FEED SAFETY AND RISK ASSESSMENT IN A DEVELOPING WORLD

Angela Pellegrino Missaglia
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4 countries produce over 60% of compound feed

Top 4 - % of global total
- China: 19%
- EU: 16%
- USA: 17%
- Rest World: 7%

Global - % by species
- Poultry: 45%
- Ruminant: 26%
- Pig: 20%
- Aqua: 5%
- Other: 4%

Source: IFIF estimates / National & Regional Associations
What does the world eat?

<table>
<thead>
<tr>
<th>Week expenses</th>
<th># People</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>US$ 1,23</td>
<td>1,4 billions</td>
<td>Strategies to meet the lowest level of food security. Eg: Somalia, African Continent</td>
</tr>
<tr>
<td>US$ 69</td>
<td>3,7 billions</td>
<td>Offer of quality food, affordable prices and respecting culture values. Eg: North of Africa, Northeast of Brazil</td>
</tr>
<tr>
<td>US$ 155</td>
<td>1,0 billion</td>
<td>High nutritional food, migrating to proteins. Eg: China, Indonesia, Brazil, BRICS</td>
</tr>
<tr>
<td>US$ 342</td>
<td>±0,7 billion</td>
<td>Market niches with qualitative and precise demands. Eg: Developed countries</td>
</tr>
<tr>
<td>US$ 500</td>
<td>&lt; 0,2 billion</td>
<td>Strategy to offer special foods, highly differentiated. Organic, special... Eg: Japan, Switzerland, Norway, etc..</td>
</tr>
</tbody>
</table>

Source: CÉLERES® based on ONU/FAO/IMF
Maintaining last 40 years APR - times 4!
Animal protein / million metric tons

**APR by product (1970-2010)**

<table>
<thead>
<tr>
<th></th>
<th>Bovine</th>
<th>Poultry</th>
<th>Pigs</th>
<th>Aqua</th>
<th>Milk</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>66.7</td>
<td>98.9</td>
<td>109.3</td>
<td>59.9</td>
<td>722.9</td>
<td>1,057.7</td>
</tr>
<tr>
<td>2050</td>
<td>112.2</td>
<td>650.0</td>
<td>329.9</td>
<td>1,767.5</td>
<td>1,325.9</td>
<td>4,185.5</td>
</tr>
</tbody>
</table>

**In 2050:**
- meats: 1,092 million tonnes + 3.52% APR
- aqua: 1,767 million tonnes + 8.83% APR
- milk: 1,325 million tonnes + 1.52% APR

Who will produce?
Feed production

• To help the demand for sale and affordable food:
  – Skilled labour;
  – Automated manufacturing systems;
  – Use of a wide range of co-products, by-products and surplus raw materials;
  – Investment in research and innovation;
  – Dialogue with consumers and regulatory authorities.

Source: Joint FAO/WHO Expert Meeting on Hazards Associated with Animal Feed
Feed production

– This reflects in:
  • The application of measures based on science and risk assessment;
  • Greater emphasis on prevention and control of contamination during processing;
  • Application of feed safety assurance programmes;
  • Risk-based approach covering the entire food chain.

Source: Joint FAO/WHO Expert Meeting on Hazards Associated with Animal Feed
Producing safe feed

– There is need for generating data on feed contaminations and to develop sampling approaches and plans;
– Sharing of data is important;
– Methodologies that facilitate risk assessment are needed;
– Data should come from industry and also from competent authorities;
– Mechanisms to develop and share data are necessary.

Source: Joint FAO/WHO Expert Meeting on Hazards Associated with Animal Feed
Developing country’s opportunities

- Increase feed production
- Participate in the global food web

Developing country’s challenges

- Meet the demands of feed production worldwide
- Produce safe and sustainable feed
## Risk Assessment x Risk Assessment

**Government**

**Risk analysis (CAC)**

- **Risk assessment**
  - Hazard identification
  - Hazard characterization
  - Exposure assessment
  - Risk characterization

<table>
<thead>
<tr>
<th>Risk</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk</td>
<td>management</td>
</tr>
</tbody>
</table>

**Industry**

### Table: Risk Assessment

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Information available</th>
<th>Source</th>
<th>Raw material rating</th>
<th>Process impact</th>
<th>Process creates hazard</th>
<th>Total risk rating (Raw material x Process)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterobacteriaceae</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>1 (6)</td>
</tr>
<tr>
<td>Pseudomonas</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>1 (5)</td>
</tr>
<tr>
<td>Campylobacter</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>1 (7)</td>
</tr>
<tr>
<td>Clostridium</td>
<td>Not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not applicable</td>
<td>0</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>1 (5)</td>
</tr>
</tbody>
</table>
Risk Analysis and the Feed Safety Management System

- Feed Safety Management System
- HACCP
  - Hazard Analysis and Critical Control Points
- Pre Requisite Programs
- Monitoring Programs

Risk Analysis

Risk Analysis
Risk Analysis and the Feed Safety Management System

Risk Analysis

Risk Assessment
- Hazard identification
- Hazard characterization
- Exposure assessment
- Risk characterization

Risk Management

Data for HACCP

GMP

HACCP

Monitoring and review

Information for HACCP plans
Feed safety in Latin America

- Regulation established in some countries: Brazil, Chile, Uruguay;
- Focus on Good Manufacturing Practices;
- Developments and system implementation driven by exports;
- Feed Latina – STDF project will approach LA and Caribbean countries.
Feed&Food Seguro Latinoamérica

Son objetivos del Programa FEED&FOOD SEGURO LATINOAMÉRICA:

- Desarrollar instrumentos de integración entre los países, información y educación, a través de un Plan aprobado y con la participación activa de FAO y Organismos Reguladores y asociaciones locales con FEEDLATINA como mediadora y facilitadora.
- Compendio Latino-americano de Alimentación Animal: Buenas Prácticas de Fabricación (base FAO y programas nacionales, incluido la versión en español del Feed Manual producido por IFIF y FAO con participación de la Secretaria General de FEEDLATINA); Guía de Instrucciones, Métodos Analíticos y Buenas Prácticas de Laboratorios, Glosario de Productos destinados a alimentación animal (armonización de conceptos)
- Análisis y Gerenciamiento de Riesgos: apoyo con informaciones, redes de comunicación y talleres para el desarrollo de programas oficiales nacionales y regionales.
- Estadísticas del Mercado Latinoamericano: producción nacional y comercio exterior; apertura y armónización de posiciones aduaneras; inteligencia de mercado para mejorar y garantizar el comercio exterior entre los países del bloque y a nivel internacional.
- Programa de Entrenamiento y Capacitación en los países de América Latina y Caribe en temas relacionados a la nutrición responsable, competitividad e innovación, asuntos regulatorios, responsabilidad técnica, buenas prácticas de fabricación y análisis y gerenciamiento de riesgos en la industria e de programas oficiales, para el desarrollo, la educación y concientización de los sectores públicos y privados.
- Enfatizamos que las medidas del proyecto deben facilitar el tránsito de productos y fortalecer el bloque latinoamericano, que hoy es responsable por el 17% de toda la producción mundial de ración y suplementos, con 120 millones de toneladas producidas anualmente.
Feed safety in Latin America

- Regulations focus on pre requisite programs;
- No HACCP approach;
- In house monitoring programs - small quantities of samples;
- Actions driven by regulation;
- Low adherence to voluntary certification programs.
Feed safety in Africa

- Regulation established in South Africa;
- Initiatives starting in Nigeria, Ethiopia;
- Basic concepts of feed safety still not implemented by industry;
- Lack of laboratory infrastructure;
- Great potential to change the present situation.
Elements of food safety systems at the national level

• Food laws, policies, regulations and standards;
• Institutions with clearly defined responsibilities for food control management and public health;
• Scientific capacity;
• Integrated management approach;
• Inspection and certification;
• Diagnostic and analytical laboratories;
• Standard setting;
• Infrastructure and equipment;
• Monitoring structures and capabilities;
• Surveillance of human health problems related to food intake;
• Capacity for emergency response;
• Training;
• Public information, education and communication.

Source: FAO Food Safety Risk Analysis
<table>
<thead>
<tr>
<th>Hazard/Feed/Edible Product – Combination 1</th>
<th>Step 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normalized value</strong></td>
<td>0 (low)</td>
</tr>
<tr>
<td><strong>Criterion 1 – Occurrence level in feed</strong></td>
<td>&lt; 10%</td>
</tr>
<tr>
<td><strong>Criterion 2 – Transfer from feed to edible product</strong></td>
<td>&lt; 5%</td>
</tr>
<tr>
<td><strong>Criterion 3 a - Toxicity of chemical hazard</strong></td>
<td>&gt; 1 mg/kg bw/day</td>
</tr>
<tr>
<td><strong>Criterion 3 b – Health effects of biological hazards</strong></td>
<td>&lt; 0,1</td>
</tr>
<tr>
<td><strong>Criterion 4 – Impact on feed availability</strong></td>
<td>Replacement easy</td>
</tr>
<tr>
<td>Hazard/Feed/Edible Product – Combination 1</td>
<td>Value</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Criterion 1 – Occurrence level in feed</td>
<td>&lt; 10%</td>
</tr>
<tr>
<td>Criterion 2 – Transfer from feed to edible product</td>
<td>5 – 50%</td>
</tr>
<tr>
<td>Criterion 3 a – Health effect of hazard</td>
<td>&lt; 1μg/kg pc/dia</td>
</tr>
<tr>
<td>Criterion 4 – Impact on feed availability</td>
<td>Baixo</td>
</tr>
</tbody>
</table>

**Score**

0,5
Risk Analysis
Proposed models in Latin America

Regional Policy

Regional Committee

Risk Assessment

Risk Management

Risk Communication

Universities
Research Institutes
Labs

Countries

Countries and Committee

Data bank
Assessment required

Information to countries

GROUP 3
Risk Analysis
Proposed models in Latin America

Country Presidency

Feed and Food Safety Agency

Management Commitees

Feed and Food legal framework

Risk assessment
Risk communication

Agriculture Ministry
Health Ministry
Environment Ministry
Others
Trends and paradoxes

Risk assessment trends

- **Tier 1** – Qualitative uncertainty assessment
- **Tier 2** – Simple (semi-qualitative) analysis
- **Tier 3** – Full quantitative probabilistic risk assessment

Risk management paradox

- Risk
  - Raw materials
  - Feed
  - Farm
  - Processing
  - Market
- Control
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