Exploit full genetic potential with optimized nutrition
The (st)art of growing

- Exploit full genetic potential
  - Lean and tall growth
  - Optimal carcass development
  - Early calving (≤24 months)
- Optimal Health and Development
- Stimulate concentrate feed intake
- Products based on high-quality raw materials
IMMUNOGLOBULINS

- Source: Whey powder and whey protein concentrate from selected origin
- Low-heat treatment - less denaturation - Improved availability of digestible protein
- Active immunoglobulins measured by specific antibody-based technique
- Immunoglobulins active on gut level against pathogens

✔ Nukamel guarantees immunoglobulin levels on selected products

MILK POWDER HEAT TREATMENT

- Milk powder classification: Low - Medium - High heat
- Heat treatment related to extent of protein denaturation
- Extent of denaturation influences clot formation
- Use of low-heat milk powder increases health and performance

✔ Nukamel selects dairy ingredients that have received low-heat treatment

Data from Nukamel research (2016): data corrected for weight at day 0 and concentrate feed intake.
**COCONUT OIL**

- Short- to medium-chain fatty acids ➜ antibacterial properties
- High digestibility for young calves
- Improved taste - increased intake
- Low melting point - improved solubility in water

✔ Nukamel’s products are based on a high level of coconut oil

**TYPICAL FATTY ACID COMPOSITION (%) OF COCONUT OIL AND PALM OIL**

<table>
<thead>
<tr>
<th>FATTY ACID</th>
<th>COCONUT OIL</th>
<th>PALM OIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>C8:0</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>C10:0</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>C12:0</td>
<td>45</td>
<td>-</td>
</tr>
<tr>
<td>C14:0</td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td>C16:0</td>
<td>9</td>
<td>42</td>
</tr>
<tr>
<td>C18:0</td>
<td>3</td>
<td>5</td>
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<tr>
<td>C18:1</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>C18:2</td>
<td>2</td>
<td>10</td>
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</table>

**DATA FROM NUKAMEL RESEARCH (2016): DATA CORRECTED FOR WEIGHT AT DAY 0.**

**WEIGHT - DAY 56 (KG)**

<table>
<thead>
<tr>
<th>P/C = 20/80</th>
<th>P/C = 80/20</th>
</tr>
</thead>
<tbody>
<tr>
<td>91.4</td>
<td>89.9</td>
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</tbody>
</table>

**SPRAY-COOLING TECHNOLOGY**

**BENEFITS**

- Improved fat digestibility
- Maze structure: simultaneously available fat and protein
- Improved solid feed intake
- Improved solubility
Foundations of Nukamel Technology

EMULSIZYM®

Nukamel’s Emulsizym® technology has been developed as an answer to restrictions in the use of antimicrobial growth promoters (AGP). Emulsizym® replaces AGP in a natural way. It means that Nukamel’s calf milk replacers are fully optimized with respect to health and digestion. Emulsizym® therefore forms a crucial part in the strategy towards antibiotic reduction. The right choice and combination of raw materials are essential to its success.

EMULSIZYM®4SEASONS

Due to increased pressure for a further reduction in the antibiotics use in animal feed, Nukamel has taken the Emulsizym® concept to the next level. In 2011, Nukamel developed a seasonal concept: Emulsizym® 4seasons.

✔ Summer: Optimal Performance
  - Additional building blocks
  - 10% surplus of Lysine, Methionine and Threonine
  - Phytogenic nutrients
    Stimulates digestive enzyme secretion & holds antibacterial activity

✔ Winter: Optimal Health
  - Supplemented with digestive oils rich in omega-3 fatty acids
  - Beneficial microbial strains
    - Regulate the microbial balance
    - Produce extracellular enzymes - increased digestibility
    - Reduce incidence of diarrhea
    - Restore the microbial flora after antibiotics
Optimal nutritional solutions for conventional and accelerated growth programs

CONVENTIONAL
✔ Safe and comfortable
• Restricted milk replacer intake
• Focus on concentrate feed intake at early age
• Enables early weaning
• Widely applicable in different systems and different dairy breeds

EFFECT OF PROTEIN LEVEL ON CALF PERFORMANCE
GROWTH DAY 56 - RELATIVE TO 16% CRUDE PROTEIN

ACCELERATED GROWTH
✔ Exploiting the full genetic potential
• Superior plan of nutrition during pre-weaning stage, resulting in increased growth
• Metabolic programming through early life nutrition
• Pre-weaning average daily gains associated with productive performance
• Early (< 24 months) first calving enabled
• Economically efficient early gains

Overview of the effects of increased growth pre-weaning on first lactation milk yield, when comparing intensive feeding programs with conventional feeding programs. (Adapted from Soberon and Van Amburgh, 2013)
HOW TO GET THERE
Our guidelines for optimal calf rearing

COLOSTRUM FEEDING
Triple A rule:
Give high-quality colostrum:
1. As soon as possible (<4h)
2. As much as possible (>4L)
3. As often as possible

Accelerated Growth Program

Conventional Program

Colostrum

0 days 3 days 7 days Age of the calf 10 weeks

Concentrate feed

Calves can be weaned when they eat > 1.5 kg concentrate feed per day
BUCKET FEEDING

1. 2/3 : 50 - 60°C
2. + 1/3

AUTOMATIC FEEDING

- Min. concentration 145g +1L water (~125 g/l)
- Regularly calibrate powder and water outflow
- Check for alarms twice daily
**PRODUCT OVERVIEW**

**Unique points**

<table>
<thead>
<tr>
<th>Protein Content</th>
<th>Nukamel Yellow</th>
<th>Nukamel Blue</th>
<th>Fokkamel Plus</th>
<th>Fokkamel Extra</th>
<th>Fokkamel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy Ingredients</td>
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<tr>
<td>Skimmed Milk Powder</td>
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<tr>
<td>Whey Protein</td>
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<tr>
<td>Immunoglobulins</td>
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</tr>
<tr>
<td>Coconut oil</td>
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<td>Acidified</td>
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<td>Emulsizym®</td>
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<tr>
<td>Automatic feeding</td>
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<td>24-hour Stable</td>
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<tr>
<td>Start After Colostrum</td>
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<tr>
<td>Accelerated Growth Programs</td>
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