Focus Area 1

Efficiency matrix exercise
Introduction - defining the issue

Causal diagram of effects of meat and dairy consumption and points of intervention

**Examples**
- Housing
- Prevention health schemes
- Herd management
- Increase conversion ratio
- Strategic feeding practices
- Strategic cropping
- Grass seasonal utilization
- Balancing inventories/forage offer

**Points of intervention**
- Consumption shifts
- Reduction in food losses
- Improved systems, breeds
- Management
- Feed conversion and composition
- Crop yields
- Land management

**Effects**
- Human health
- Animal welfare
- Climate change
- Loss of biodiversity
- Nitrogen emissions
- Greenhouse gas emissions
- Nitrogen
- Feed
- Manure
- Land (use)

Source: Adapted from FAI output, Henk, Westhoek

FAI meeting. Paris, March 19-20-2014

Efficiency matrix
Background - What we had

**LIVESTOCK PERFORMANCE**
- Mortality
- Daily weight gain
- Yields/unit
- Weaning %
- Intercalving period
- Herd structure
- Replacement rate
- Live weight
- Slaughter weight
- Methane em./unit

**FORAGE PRODUCTION**
- Yields
- Dry matter
- Water use effic.
- Grass off take %
- Syntethic fertilizer per manure
- for N&P applied on feed pasture %

**ANIMAL FEEDING**
- Feed conversion (herd level)
- kg feed/kg product
- Home grown prod.
- Purchase feed level
- By-products use
- Feed digestibility
- Application of prec. farming techniques
- Irrigation
- Protein concentration
- Soil carbon sequestration
- Diet components
- Use of medication
- Effect of composition
- Bedding material intake
- Legumes within forage
- Appl. Prec. F.T
- Nutrients level (protein phosphorus)
- Amount of anti./animal unit

**ANIMAL HEALTH**
- Mortality
- Loss of products
- Impact of disease medication
- Welfare systems
- Mastittis
- Lameness
- Other metabolic diseases
- Body condition
- Easy calving
- Acidity
- Other diseases (E. Coli)

**MANURE MNGMT SYSTEM**
- Like „Syntethic fertilizer per manure for N & P applied on feed/pasture (%)” + IPCC
- Nutrient use effiency of whole production system (from field to fork)
- Type of system to management (dip, biodigester, reactor)
- Waste water quantity and qualitys, laggons, etc.
- Dry matter
- Use as fertilizer
- Air pollution
- Water pollution

**HOUSING**
- Energy use
- Manure storage eff.
- Manure treatment
- Bedding materials
- Water consump.
- Appli.P.F.T.

**EMISSIONS CONTROL**
- Abatement technologies

**RESOURCE USE**
- Water use (drinking, cleaning, irrigation, etc.)
- Energy use (type and quantity)
- Nutrient use (Nitrogen and phosphorus) per area, animal, kg of feed

**ECONOMY**
- Efficiency matrix

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The matrix

### Efficiency matrix and NRU metrics

<table>
<thead>
<tr>
<th>Efficiency areas</th>
<th>Indicators</th>
<th>Evaluation areas</th>
</tr>
</thead>
</table>
| **LAND & GRAIN PRODUCTION** | - Yield/ha  
  - % dry matter  
  - Energy  
  - Nitrogen availability  
  - % of total production sold/used | Economic evaluation when closing the efficiency gap |
| **ANIMAL FEEDING** | - Fresh/dry matter intake  
  - Feed ration composition  
  - Feed ration intake per ingredient  
  - % of purchased feed  
  - % Home grown produced  
  - Protein, energy and fiber content/ingredient  
  - Feed conversion ratio | Environmental evaluation when closing the efficiency gap |
| **LIVESTOCK PERFORMANCE** | - Herd performance  
  - Reproductive performance  
  - No. Animals transferred or sold to other production units | Social evaluation as well as animal welfare when closing the efficiency gap |
| **ANIMAL HEALTH** | - Mortality distribution by age group  
  - % disease incidence by age group  
  - % disease prevalence by age group | |
| **MANURE MANAGEMENT SYSTEM** | - Methane emission per unit/year  
  - Manure applied as % total produced  
  - Synthetic fertilizer applied/ha/year  
  - Manure applied per ha/year | |

**NATURAL**

- Land

**RESOURCES**

- Water

**USED**

- Nutrients

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How to use the matrix - some examples

Efficiency matrix and NRU metrics

Causal diagram of effects of meat and dairy consumption and points of intervention

<table>
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<tr>
<th>Land</th>
<th>Water</th>
<th>Nutrients</th>
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<tbody>
<tr>
<td>FORAGE &amp; GRAIN</td>
<td>ANIMAL FEEDING</td>
<td>MANURE MANAGEMENT SYSTEM</td>
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<td>Housing</td>
<td>HERD PERFORMANCE</td>
<td>Methane emission per unit/year</td>
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Status quo – Scenario baseline

Scenario X, Y...Z

- Economic evaluation when closing the efficiency gap
- Environmental evaluation when closing the efficiency gap
- Social evaluation as well as animal welfare when closing the efficiency gap
- Loss of biodiversity
Specific questions - plenary discussion

1. Additional measurements for NRU (indicators)?

2. Additional measurements for Efficiency areas (indicators for forage and grain production, animal feeding, livestock performance, animal health and manure management)?

3. Animal species (Ruminants / monogastrics)?

4. Evaluation areas (economic, environmental, animal welfare and social impact) – What to evaluate?

5. How to link this exercise to the practice change (pilots)?
Open questions - plenary discussion

1. Which processes already exist?

2. How can we build on those?

3. What is missing?

4. How to use the pilots and work in other FAs to build/test the matrix?

5. Do we need specific test phase?
1. NRU measurements

2. Efficiency areas indicators (indicators for forage and grain production, animal feeding, livestock performance, animal health and manure management)

3. Efficiency areas for Animal species
   a. Ruminants
   b. Monogastrics

4. Evaluation areas (economic, environmental, animal welfare and social impact)
Thank you...