TECHNOLOGICAL INNOVATION TO SUPPORT THE DEVELOPMENT INDONESIAN DAIRY SECTOR

Indodairy Inception Workshop
Bogor, 17 November 2016
1. Milk production: 1.01 million ton
2. National demand: 2.84 million ton
3. Imported milk: 1.84 million ton (64.4%)
4. Milk consumption: 11.1 kg/capita/year (6th of 7 ASEAN countries)
## Projected Milk Demand and Production in Indonesia

(Developed by the Coordinating Ministry for Economic Affairs, 2014)

<table>
<thead>
<tr>
<th>Details</th>
<th>2011</th>
<th>2015&lt;sup&gt;4)&lt;/sup&gt;</th>
<th>2020&lt;sup&gt;4)&lt;/sup&gt;</th>
<th>2025&lt;sup&gt;4)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (000)</td>
<td>244.776</td>
<td>255.881</td>
<td>274.944</td>
<td>295.428</td>
</tr>
<tr>
<td>Consumption (L/capita/year)</td>
<td>11</td>
<td>15</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Total consumption (000 ton)</td>
<td>2.693</td>
<td>3.838</td>
<td>5.499</td>
<td>8.863</td>
</tr>
<tr>
<td>Dairy cows population (000 head)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FH Cow&lt;sup&gt;1)&lt;/sup&gt;</td>
<td>597&lt;sup&gt;1)&lt;/sup&gt;</td>
<td>782</td>
<td>1,097</td>
<td>1,766</td>
</tr>
<tr>
<td>non FH&lt;sup&gt;2)&lt;/sup&gt; cow</td>
<td>14,400&lt;sup&gt;1)&lt;/sup&gt;</td>
<td>21,083</td>
<td>33,954</td>
<td>54,683</td>
</tr>
<tr>
<td>Buffalo&lt;sup&gt;3)&lt;/sup&gt;</td>
<td>1,305&lt;sup&gt;1)&lt;/sup&gt;</td>
<td>2,101</td>
<td>3,383</td>
<td>5,450</td>
</tr>
<tr>
<td>Goat&lt;sup&gt;3)&lt;/sup&gt;</td>
<td>18,000</td>
<td>20,000</td>
<td>25,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Dairy cows productivity (L/lactation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FH cow</td>
<td>3,000</td>
<td>3,500</td>
<td>4,500</td>
<td>6,000</td>
</tr>
<tr>
<td>non FH cow</td>
<td>-</td>
<td>750</td>
<td>900</td>
<td>1,200</td>
</tr>
<tr>
<td>Murrah buffalo dairy</td>
<td>1,800</td>
<td>2,100</td>
<td>2,700</td>
<td>3,000</td>
</tr>
<tr>
<td>Dairy goats</td>
<td>75</td>
<td>120</td>
<td>150</td>
<td>180</td>
</tr>
<tr>
<td><strong>Daily total production</strong>&lt;sup&gt;-1&lt;/sup&gt; (000 kg)</td>
<td>4,000</td>
<td>5,200</td>
<td>12,325</td>
<td>28,871</td>
</tr>
</tbody>
</table>

1) Census 2011; 2) Betina Ongole 14%; 3) 30% female; 4) Projection
2) Source: Coordinating Ministry for Economic Affairs, 2014
Minister of Agriculture Policy (Bogor, 15 Nov 2016)

• Milk pricing policies that benefit farmers (Permentan ... / 2016)
• Pregnancy dairy cows 500 thousand head / year, in line with SIWAB
• The provision of land for planting HPT (cooperation with Perhutani)
• Replacement program for dairy cattle rearing
I. REPRODUCTION TECHNOLOGY

OBJECTIVE:
improving reproductive efficiency of livestock that are expected to improve pregnancy rate and increase in births

1. Chilled semen:

- Preserving cement at 5 °C
- Assist the preparation of cement in the region who have difficulty Liquid Nitrogen
- There are superior males and from 10 disease-free
- The shelf life of 7 days
- The success of pregnancy 70%
- The success of the birth of 65%
2. Sperm Separation X & Y:

- Prevent freemaartin cases
- Sperm separation is done by sephadex column
- Getting calf with gender expected in the dairy cow births a female child (heifer) is expected
- The birth of a female child be 60-77%
3. Decreasing sperm concentration in Straw Frozen Semen

Impairment testing Sperm concentration (standard 25 million)

Decrease I:
Kons Sperm 20 million

Decrease II:
Kons Sperm 15 million

2 superior male with protein markers:
Genotipe AB
Genotipe BB

1. Can decrease up to 15 million
2. Birth success rate 65%
4. Nano Hormon

Nano Technology
- Particle dispersion/solid size 10-1000 nm
- Potential components hormone carriers (hCG, PGF2α)
  a. Hormone stability
  b. Protection of rapid degradation and transport of hormones
  c. Release control

Spray Application
- Non-invasive
- Technology breakthrough

Limited:
- Quickly degraded
- Livestock stress

Injection CIDR Spons

Simultaneously lust, IB, and pregnant
5. Microencapsulation of Spermatozoa

- Encapsulation of cells → strategy to entrap living cells in a semi-permeable membrane
- Microencapsulation is defined from the size of the resulting capsules, where capsule with a size of 0.3-1.5 mm
- Microencapsulation research spermatozoa is still very limited and not optimal
- Mikroencapsulation spermatozoa technology:
  1. Enhancing the vitality and stability of spermatozoa membrane on a longer time. Prevent reflux spermatozoa current IBPagositocyt prevent action in the female reproductive tract
- Important to overcome the problems associated with OPTIMAL TIME MARRIED and VARIATION OVULATORY
II. Veterinary Technology

1. INFECTIOUS BOVINE RINOTRACHEITIS (IBR)

- Caused by *Bovine herpesvirus-1 (BHV-1)*
- Di Jawa Tengah dIn Central Java and West Java prevalence of IBR is more pronounced than with other reproductive diseases
- Innovation:
  - IBR vaccines to prevent diseases
  - ELISA technology development for early diagnosis and monitoring of post-vaccination IBR
2. Mastitis

- 2 types of mastitis: clinical and subclinical
- Germs are resistant to tetracycline (37.46%), ampicillin (25%) and gentamicin (21.87%)
- Disadvantages: lowered milk production, increase the cost of care, treatment, increasing the milk is wasted, increasing replacement cows, calves die / grow slowly.
Innovation:
- Isolation and identification of germs that cause mastitis
- Introductions herbal medicine (betel leaf) as an alternative to antibiotics
III. Feeding Technology

1. BIOPLUS,
   - probiotics, improve the efficiency of use of forages dosage: 350 g / head, 1x 8-month pregnant mother, early dry on all livestock.
   - Bioplus fiber for cattle weaning, growth, male and parent
   - Biopus calf to calf that has not been weaned, accelerate the improvement of digestive system rumen

2. Calcium grease (Kalsium Lemak-KALEM)
   - To improve milk synthesis and production
   - 3. Mineral Zn+Caroten)
   - Prevent deficiency mineral Zn in the body
IV. Post-harvest technology

- Suppression of bacterial contaminants milk through hygienic milking techniques
- Buffalo milk processing technology improvements in West Sumatera (dadiah)
- Dried starter manufacturing technology for yoghurt and dadiah
4. Technology of quick calculation of milk bacteria

5. Research the production of fresh white cheese (fresh white cheese), low fat content of vegetable fat enriched probiotic L. casei, has the potential to prevent heart disease

6. Research dried fermented milk probiotic (L. casei and Bifidobacterium longum), containing probiotic bile salt resistant and low pH gastrointestinal tract, are rich in calcium and phosphorus
7. MILK PROCESSING

1. Fermented Milk (preventing diarrhea, gastroenteritis)
   • Lactic acid L.bulgaricus + S. thermophilus: yoghurt
   • kefir grains Streptococcus, lactobacilli: kefir
   • c. rennet / animal enzymes: cheesed. plant enzymes: Dalie.
   D. inside bamboo: Curds

2. Milk pasteurization and sterilization
   • Pasteurized: LTLT, HTST, UHT
   • sterilization: UHT 137-1400 C 2-5 seconds

3. Butter: Churning cream

4. Milk caramel: caramelize the sugar + milk

5. Ice cream: a mixture of various materials

6. Milk tofu: milk which is not fresh
CLOSING

• IAARD has resulted in food technology, reproduction, breeding, disease diagnostics and are ready to be applied
• Application of various technologies that will be able to improve the efficiency of milk production by up to 25% (decrease in feed costs, increasing productivity, accelerating time mating)
• Application technology joint dairy cattle farmers will increase milk production, improve the marketability and income of farmers
Thank You