An attempt to provide the elements when measuring livestock efficiency
The Agenda, Focus Area 1 meeting

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Contents

1. Definitions

2. Indicators

3. Identifying gaps
Why does it need intervention?

Can’t the market signals provide incentives for
- more efficiency
- sustainable grassland use?
- less environmental burden?

Apparently not >>> market failure?
- Public goods (environment) and pricing missing or too low
- Lack of information / know-how on technology / systems
- Asymmetric price information
**Definitions**

**Intensity** – measures the relation between two production factors
- N-fertiliser per ha
- Hectares per cow, stocking rate

**Productivity** – measures output related to input
- Labour productivity: kg beef produced per hour labour input

**Effectiveness**
- Ability to reach an objective to the highest degree

**Economic efficiency**
- To reach a given output with minimum cost
- To maximise output at a given cost
Is the feedlot a low intensity system?

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>BR 140</th>
<th>DE 280</th>
<th>US 75,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land intensity</td>
<td>Hectares per head</td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Labour intensity</td>
<td>Hours per head</td>
<td>Medium</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Capital intensity</td>
<td>USD per head</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Land productivity</td>
<td>kg beef per ha</td>
<td>130</td>
<td>2.765</td>
<td>nr</td>
</tr>
<tr>
<td>Labour productivity</td>
<td>kg beef per hour</td>
<td>11</td>
<td>35</td>
<td>247</td>
</tr>
<tr>
<td>Capital productivity</td>
<td>kg beef per 1,000 USD</td>
<td>165</td>
<td>185</td>
<td>6.064</td>
</tr>
</tbody>
</table>

Conclusion: the focus should be on productivity
Labour productivity in beef finishing farms

Physical / economic labour productivity

kg CW per hour\(^1\)  USD returns per USD labour cost\(^2\)

<table>
<thead>
<tr>
<th>Region</th>
<th>Physical labour productivity: Carcass weight (CW) sold</th>
<th>Total hours worked</th>
<th>Economic labour productivity: USD returns per kg CW</th>
<th>USD labour costs per kg CW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasture (BR)</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silage (DE)</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedlot (US)</td>
<td>246</td>
<td>16</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Feedlot (CN)</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Regional wage level: 7
Increasing performance in the pasture system

[Bar chart showing daily weight gain (g/day) and finishing period (days) for different breeds.

Breed codes: AU-310, BR-600B, BR-140, CO-350, AR-550, AR-600, AU-85, UK-80]
Measuring efficiency – possible indicators

Production systems
Livestock performance
Forage production
Animal feeding
Animal health
Animal welfare
Economic results
Environment
... more levels ...

... also taking into account ideas from institutions who cannot participate in this workshop (PBL/Wageningen, TAFS-Forum)

... and output from previous FA1 workshops
Measuring efficiency – possible indicators

Production systems
- Livestock performance
- Forage production
- Animal feeding
- Animal health
- Animal welfare
- Economic results
- Environment

FAO
- Grazing, mixed, industrial
- *agri benchmark*
  - Pasture, Silage, Feedlot, Cut & Carry
- Others

>>> Homogeneous and unequivocal classification required
Measuring efficiency – possible indicators

Production systems

Livestock performance

Forage production
Animal feeding
Animal health
Animal welfare
Economic results
Environment

Reproductive animals

- Inter-‘birth’ intervals (calving interval)
- ‘Birth’ percentage, mortality, weaning percentage
- Weaning weights
- Livestock and breeding prices

Fattening / finishing animals

- Daily weight gains
- Final weights
- Carcass yields / dressing percentage
- Meat prices
Measuring efficiency – possible indicators

Production systems
- Livestock performance
- Forage production
- Animal feeding
- Animal health
- Animal welfare
- Economic results
- Environment

Land use and yields
- Land tenure
- Crop rotation
- Number of harvests, double use
- Per ha yields
- Feed contents: dry matter, protein, energy, fibre etc.

Inputs and prices / costs
- Seeds, fertiliser, plant protection, fuel, depreciation machinery, contractor work, own labour, irrigation, other
- Crop and forage prices
Measuring efficiency – possible indicators

Production systems
Livestock performance
Forage production
Animal feeding
Animal health
Animal welfare
Economic results
Environment

Feed types and quantities
- Type of homegrown feed including byproducts and stubble
- Type of purchased feed
- Feed rations by animal category and feeding period (winter/summer, pre-finishing, finishing)

Feed productivity, prices, costs
- Digestibility
- Feed conversion (kg feed per kg gain or kg product)
- Feed prices and costs including valuating byproducts, stubble
Measuring efficiency – possible indicators

Production systems
Livestock performance
Forage production
Animal feeding
Animal health
Animal welfare
Economic results
Environment

Endemic diseases within a region
- Prevalence percentage
- Number of outbreaks
- % reduction of outbreaks
- Diseases free areas
- % of vaccination coverage

Herd performance
- Mortality rate by categories (age)

Diseases affecting specifically fertility
- Abortion rate
Measuring efficiency – possible indicators

Production systems  
Livestock performance  
Forage production  
Animal feeding  
Animal health  
**Animal welfare**  
Economic results  
Environment

**Action-oriented indicators**
- Type of housing  
- Space available for animals  
- Straw bedding  
- Toys to play with

**Result-oriented indicators**
- Animal aspect / look  
- Bruises / damages  
- Lameness  
- Carcass damages  
- Animal behaviour  
- Body temperature
Measuring efficiency – possible indicators

Production systems
Livestock performance
Forage production
Animal feeding
Animal health
Animal welfare
Economic results
Environment

Revenues / returns
- Whole farm / enterprise market and subsidy returns
- Off-farm income

Costs
- Labour, land, capital costs (factor costs)
- Non-factor costs

Profitability
- Short-, mid, long-term profitability
- Whole farm vs. enterprise
Measuring efficiency – possible indicators

Production systems
Livestock performance
Forage production
Animal feeding
Animal health
Animal welfare
Economic results

Environment

Nutrients
- Stocking rate
- Manure system
- N and other nutrients (balance)

Emissions
- Enteric fermentation
- Manure storage and handling
- Feed production (incl. purchase)
- Carbon sequestration

Energy use
- Fuel consumption
- Heating and cooling
Measuring efficiency – possible indicators

**Basic**
- Production systems
- Livestock performance
- Forage production
- Animal feeding
- Economic results
- Environment
- ... others?

**Complementary, but necessary**
- Animal health
- Animal welfare
- ... others?
Next steps

Agree on the levels presented

Add further levels

Prioritise levels for FA1 work
Thank you for your interest in agri benchmark

agri benchmark  
- passionate about facts

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Identifying gaps – first examples

Cow-calf and grazing

Finishing South America grassland fertility rates

Sheep overgrazing / desertification
State of the art technology vs. What is really done at farm level

Cash Crops

Poultry
Pork
Feedlots

Cow-calf
Grazing systems

Technology adoption

Management skills key to improving productivity
Management is the key to unlocking the potential

- Extension programs are disappearing around the globe (US, CA, BR, AR) or do not exist...
- Where will the money come from? (RU, SA, KZ)
- Institutions, Machinery sales connected to training,

Countries with the most potential of future intensification (RU, SA, BR, AR)
Basic relationships between animal production per head and per hectare for grazing livestock

Source: Kemp et al. (2008)