Manufacturing Management and Quality Control of Animal Feed of Feed manufacturer in Japan

15 January 2019, Tokyo, Japan
OIE Regional Workshop on Animal Feed Safety
Shuichi Tanaka
Nosan Corporation
s_tanaka@nosan.co.jp
Introduction

• Shuichi Tanaka
• Nosan Corporation
  Director of Quality Assurance Department
• Japan Feed Manufacturers Association
  Establishment : 9th April 1957
  Member : 46 members with 71 mills (as of Aug. 2018)
  Technical committee vice chairman
Contents of today's presentation

• Outline of Japanese feed industry

• Quality control and management in Japanese feed companies
  Historical story / Key guidelines

• Challenge for the future of Japanese feed industry
feed industry in Japan
In 2016, The world's production of animal feed is about 1 billion ton.

The production volume in Japan is 24 million tons.

The same production volume as Germany and Spain.
Formulation of compound feed

- **Production volume of compound feed**
  - April 2017 - March 2018
  - 23.4 MT

- **Japan's feed grain import volume**
  - April 2017 - March 2018
  - **Corn**: 10.62 MT
  - G.Sorghum: 0.37 MT
  - Wheat: 0.40 MT
  - Barley: 0.97 MT
  - Other: 0.06 MT
  - **Total**: 12.42 MT

Source: MAFF
Animal Feed Production in Japan (Compound feed/1,000 metric ton)

→ 1985 Plaza Accord

→ 1986-1994 Uruguay Round

→ 1988～ Negotiations on agricultural products between Japan and the United States

## Trends of the top 5 items of imported agricultural products in Japan

### (Based on imported value)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wheat</td>
<td>Corn</td>
<td>Corn</td>
<td>Corn</td>
<td>Pork</td>
<td>Pork</td>
</tr>
<tr>
<td>2</td>
<td>Soy</td>
<td>Soy</td>
<td>Soy</td>
<td>Beef</td>
<td>Tobacco</td>
<td>Corn</td>
</tr>
<tr>
<td>3</td>
<td>Crude sugar</td>
<td>Wheat</td>
<td>Wheat</td>
<td>Alcoholic beverage</td>
<td>Beef</td>
<td>Tobacco</td>
</tr>
<tr>
<td>4</td>
<td>Corn</td>
<td>Crude sugar</td>
<td>Crude sugar</td>
<td>Pork</td>
<td>Fresh and dried fruits</td>
<td>Beef</td>
</tr>
<tr>
<td>5</td>
<td>Beef tallow</td>
<td>Grain sorghum</td>
<td>Coffee beans</td>
<td>Tobacco</td>
<td>Corn</td>
<td>Fresh and dried fruits</td>
</tr>
</tbody>
</table>


## Trend of self-sufficiency rate of livestock products (%)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk &amp; Dairy products</td>
<td>81</td>
<td>85</td>
<td>72</td>
<td>68</td>
<td>65</td>
<td>65</td>
<td>64</td>
<td>63</td>
<td>62</td>
<td>62</td>
<td>60</td>
</tr>
<tr>
<td>Meat (total)</td>
<td>77</td>
<td>81</td>
<td>57</td>
<td>54</td>
<td>54</td>
<td>55</td>
<td>55</td>
<td>54</td>
<td>53</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Beef</td>
<td>81</td>
<td>72</td>
<td>39</td>
<td>43</td>
<td>40</td>
<td>42</td>
<td>41</td>
<td>42</td>
<td>40</td>
<td>38</td>
<td>36</td>
</tr>
<tr>
<td>Pork</td>
<td>86</td>
<td>86</td>
<td>62</td>
<td>50</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>51</td>
<td>51</td>
<td>50</td>
<td>49</td>
</tr>
<tr>
<td>Chicken</td>
<td>97</td>
<td>92</td>
<td>69</td>
<td>67</td>
<td>66</td>
<td>66</td>
<td>67</td>
<td>67</td>
<td>66</td>
<td>65</td>
<td>64</td>
</tr>
<tr>
<td>Egg</td>
<td>97</td>
<td>98</td>
<td>96</td>
<td>94</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>96</td>
<td>97</td>
<td>96</td>
</tr>
</tbody>
</table>

Animal feed production for each type of livestock (compound feed / 1,000 metric ton)

Location of compound feed factory

Production volume of compound feed for each prefecture
April 2017 - March 2018

Hokkaido 3.5MT
Aomori 2.0MT
Ibaraki 4.1 MT
Kagoshima 4.2 MT

April 2017
Number of companies: 65
Number of feed mills: 115
Most of feed mills are located in the port area on the Pacific side
Integration of feed mills were progressing in large port area.
### Types of feed for livestock

<table>
<thead>
<tr>
<th>livestock</th>
<th>physical property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layer</td>
<td>Mash/Pellet/Crumbles</td>
</tr>
<tr>
<td>Broiler</td>
<td>Mash/Pellet/Crumbles</td>
</tr>
<tr>
<td>Swine</td>
<td>Mash/Pellet/Crumbles/Granulated powder (Milk replacer)</td>
</tr>
<tr>
<td>Dairy</td>
<td>Pellet and Flaked Grain/Mash/Pellet/Granulated powder (Milk replacer)</td>
</tr>
<tr>
<td>Beef</td>
<td>Pellet and Flaked Grain/Mash/Pellet</td>
</tr>
</tbody>
</table>

Many types of compounded feed in Japan.

Heat treatment improve feed efficiency.

Many brands at the factory. 177 brands per feed factory (MAFF, 2005)

http://chikusangenki.sakura.ne.jp/2015/12/04/story02_001/
Characteristics of feed industry in Japan

• Depend on imports for most of feed ingredients.
  • Importance of information from suppliers / importers.
  • Importance of quality control of suppliers / importers.

• There are lots of types and brands of feed at the feed factory.
  • Manufacturing management and quality control are complicated.

• Genetic improvement of livestock and progress of livestock management.
Quality control and management in Japanese feed companies
Feed Safety Act in 1953

- After 1945, it was necessary to secure the amount of feed
- Quality Improvement of Feeds in 1954
- Safety rules were added in 1976
  - Dark oil accident (PCB)
  - Dicyandiamide / Ammeline accident
  - Veterinary drug
- “Guidelines for the manufacturing and quality managements of feeds containing antimicrobial feed additives" in 2007.
  - Beginning of the process approach.
Salmonella in feed

Historical affairs

• In the 1990's, salmonella contamination of feed was often caused by imported MBM.

• In 1998, Guidelines for formula feed mill to prevent/reduce Salmonella.
Guidelines for formula feed mill to prevent/reduce Salmonella

- Guidelines for feed mill
  - In 2009, voluntary guidelines for suppliers of feed ingredients

Key requirements of guidelines
- Control of feed ingredients
  - Supplier / transport · acceptance · storage / inspection
- Facilities & Equipment
  - Residue / condensation / shipping container / storage location / inspection
- Factory Hygiene control
  - Environment / harmful birds and beasts
- Management system
  - Organization / preparation of manual / education training
## Proportion of feed ingredient samples Salmonella-positive

<table>
<thead>
<tr>
<th>Year</th>
<th>Animal protein feed</th>
<th>Oil seed meal</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988～1989</td>
<td>14.7</td>
<td>-</td>
<td>6.7</td>
<td>14.6</td>
</tr>
<tr>
<td>1990～1991</td>
<td>15.3</td>
<td>15.4</td>
<td>4.3</td>
<td>14.2</td>
</tr>
<tr>
<td>1992～1993</td>
<td>8.1</td>
<td>0.0</td>
<td>16.1</td>
<td>8.5</td>
</tr>
<tr>
<td>1994～1995</td>
<td>8.8</td>
<td>6.7</td>
<td>0.0</td>
<td>8.2</td>
</tr>
<tr>
<td>2000</td>
<td>1.6</td>
<td>1.8</td>
<td>4.3</td>
<td>1.9</td>
</tr>
<tr>
<td>2005</td>
<td>3.9</td>
<td>0.0</td>
<td>14.3</td>
<td>4.5</td>
</tr>
<tr>
<td>2015</td>
<td>2.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Source: Japan Scientific Feeds Association / Famic
### Number and proportion of formula feed samples Salmonella-positive

<table>
<thead>
<tr>
<th>Fiscal year</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of samples positive/examined</td>
<td>Proportion positive (%)</td>
<td>Number of samples positive/examined</td>
<td>Proportion positive (%)</td>
</tr>
<tr>
<td><strong>Formula feed</strong></td>
<td>0/141</td>
<td>0.7%</td>
<td>0/134</td>
<td>0.0%</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Fiscal year</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of samples positive/examined</td>
<td>Proportion positive (%)</td>
<td>Number of samples positive/examined</td>
<td>Proportion positive (%)</td>
</tr>
<tr>
<td><strong>Formula feed</strong></td>
<td>1/141</td>
<td>0.7%</td>
<td>0/134</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Source: Food and Agricultural Materials Inspection Center (A Surveillance of Salmonella Contamination in Feeds)

In 2016, Salmonella contamination of corn was confirmed.
Reason why % of samples positive goes down.

• Attention was paid to the cleanliness of feed ingredients.
• Importation of MBM was stopped due to the occurrence of BSE (2001).
• Many feed factory practice 5S.
  • 5S is a workplace organization method that uses a list of five Japanese words: seiri (整理), seiton (整頓), seisō (清掃), seiketsu (清潔), and shitsuke (躾). These have been translated as "Sort", "Set In order", "Shine", "Standardize" and "Sustain".[1]

https://en.wikipedia.org/wiki/5S_(methodology)
BSE in Japan

Year when BSE was confirmed

In September 2001, BSE was confirmed for the first time in Japan.

October 2001: regulation of feed for BSE

The last case concerning BSE was the cow born in January 2001

Birth year of cattle infected with BSE

The situation of occurrence of BSE in Japan
Feed regulation for BSE in 2001

BSE guidelines (Guidelines for the prevention of ruminant-feed contamination with animal-derived proteins) established in 2003

• Forbidden to use meat and bone meal, fish meal, animal fat and oil as cattle feed.
  Monitoring that protein derived from cattle.

• All manufacturing process of feed for ruminant were separated from other feeds (manufacturing, shipping, transportation, storage, feeding at the farm).

• This BSE regulation is considered to be effective. But⋯
Antibiotics (as feed additives)

Issues of antibiotics in feed

- In the 1950's, addition of antibiotics to feed.
- Antibiotics as feed additive in 1976.
- From 1978, analysis of the final product before shipment is required (salinomycin/ monensin etc.)
- 1997, Antimicrobial Resistance (Revocation of Avoparcin as feed additive).
- “Guidelines for the manufacturing and quality managements of feeds containing antimicrobial feed additives" in 2007.
Guidelines for “antibiotics”

Transition from management through analysis of final products to process management.

Key requirements of guidelines
- Organization (responsibility and authority)
- Management of premix (confirmation to supplier)
- Facilities & Equipment (especially weighing facilities / mixer)
- Inventory of premix
- Periodic check of weighing record / Inventory volume
- Inspection of final product (as monitoring)
- Measures when an abnormality occurs/ complaint handling/ salvage procedure
- Self-audit / Education and training

Confirmation of management system by FAMIC

We don’t need analysis of the final product before shipment!
Guidelines for the prevention of feed-contamination with harmful chemical substances 2008

Background

• BSE occurrence 2001
• Positive list system of food was started
• Malachite green in Chinese fish powder 2006
• Melamine of Thai fish meal 2007
Guidelines for the prevention of feed-contamination with harmful chemical substances 2008

Key Point
Consider feed chain
The target of the guideline is pesticide residues, mycotoxins, heavy metals

Key requirements of guidelines
• Role of the MAFF
• Role of raw material importers
• Guideline for feed manufacturer (process management)
• Guidelines for shipping and storage
• Response when there is a possibility of production of harmful livestock products
Guidelines for the Good Manufacturing Practice (GMP) of feeds in 2015
The approval process by FAMIC was established in 2016

Key Point

- Integrated the four guidelines that were set for each hazard (Salmonella/BSE/ Antibiotics (as feed additives)/ harmful chemical substances).
- It is intended to shift from control by analysis of final products to process management.
- Promote voluntary initiatives of feed chain operators (Feed manufacturer, Raw material supplier, Importer, Distributor).
- General hygiene control requirements.
- Recommendation for introduction of HACCP.
future issues of our feed industry
Challenge for the future

• Continuous improvement on nutrition / Genetic ability of livestock

• Harmonization
  • Necessary to harmonize the regulation of feed area / EPA (EU) and TPP11.
  • Whether antibiotics as feed additives can be continued.

• Zero risk
  • Review of strict zero risk management is necessary.

• Promotion of HACCP approach

• Cooperation with FSMS of farm (JGAP · FARM HACCP)

• Biosecurity
  • Classical swine fever/African swine fever / PED etc.

• New social requirements such as SDGs.
  • Environment · AMR · GFSI scheme etc.
Thank you.