and label bags	No hazard identified	n/a	n/a	n/a	n/a	
3.14 Store at ambient (max. 7 days)	No hazard identified	n/a	n/a	n/a	n/a	
3.15 Open rice/pasta bags and pour contents into cooker	No hazard identified	n/a	n/a	n/a	n/a	Allergens managed by strict prerequisite programmes, including dedicated containers and segregated storage area, plus labelling
Module 4: Packaging decant/unwrap						
4.1 Transfer food contact packaging to production lobby	No hazard identified	n/a	n/a	n/a	n/a	
4.2 Remove outer packaging and transfer through hatch	No hazard identified	n/a	n/a	n/a	n/a	
4.3 Place in production floor holding stock	No hazard identified	n/a	n/a	n/a	n/a	
4.4 Remove outer packaging	No hazard identified	n/a	n/a	n/a	n/a	
4.5 Load into packing machine	No hazard identified	n/a	n/a	n/a	n/a	
4.6 Transfer secondary/tertiary packaging to packing room store	No hazard identified	n/a	n/a	n/a	n/a	
4.7 Remove outer packaging	No hazard identified	n/a	n/a	n/a	n/a	
4.8 Load into packing machine	No hazard identified	n/a	n/a	n/a	n/a	
Module 5: Cooking and cooling activities (including hot fill)						
5.1 Cook rice and pasta (boil according to recipe)	Survival of pathogenic micro-organisms due to inadequate heat processing	High	High	**Yes**	Approved cooking methods – times and temperatures	
5.2 Cook hot sauces (according to recipe)	Survival of pathogenic micro-organisms due to inadequate heat processing	High	High	**Yes**	Approved cooking methods – times and temperatures	
5.3 Drain into tubs	No hazard identified	n/a	n/a	n/a	n/a	
5.4 Blast chill	Germination and outgrowth of spore-forming pathogens	High	High	**Yes**	Approved procedures for handling and cooling; time and temperature parameters set	Size of vessels being chilled increases likelihood of growth
5.5 Decant into mixing vessel	No hazard identified	n/a	n/a	n/a	n/a	
5.6 Pump to filler hopper	No hazard identified	n/a	n/a	n/a	n/a	

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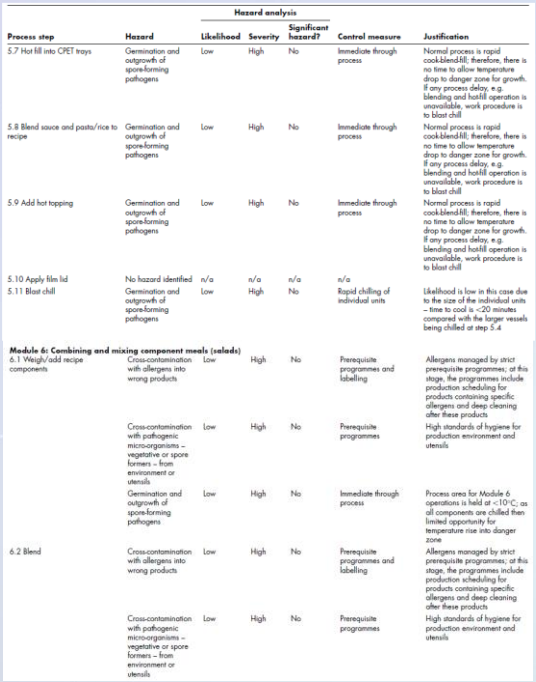

Process step	Hazard	Hazard analysis: Likelihood	Severity	Significant hazard?	Control measure	Justification
5.7 Hot fill into CPET trays	Germination and outgrowth of spore-forming pathogens	Low	High	No	Immediate through process	Normal process is rapid cook-blend-fill; therefore, there is no time to allow temperature drop to danger zone for growth. If any process delay, e.g. blending and hot-fill operation is unavailable, work procedure is to blast chill
5.8 Blend sauce and pasta/rice to recipe	Germination and outgrowth of spore-forming pathogens	Low	High	No	Immediate through process	Normal process is rapid cook-blend-fill; therefore, there is no time to allow temperature drop to danger zone for growth. If any process delay, e.g. blending and hot-fill operation is unavailable, work procedure is to blast chill
5.9 Add hot topping	Germination and outgrowth of spore-forming pathogens	Low	High	No	Immediate through process	Normal process is rapid cook-blend-fill; therefore, there is no time to allow temperature drop to danger zone for growth. If any process delay, e.g. blending and hot-fill operation is unavailable, work procedure is to blast chill
5.10 Apply film lid	No hazard identified	n/a	n/a	n/a	n/a	
5.11 Blast chill	Germination and outgrowth of spore-forming pathogens	Low	High	No	Rapid chilling of individual units	Likelihood is low in this case due to the size of the individual units – time to cool is <20 minutes compared with the larger vessels being chilled at step 5.4
Module 6: Combining and mixing component meals (salads)						
6.1 Weigh/add recipe components	Cross-contamination with allergens into wrong products	Low	High	No	Prerequisite programmes and labelling	Allergens managed by strict prerequisite programmes; at this stage, the programmes include production scheduling for products containing specific allergens and deep cleaning after these products
	Cross-contamination with pathogenic micro-organisms – vegetative or spore formers – from environment or utensils	Low	High	No	Prerequisite programmes	High standards of hygiene for production environment and utensils
	Germination and outgrowth of spore-forming pathogens	Low	High	No	Immediate through process	Process area for Module 6 operations is held at <10°C; as all components are chilled then limited opportunity for temperature rise into danger zone
6.2 Blend	Cross-contamination with allergens into wrong products	Low	High	No	Prerequisite programmes and labelling	Allergens managed by strict prerequisite programmes; at this stage, the programmes include production scheduling for products containing specific allergens and deep cleaning after these products
	Cross-contamination with pathogenic micro-organisms – vegetative or spore formers – from environment or utensils	Low	High	No	Prerequisite programmes	High standards of hygiene for production environment and utensils

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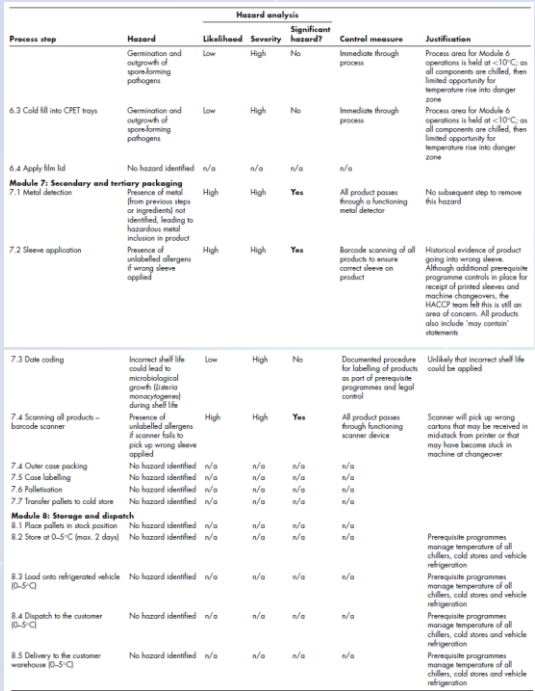

Process step	Hazard	Hazard analysis: Likelihood	Severity	Significant hazard?	Control measure	Justification
	Germination and outgrowth of spore-forming pathogens	Low	High	No	Immediate through process	Process area for Module 6 operations is held at <10°C; as all components are chilled, then limited opportunity for temperature rise into danger zone
6.3 Cold fill into CPET trays	Germination and outgrowth of spore-forming pathogens	Low	High	No	Immediate through process	Process area for Module 6 operations is held at <10°C; as all components are chilled, then limited opportunity for temperature rise into danger zone
6.4 Apply film lid	No hazard identified	n/a	n/a	n/a	n/a	
Module 7: Secondary and tertiary packaging						
7.1 Metal detection	Presence of metal (from previous steps or ingredients) not identified, leading to hazardous metal inclusion in product	High	High	**Yes**	All product passes through a functioning metal detector	No subsequent step to remove this hazard
7.2 Sleeve application	Presence of unlabelled allergens if wrong sleeve applied	High	High	**Yes**	Barcode scanning of all products to ensure correct sleeve on product	Historical evidence of product going into wrong sleeve. Although additional prerequisite programme controls in place for receipt of printed sleeves and machine changeovers, the HACCP team felt this is still an area of concern. All products also include 'may contain' statements
7.3 Date coding	Incorrect shelf life could lead to microbiological growth (*Listeria monocytogenes*) during shelf life	Low	High	No	Documented procedure for labelling of products as part of prerequisite programmes and legal control	Unlikely that incorrect shelf life could be applied
7.4 Scanning all products – barcode scanner	Presence of unlabelled allergens if scanner fails to pick up wrong sleeve applied	High	High	**Yes**	All product passes through functioning scanner device	Scanner will pick up wrong cartons that may be received in mid-stack from printer or that may have become stuck in machine at changeover
7.4 Outer case packing	No hazard identified	n/a	n/a	n/a	n/a	
7.5 Case labelling	No hazard identified	n/a	n/a	n/a	n/a	
7.6 Palletisation	No hazard identified	n/a	n/a	n/a	n/a	
7.7 Transfer pallets to cold store	No hazard identified	n/a	n/a	n/a	n/a	
Module 8: Storage and dispatch						
8.1 Place pallets in stock position	No hazard identified	n/a	n/a	n/a	n/a	
8.2 Store at 0–5°C (max. 2 days)	No hazard identified	n/a	n/a	n/a	n/a	Prerequisite programmes manage temperature of all chillers, cold stores and vehicle refrigeration
8.3 Load onto refrigerated vehicle (0–5°C)	No hazard identified	n/a	n/a	n/a	n/a	Prerequisite programmes manage temperature of all chillers, cold stores and vehicle refrigeration
8.4 Dispatch to the customer (0–5°C)	No hazard identified	n/a	n/a	n/a	n/a	Prerequisite programmes manage temperature of all chillers, cold stores and vehicle refrigeration
8.5 Delivery to the customer warehouse (0–5°C)	No hazard identified	n/a	n/a	n/a	n/a	Prerequisite programmes manage temperature of all chillers, cold stores and vehicle refrigeration

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HACCP control chart

Process step	Hazard	Control measure	Critical limits	Monitoring	Monitoring responsibility	Corrective action	Corrective action responsibility	Record
5.1 Cooking rice and pasta	Survival of pathogenic micro-organisms due to inadequate heat processing	All cooked components cooked to minimum time and temperature.	All product achieves core temperature 72°C minimum	Temperature checks with calibrated probes	Cooker operator	Continue to heat until required temperature (72°C minimum) is reached	Production manager	Cooking records
5.2 Cooking hot sauces	Survival of pathogenic micro-organisms due to inadequate heat processing	All cooked components cooked to minimum time and temperature.	All product achieves core temperature 72°C minimum	Temperature checks with calibrated probes	Cooker operator	Continue to heat until required temperature (72°C minimum) is reached	Production manager	Cooking records
5.4 Blast chilling	Germination and outgrowth of spore-forming pathogens	Effective blast chill process reduces temperature within safe time limit (normally achieves <5°C within 90 minutes)	All product to be cooled below 5°C within 120 minutes	Centre temperature checks with calibrated probes at entry and exit from chiller. Residence time checked and recorded	Cooker operator	Discard batch. Investigate and repair any fault with blast chiller	Production/ Technical/ Engineering managers	Production records
7.1 Metal detection	Presence of metal (from previous steps or ingredients) not identified leading to hazardous metal inclusion in product	All product passes through a functioning metal detector	Absence of all metal above 7 mm – ferrous, non-ferrous and stainless. Correctlys functioning metal detector and rejection mechanism in place and working continuously.	Check detection and rejection mechanism with test strips – 2.5 mm all types – placed in centre of the product	Line operator	Recheck product since previous satisfactory check	Line manager	Production records
7.4 Barcode scanning	Presence of unlabelled allergens if scanner fails to pick up wrong sleeve applied	All product passes through a functioning scanner device	Scanner functioning at all times	Check with packaging samples – start-up and half hourly	Line operator	Recheck product since previous satisfactory check	Line manager	Production records

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Serviços alimentares

- refeições pré-preparadas, adquiridas congeladas
  - fornecedor certificado
- armazenamento sob congelação ligado à cozinha onde é feita a preparação

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Serviços alimentares

- estudo HACCP apoiado em pré-requisitos
  - inclui controlo de alergénios
    - sobretudo glúten
- HACCP dirigido para perigos microbiológicos

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Serviços alimentares

- equipa HACCP
  - gestor técnico do fornecedor
  - chef e assistente
  - consultor técnico

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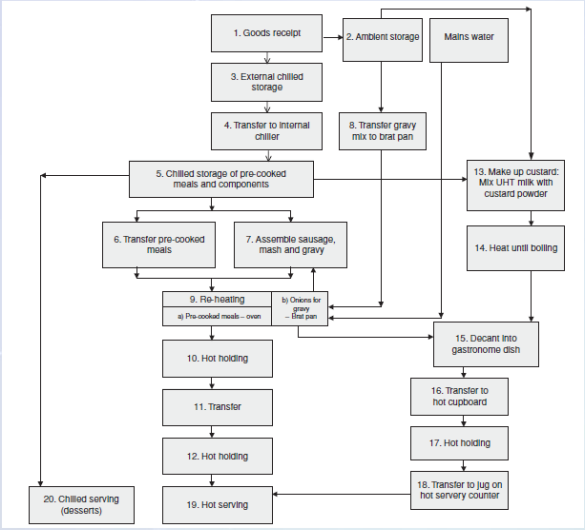

Table A.1 Lapland UK menu.

Norfolk Gold Turkey, Leek and Ham Pie
Turkey pieces with dry cured ham, and leeks, in a creamy parsley sauce, topped with all butter short crust pastry
Cottage Pie*
Tender organic steak mince, with onion, carrot and leeks, topped with creamy mashed potato
Scottish Smoked Haddock, Salmon and Hake Pie
Naturally smoked haddock, with salmon, and hake in a creamy fish sauce, topped with mash
Sausages with Mash and Onion Gravy
Premium pork sausages with a sweet red onion gravy on creamy mashed potato
Red Lentil and Mixed Bean Casserole*
With sundried tomato and fresh basil sauce (vegan friendly)
Macaroni Cheese
Macaroni in a creamy mature cheddar sauce, baked with extra cheese topping

Chocolate Pot*
Strawberries, Raspberries and Blackcurrants Set in Strawberry Jelly*
Spiced Apple and Raisin Crumble with Custard
*Coeliac friendly

Salsichas, puré de batata e rodelas de cebola recebidas separadamente e depois misturados
Restantes recebidas em conjuntos e aquecidas, mantidas em quente e servidas em quente
Sobremesas recebidas em doses individuais e prontas a servir
Molho e creme (custard) recebidos desidratados e depois adicionados

Serviços alimentares

- pré-requisitos
  - controlo de temperatura
    - armazenamento a frio, aquecimento e manutenção em quente
  - higiene pessoal
    - funcionários e visitantes

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Serviços alimentares

- pré-requisitos
  - limpeza, saneamento e gestão de resíduos
    - limpeza da cozinha e sala de refeições, todo o equipamento e utensílios
    - gestão de pragas
    - controlo de resíduos
  - transporte
    - transferência de refeições e componentes com controlo de temperatura e higiene

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Serviços alimentares

- pré-requisitos
  - controlo de alergénios
    - produtos fornecidos sem glúten
      - prevenção de contaminação cruzada
    - aviso de possibilidade de conter outros alergénios

Table A.2 Allergens present as intrinsic ingredients by the product.

Product	Milk	Wheat and Gluten	Celery and Celeriac	Mustard	Sulphites	Nuts	Crustacean	Eggs	Fish	Peanut	Soy(a) bean	Sesame	Suitable for vegetarians	Suitable for vegans	Suitable for Coeliacs
Cottage pie	✓	✓	✓	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
Fish pie	✓	✓	✓	✓	☒	☒	☒	☒	✓	☒	☒	☒	☒	☒	☒
Macaroni cheese	✓	✓	☒	✓	☒	☒	☒	✓	☒	☒	☒	☒	✓	☒	☒
Bean and lentil casserole	✓	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	✓	✓	✓
Turkey pie	✓	✓	✓	✓	☒	☒	☒	✓	☒	☒	✓	☒	☒	☒	☒
Sausage and mash	✓	✓	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
Apple crumble and custard	✓	✓	☒	☒	☒	✓	☒	✓	☒	☒	☒	☒	✓	☒	☒
Chocolate mousse	✓	✓	☒	☒	☒	☒	☒	✓	☒	☒	✓	☒	✓	☒	☒
Fruit jelly	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	✓
Apple crumble no custard	☒	✓	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	✓	✓	☒

Key
ALLERGENS = CONTAINS
ALLERGENS = DOES NOT CONTAIN

NOT SUITABLE FOR LACTO VEGETARIANS
SUITABLE FOR LACTO VEGETARIANS
NOT SUITABLE FOR VEGANS
SUITABLE FOR VEGANS
NOT SUITABLE FOR COELIACS
SUITABLE FOR COELIACS

Process step	Hazard	Hazard analysis: Likelihood	Severity	Significant hazard?	Control measure	Justification
1. Goods receipt	Growth of micro-organisms due to temperature abuse of refrigerated goods in transit	Low	Low	No	Rejection of material outside of specified limits – target <5°C; <7°C maximum	The risk of growth is low because the manufacturing site is 20 minutes away by road and temperature is checked before goods leave the site by the refrigerated vehicle
2. Ambient storage	No hazard identified	n/a	n/a	n/a	n/a	
3. External chilled storage	Growth of micro-organisms due to temperature abuse of refrigerated goods in transit	Low	Low	No	All chillers are controlled via prerequisite programmes, including detailed monitoring of operating temperatures; external storage is self-contained chiller unit	The risk of growth is low and unlikely that pathogens other than spores will be present
4. Transfer to internal chiller	No hazard identified	n/a	n/a	n/a	n/a	
5. Chilled storage of pre-cooked chilled meals and components	Growth of micro-organisms due to temperature abuse of refrigerated goods in transit	Low	Low	No	All chillers are controlled via prerequisite programmes, including detailed monitoring of operating temperatures; external storage is self-contained chiller unit	The risk of growth is low and unlikely that pathogens other than spores will be present
6. Transfer pre-cooked meals	No hazard identified	n/a	n/a	n/a	n/a	
7. Assemble sausage, mash and gravy	Cross-contamination with pathogens due to manual handling	Low	High	No	Strict management of prerequisite programmes on hygienic handling	This product has more manual handling but hygiene is strictly controlled
8. Transfer gravy mix to brat pan	No hazard identified	n/a	n/a	n/a		
9. Reheating (a) Oven (b) Brat pan	Survival of vegetative pathogens that may have contaminated meals and components since initial manufacture (environmental or handling contaminants)	High	High	Yes	Cook to centre temperature of 72°C minimum – both oven and brat pan processes	Due to the amount of handling, it was considered that there was a possibility of contamination between initial manufacture and reheating
10. Hot holding	Germination and outgrowth of spore-forming pathogens	Low	High	No	Hot-holding procedures managed under prerequisite programmes	Prerequisite programmes require monitoring and recording of hot-hold temperatures every 30 minutes through the service period; in reality, hot-hold temperatures are normally over 80°C
11. Transfer to dining room hot cupboard	No hazard identified	n/a	n/a	n/a	n/a	
12. Hot holding	Germination and outgrowth of spore-forming pathogens	Low	High	No	Hot-holding procedures managed under prerequisite programmes	Prerequisite programmes require monitoring and recording of hot-hold temperatures every 30 minutes through the service period; in reality, hot-hold temperatures are normally over 80°C
13. Make up custard: mix ultra-high temperature milk with custard powder	No hazard identified	n/a	n/a	n/a	n/a	

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Process step	Hazard	Hazard analysis: Likelihood	Severity	Significant hazard?	Control measure	Justification
14. Heat until boiling	Survival of vegetative pathogens – possible contaminants in custard powder	High	High	Yes	Cook until boiling	The HACCP team discussed the possibility of *Salmonella* spp. contamination in custard powder ingredients and decided to consider this a significant hazard
15. Decant into gastronome dish	No hazard identified	n/a	n/a	n/a	n/a	
16. Transfer to hot cupboard in the dining room	No hazard identified	n/a	n/a	n/a	n/a	
17. Hot holding	Germination and outgrowth of spore-forming pathogens	Low	High	No	Hot-holding procedures managed under prerequisite programmes	Prerequisite programmes require monitoring and recording of hot-hold temperatures every 30 minutes through the service period; in reality, hot-hold temperatures are normally over 80°C
18. Transfer to jug on hot servery counter	No hazard identified	n/a	n/a	n/a	n/a	
19. Hot serving	No hazard identified	n/a	n/a	n/a	n/a	
20. Chilled serving (desserts)	No hazard identified	n/a	n/a	n/a	n/a	Chilled desserts taken straight from chiller for service

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Process step	Hazard	Control measure	Critical limits	Monitoring	Monitoring responsibility	Corrective action	Corrective action responsibility	Record
21. Reheating (a) Oven (b) Brat pan	Survival of vegetative pathogens that may have contaminated meals and components since initial manufacture (environmental or handling contaminants)	Cook to centre temperature of 72°C minimum – both oven and brat pan processes	All product achieves core temperature 72°C minimum	Temperature checks with calibrated probes	Assistant chef	Continue to heat until required temperature (72°C minimum) is reached	Chef	Cooking daily check sheet
22. Heat until boiling	Survival of vegetative pathogens – possible contaminants in custard powder	Cook until boiling	Custard to be visibly boiling and meet minimum temperature 80°C	Temperature checks with calibrated probes	Assistant chef	Continue to heat until required temperature is reached	Chef	Cooking daily check sheet

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Serviços alimentares

- verificação e revisão
  - consultor faz auditorias 2 vezes por mês

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Casa

- possíveis perigos microbiológicos
  - *Salmonella* e *Campylobacter* em carne crua
  - *Listeria monocytogenes* em carne pré-cozinhada e queijo de pasta mole
  - *E. coli* O157:H7 em carne picada crua, leite e sumos não pasteurizados e outros alimentos frescos
  - *C. botulinum* em carnes não adequadamente refrigeradas
  - *C. perfringens* em molhos e aves assadas
  - *Bacillus cereus* em arroz e batatas cozidos e inadequadamente refrigerados
  - *S. aureus* em pastelaria com cremes
  - *Salmonella* em carnes para animais domésticos

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Casa

- possíveis perigos microbiológicos
  - *B. cereus* e *S. aureus* produzem toxinas termoestáveis

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Casa

- possíveis perigos químicos
  - alergénios
  - produtos de limpeza
  - pesticidas e raticidas

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Casa

- possíveis perigos físicos
  - pedaços de vidro
  - outros materiais

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Casa

- medidas de controlo
  - usar água potável
  - controlar alergénios
  - não guardar substâncias tóxicas na cozinha ou junto da comida
  - não permitir animais junto da comida
  - controlar contaminação cruzada
    - lavar mãos, separar utensílios para comida crua e cozinhada
  - refrigeração
  - cozinhar alimentos

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Casa

- refrigeração
  - ≤ 4 ºC logo que possível para alimentos perecíveis
  - ter em conta tempo de prateleira
  - refrigerar rapidamente restos de refeições
    - devem ser consumidos no prazo de 48 h e aquecidos a 74 ºC
  - dividir em pequenas porções para arrefecer mais rapidamente
  - verificar temperatura com termómetro
    - temperaturas superiores na porta
  - descongelar no frigorífico ou microondas, não à temperatura ambiente

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Casa

- cozinhar
  - seguir instruções nos alimentos rotulados
  - temperaturas recomendadas para carne (centro térmico)
    - vaca, porco e vaca picada – 71 ºC
    - aves picada – 74 ºC
    - peças grandes – 82 ºC
  - verificar temperatura com termómetro

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Casa

- saneamento e higiene pessoal
  - possíveis causas de contaminação
    - contacto entre alimentos crus e cozinhados
    - equipamentos e utensílios não limpos
    - lavagem de mãos insuficiente
    - preparar alimentos quando doente
    - uso inadequado de toalhas para secar louça
    - contacto com animais enquanto se preparam alimentos
    - fumar, espirrar ou tossir enquanto se preparam alimentos

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Casa

- saneamento e higiene pessoal
  - usar programas de pré-requisitos
    - lavagem e saneamento
    - alterar padrões de consumo de alimentos

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Casa

- possíveis PCCs
  - controlar temperatura de refrigeração
  - controlar temperatura de cozedura
  - remover alergénios quando relevante
  - não consumir leite e sumos não pasteurizados, massas de pão e bolos não cozinhadas
  - restringir consumo de alguns alimentos por pessoas imunocomprometidas

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Casa

- caso de estudo – família com 3 episódios
  - 3 membros com vómitos 2 h após comer refeição com arroz Pilaf
  - 4 membros com diarreia 14 h após comer ganso assado
  - 2 membros e 3 visitantes com vómitos e diarreia 1 dia após barbecue com frango e salada

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Casa

- caso de estudo – família com 3 episódios
  - 1º episódio
    - mãe cozinhou arroz na véspera, colocou quente numa caixa plástica fechada, que colocou na porta do frigorífico
    - esporos de *B. cereus* podem estar presentes no arroz
      - sobrevivem cozedura e crescem se arroz não for rapidamente arrefecido
      - *B. cereus* produz toxina termoestável

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Casa

- caso de estudo – família com 3 episódios
  - 2º episódio
    - ganso assado a temperatura inferior à recomendada (163 ºC)
    - *C. perfringens* pode ocorrer em alimentos cozinhados durante muito tempo ou mantido a temperaturas > 50 ºC até consumo
      - pode produzir esporos
        - esporos podem crescer no intestino e produzir toxinas

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Casa

- caso de estudo – família com 3 episódios
  - 3º episódio
    - mesmas pinças usadas para manipular frango cru e grelhado
    - frango grelhado pode ter sofrido contaminação cruzada com *Salmonella* ou *Campylobacter*
    - frango cru cortado na mesma base que foi depois usada para a salada, sem desinfectar
    - salada pode ter estado na origem da contaminação
      - gema de ovo crua podia estar contaminada com *S. enteritidis*
    - infecções com *Salmonella* tipicamente associadas a vómitos, enquanto as com *Campylobacter* não

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Casa

- caso de estudo – família com 3 episódios
  - plano de segurança alimentar
    - filha tornou-se líder da equipa
      - recolha de dados e monitorização semanal da temperatura do frigorífico
      - ajustes da temperatura quando necessário
    - filho monitoriza temperaturas de cozedura e responsabiliza-se por refrigeração adequada dos produtos
    - mãe monitoriza manipulação dos alimentos e limpa regularmente cozinha
    - pai procura informação e comunica-a à família

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Higiene e Segurança Alimentar

Protecção do consumidor

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Consumidor

- comprador de bens e serviços
- o que consome bens e serviços sem os utilizar para produzir e vender outros bens
  - termo usado no sistema HACCP, em vez de cliente, comprador, ...

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Padrões de protecção

- FAO
- OMS
- *Codex Alimentarius*
- outros padrões internacionalmente aceites

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Políticas governamentais

- possibilitar escolhas informadas e saudáveis por parte dos consumidores
  - incluindo populações mais vulneráveis
- impedir informação enganadora e garantir que informação é fiável
- proteger crianças de publicidade a alimentação não saudável
- garantir a segurança dos alimentos comercializados

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Regulamentação internacional

- Princípios gerais de higiene alimentar do Codex
  - CAC/CXC 1-1969, 2020
    - https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXC%2B1-1969%252FCXC_001e.pdf
- Regulamento (EC) 178/2002
  - http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:031:0001:0024:pt:PDF

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Regulamentação internacional

- **informação ao consumidor**
  - **Regulamento (EU) 1169/2011, 2018**
  - **http://eur-lex.europa.eu/legal-content/PT/TXT/PDF/?uri=CELEX:32011R1169&from=en**

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Rotulagem

- **legibilidade**

Nutrition Facts

Serving Size 1 cup (228g)
Servings per Container 2

Amount Per Serving

Calories 280	**Calories from Fat** 120
	% Daily Value*
Total Fat 13g	20%
Saturated Fat 5g	25%
Trans Fat 2g	
Cholesterol 2mg	10%
Sodium 660mg	28%
Total Carbohydrate 31g	10%
Dietary Fiber 3g	0%
Sugars 5g	
Protein 5g	
Vitamin A 4%	Vitamin C 2%
Calcium 15%	Iron 4%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

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Rotulagem de alergénios

- alergia e intolerância
- se rótulo não puder dar informação sobre presença de alergénios, alimento não deve ser comercializado

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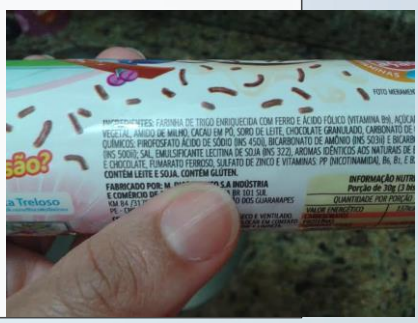
Rotulagem de alergénios

- requisitos de Reg. (EU) 1169/2011, 2013
  - indicados na lista de ingredientes com referência clara ao nome da substância ou produto e individualizados dos restantes ingredientes (tipo de letra, cor, ...)
  - indicar cereais contendo glúten
  - indicar crustáceos e derivados
  - indicar ovos e derivados
  - indicar peixe e derivados
  - indicar amendoins e derivados
  - indicar soja e derivados



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Rotulagem de alergénios

- requisitos de Reg. (EU) 1169/2011, 2013
  - indicar leite e derivados (incl. lactose)
  - indicar frutos secos (amêndoa, avelã, noz, cajú, pecã, castanha-do-Brasil, pistáchio, macadamia e produtos derivados)
    - excepto frutos secos usados para bebidas destiladas e EtOH
  - indicar aipo e derivados
  - indicar mostarda e derivados
  - indicar sementes de sésamo e derivados

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Rotulagem de alergénios

- requisitos de Reg. (EU) 1169/2011, 2013
  - indicar SO_2 e sulfitos em concentração > 10 mg/kg ou 10 mg/L
  - indicar tremoceiro e derivados
  - indicar moluscos e derivados

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Rotulagem de alergénios

- **restaurantes devem mencionar nas ementas**

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Rotulagem de alergénios

- **devido a incerteza científica, princípio de precaução relativo a pigmentos (naturais e sintéticos)**
  - **Regulamento (EC) 1333/2008, 2022**
    - **"pode causar efeitos negativos na actividade e na atenção das crianças"**
      - **amarelo-sol (E110)**
      - **amarelo de quinoleína (E104)**
      - **carmosina (E122)**
      - **vermelho allura (E129)**
      - **tartarazina (E102)**
      - **Ponceau 4R (E124)**

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Rotulagem de alergénios

- "pode conter [alergénico]"
  - só aplicado quando não se tem certeza de poder evitar
- "produzido numa instalação em que se usa [alergénico]"
  - a evitar, porque de difícil compreensão

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Crises

- evento, previsível ou imprevisível, que representa uma ameaça significativa, no imediato ou no futuro, para uma organização, os seus funcionários, consumidores e público em geral

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Crises

Triggered by	Examples of Crises
Advances in science and new scientific development or findings	Acrylamide, Worldwide 2002 Semicarbazide, Worldwide 2003
Emergence of new hazards	Bovine spongiform encephalopathy (BSE) and emergence of prions Worldwide, 1986 *E. coli* O157 (USA, Japan, UK, etc. 1990s) *Vibrio cholerae* (Latin America, 1993) Avian influenza (2004)
Human error: scientific, technical, managerial, operational error or violation	Bovine spongiform encephalopathy (BSE), Worldwide, 1986 *Salmonella* in chocolate (UK, 2006) *Staphylococcus aureus* (Japan, 2000) Vitamin B1-deficient infant formula, ex Germany, Israel, 2003 Isopropylthioxantone (Worldwide, 2005) *Salmonella saint paul* (USA, 2008) *Salmonella typhimurium* (USA, 2008–2009) *E. coli* O104:H4 (Germany, France, 2011)
Fraud or malicious acts of sabotage, e.g. tampering, terrorism	Lead oxide in paprika (Hungary, 1994) Dioxin in animal feed (Belgium, 1999) Sudan red in chili peppers (Europe, 2003) Wheat gluten in pet food adulterated with melamine, ex China (North America, 2007) Adulterated sunflower oil ex Ukraine (Europe, 2008) Infant formula adulterated with melamine (China, 2008)

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Crises

TABLE 41.2 Summary of Lessons Learned from Various Incidents and Crises

Incidents	Lessons Learned
Mineral water contaminated with benzene (France, 1989)	Rapid product recall increases trust Importance of valid information for decision-making Attempts to downplay the extent of an incident will damage the reputation of a company Importance of consistent communication Importance of international coordination
BSE/vCJD (Worldwide, (Europe 1996–2000))	Importance of transparency and ability to communicate uncertainty to public Importance of prioritizing public health over economic considerations Importance of consumer/public perception (e.g. dreadful nature of disease) Need for separation of risk management from risk assessment The social dimension of food safety Importance of traceability and farm-to-fork approach Role of media Importance of risk communication by a global public health authority
S. aureus intoxication; milk (Japan, 1955)	Importance of rapid action (halt of sale, recall of products, and public apology) increases trust
S. aureus intoxication, milk powder (Japan, 2000)	Speed of action Priority to public health Communication: empathy with the victims Full transparency: any attempt of denial, or minimizing the impact (false or partial information, partial product recall) will damage the reputation more Preparation: clear procedures and training Mechanism for reporting problems to management Beware of culture of fear!
Mislabeling of beef product (January, 2001)	A good crisis management does not always help! Fraud and ethical malpractice will not be forgiven
Animal feed contaminated with dioxin (Belgium, 1999)	Importance of speed of action Demonstration of the complexity of the food chain and the need for traceability The need for farm-to-fork approach Role of media Importance of risk perception The need for resources (e.g. laboratories)
Soft drink allegedly contaminated with pesticides (Belgium, France, 1999)	Importance of communication Importance of considering the context of an incident Voluntary recall can increase trust Role of media
Packaging contaminant: semicarbazide (Worldwide, 2003)	Early and transparent communication of the food industry increases trust A rapid risk assessment and communication by trusted sources prevent escalation of a crisis and ensure coherent actions across Europe

(*Continued*)

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Crises

Incidents	Lessons Learned
Packaging contaminant: isopropylthioxanthone (Worldwide, 2005)	Importance of risk assessment and communication by competent authorities Alignment with government views Coordination of government agencies Importance of risk perception Financial consequences can also create a crisis Importance of documentation and records Media plays an immense role
Pet food adulterated with melamine (North America, 2007)	The need for additional resources (e.g. to handle consumer queries) Early reporting to public health authorities to minimize damage Importance of coordination and communication between authorities Importance of considering the fate of disposed products Root cause analysis of incidents and dissemination of our experience can prevent future crises
Sunflower oil adulterated with mineral oil (Europe, 2008)	International coordination to prevent dumping of contaminated food to other countries or food sectors Difference between being allowed to keep a contaminated product already in the market and being allowed to release a contaminated product
Salmonella/Peanut butter (USA, 2006 and 2008/9)	Importance of root cause, corrective actions based on understanding the underlying factors for malpractices
Melamine/Infant formula (China, 2008)	Importance of root cause, corrective actions based on understanding the underlying factors for malpractices Risks associated with fear culture Control of contaminated products and their safe disposal
Enterohemorraghic *E. coli* (EHEC O104:H4) and fenugreek (Germany, France 2011)	Importance of speedy action Validation of information before communication to the general public Coordination among authorities Impact of public fear on food market
Horsemeat (Europe, 2013)	Lack of ethics in food business Complexity of the food chain, limitation of traceability Where there is no ethic, all range of problems can happen and are unpredictable

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Organizações internacionais

- **OMS**
  - **coordena questões de saúde na ONU**
  - **normas, padrões, políticas, apoio técnico e vigilância**
  - **comité de especialistas em aditivos (JECFA)**
  - **reunião conjunta sobre resíduos de pesticidas (JMPR)**
  - **reunião de especialistas sobre avaliação de riscos microbiológicos (JEMRA)**

World Health Organization

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Organizações internacionais

- **FAO**
  - **colabora com OMS**
  - **aconselhamento científico**
  - **fornece indicações a governos e ao Comité do *Codex***
  - **produz diversas publicações e dá formação**
  - **JECFA, JMPR, JEMRA**

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Organizações internacionais

- **Comissão do *Codex Alimentarius***
  - **proteger saúde dos consumidores**
  - **garantir práticas comerciais justas**
  - **publica padrões e códigos**
    - **reconhecidos por Organização Mundial do Comércio**
      - **Acordo sobre a aplicação das medidas sanitárias e fitossanitárias (SPS)**
        - **referência da segurança alimentar**
  - **base para muitos padrões nacionais**

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Organizações internacionais

International Organization for Standardization

- ISO (Organização Internacional de Normalização)
  - 114 normas para produtos e processos alimentares
  - 5 publicações sobre segurança alimentar

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Organizações regionais

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

- CEN (Comité Europeu de Normalização)
  - promoção do comércio global
  - protecção dos cidadãos e do ambiente
    - normas, publicações técnicas
      - normas EN tornam-se normas nacionais
        - uniformização do mercado Europeu
  - > 400 normas e publicações técnicas relacionadas com indústria alimentar

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Organizações regionais

- **EFSA (Autoridade Europeia para a Segurança dos Alimentos)**
  - **referência Europeia para avaliação de risco**
  - **avaliar e comunicar riscos em toda a cadeia alimentar**

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Organizações nacionais

- **FDA (Food and Drug Administration)**
  - **CFSAN (Center for Food Safety and Applied Nutrition)**
  - **autoridade que regula todos os alimentos excepto carnes**
    - **FSIS, USDA**
  - **protecção da saúde pública**
  - **Boas Práticas de Fabrico (GMPs)**
  - **várias outras publicações e normas**
  - **avaliações de risco**

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Organizações nacionais

- **ASAE (Autoridade de Segurança Alimentar e Económica)**
  - **comunicação de riscos na cadeia alimentar**
  - **disciplina do exercício das actividades económicas**
  - **recebe notificações através do RASFF**
    - **Rapid Alert System for Food and Feed**

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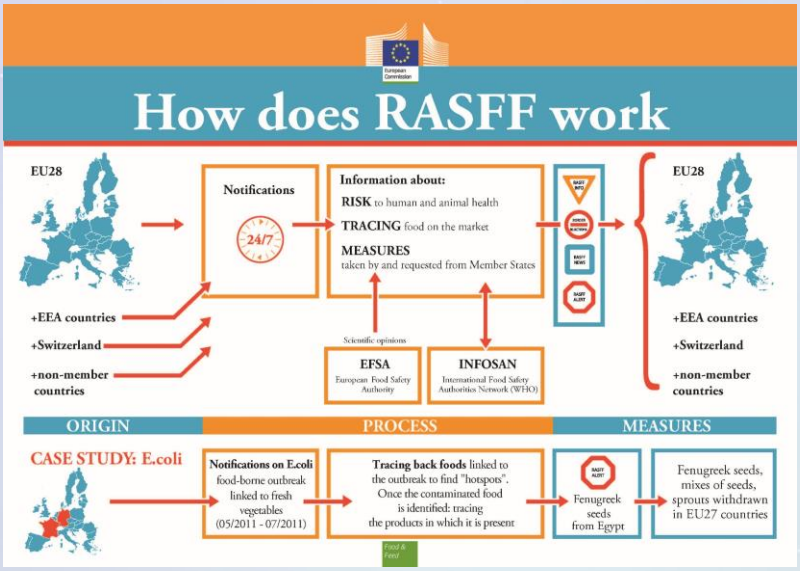

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http://ec.europa.eu/food/safety/rasff/index_en.htm

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Organizações industriais

- GFSI (Global Food Safety Initiative)
  - base Europeia
- ILSI (International Life Sciences Institute)
  - base nos EUA
- ICMSF (International Commission on Microbiological Specifications for Foods)
  - critérios e normas microbiológicos

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Organizações industriais

- EUFIC (European Food Information Council)
  - informação em nutrição, saúde, segurança e qualidade alimentar
    - http://eufic.org
- ...

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