Focus Area 1

Closing the Efficiency Gap

08 October 2014, Cali
Ernesto Reyes

*agri benchmark* Network (Beef, Sheep, IFCN dairy)

Global benchmarking analysis of production systems, their economics, drivers and perspectives

Chair of FA1
1. Objectives and actions

2. Working areas

3. Efficiency Matrix exercise

4. Pilots
1. FA-1 Objectives and actions

Build up a comprehensive approach for improving efficiency across the livestock sector

Developing metrics system for NRUE

• Natural Resource Use Efficiency (NRUE)
• NRUE Matrix

Tools & models

• Modeling and evaluation of efficiency gaps
1. FA1 - Objectives and actions

2. Promote regional/local interventions through efficient practices across the livestock sector

<table>
<thead>
<tr>
<th>Exploring and select projects</th>
<th>Piloting</th>
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<tbody>
<tr>
<td>• FA1 partners projects</td>
<td>• Selecting projects</td>
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<tr>
<td>• Criteria list for selecting pilots</td>
<td>• Testing metrics, tools &amp; models</td>
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<tr>
<td></td>
<td>• Start monitoring activities</td>
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<td>• Scale up the process</td>
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1. FA1 - Objectives and actions

Facilitate the exchange of information and linkages between stakeholders, livestock initiatives and projects

<table>
<thead>
<tr>
<th>Networking activities</th>
<th>Central portal of information</th>
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<tbody>
<tr>
<td>• Linkages between experts and projects</td>
<td>• Communication platform</td>
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<td>• Information exchange center</td>
<td>• Dissemination platform</td>
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<tr>
<td>• Common understanding and agreements</td>
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<tr>
<td>• Promoting NRU efficiency practices</td>
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</table>
1. Objectives and actions

2. Working areas
2. FA1- Working areas

- Defining NRUE
- Enlarging the scope of the FA1
- Efficiency matrix
- Efficiency matrix + evaluation areas
- Pilots proposals
- Efficiency matrix V1+ criteria for pilots selection

FA1- meetings
- Rome (04-2012)
- Nairobi (01-2013)
- Braunschweig (04-2013)
- Rome (09-2013)
- Ottawa (10-2013)
- Paris (03-2014)
- Call conference (09-2014)
2. FA1 - Working areas

1. Efficiency matrix
2. Pilots proposals and selection
3. Modeling and assessment
4. Data portal
5. FA1 management
1. Objectives and actions

2. Working areas

3. Efficiency Matrix exercise
3. Efficiency matrix exercise

### Efficiency matrix and NRU metrics

<table>
<thead>
<tr>
<th>NATURAL</th>
<th>RESOURCES</th>
<th>USED</th>
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<tbody>
<tr>
<td>Land</td>
<td>Water</td>
<td>Nutrients</td>
</tr>
</tbody>
</table>

#### FORAGE & GRAIN
- Housing
- Prevention health schemes
- Herd management
- Increase conversion ratio
- Strategic feeding practices
- Strategic cropping
- Silvopastoral systems
- Balancing inventories/forage offer

#### 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

#### LIVESTOCK PERFORMANCE
- HERD PERFORMANCE
  - Reproductive performance
  - No. Animals transferred or sold to other production units
- PRODUCTION PERFORMANCE
  - Yield per unit per year
  - No. of production periods per year
  - Co-products per unit/year

#### 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

### Reference Scenario - baseline

### Scenario X, Y...Z
3. EM - NRUE - Horizontal assessment

**Production, conservation and marketed**

- Forage biomass yield (ton/ha/year)
- Ratio: Total forage production sold/used (%)
- Proportion of forage production to conservation and used in the farm (%)
- Proportion of forage production to conservation and sold (%)
- Proportion of conserved forage consumed (%)

- Grain yield (ton/ha/year)
- Ratio: Total grain production sold/used (%)
- Proportion of conserved grain consumed (%)
- Proportion of conserved grain and sold (%)

**Composition and nutritive value**

- Dry matter content (%) (Pastures and forages)
- Protein content (%)
- Energy content (Kcal., Mcal., Kj., and Mj. of dry matter)
  - Crude energy
  - Digestible energy
  - Metabolize energy
- Feed digestibility (Organic matter, OMD - %)

- Dry matter content (%) (Grain)
- Protein content (%)
- Energy content (Kcal., Mcal., Kj., and Mj. of dry matter)
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  - Digestible energy
  - Metabolize energy
- Feed digestibility (Organic matter, OMD - %)
3. EM - NRUE - Horizontal assessment

FEEDS AND NUTRITION

Nature and ratios of feedstuffs used
- Home grown produced feed (%)
- Purchased feed (%)
- Ratio: home grown produced/purchased feed (%)
- Conventional feed and ingredients use (grass, forages, silages, cereals; farm produced or imported - %)
- Unconventional feed and ingredients used (local, "indigenous" e.g. crop residues, agroindustrial by-products)
- Feed conversion ratio

Feed ingredients, ration composition and intake
- Conventional feed and ingredients (grass, forages, silages, cereals)
- Inclusion in the ration (%)
- Intake
  - Fresh basis (kg/LU/day)
  - Dry matter basis (kg/DM/LU/day)
- Protein content (%)
- Energy content (Crude energy)
  - CE; of row material
  - If monogastrics: Digestible energy
  - If ruminants: Metabolizable energy
- Fiber content
  - Crude fiber
  - Neutral detergent fiber
  - Acid detergent fiber

Feed and ingredient type
- Energy feeds
- Protein feeds
- Dry forages
- Silages and haylages
- Pastures and ranges plants
- Vitamin supplements
- Mineral supplements

Unconventional feed and ingredients (local, "indigenous", e.g. crop residues, agroindustrial by-products)
3. EM - NRUE - Horizontal assessment

**ANIMAL HEALTH**

- **Cattle and small ruminants**
  - % Still birth
  - % Mortality 1st year
  - Overall % off-take due to disease (death or culling)
  - Prevalence of OIE notifiable diseases in country

- **Pigs**
  - % stillbirth/farrowing
  - Ratio No. of pigjets weaned:born alive/litter
  - Prevalence of OIE notifiable diseases in country

- **Poultry**
  - % off-take due to disease (death or culling)
  - Prevalence of OIE notifiable disease in country

**MANURE MANAGEMENT SYSTEM**

- **MANURE APPLIED**
  - Manure storage capacity (% of months available/months needed)
  - Ratio: manure used on farm/exported
  - Manure applied in accordance with crop requirements (right time/right quantity)

- **MANURE STORAGED**
  - % of the original amount of nitrogen still in the manure after manure storage/spreding
  - Manure storage capacity (% months available/months needed)
  - Storage and treatment systems
    - Biodigester, lagoons, composting, etc.
3. EM - NRUE - Horizontal assessment

PRODUCTION PERFORMANCE

REPRODUCTIVE
- Cattle
  - Age at 1st calving
  - Calving interval (days)
- Small ruminants
  - Age at 1st parturition
  - Parturition interval
  - No. of offspring born/dam
- Pigs
  - Age at 1st farrowing
  - Parturition interval
  - No. of piglets born/farrowing

YIELD/FARM
- Cattle
  - Milk/cow/day (year), No. of calves sold/slaughtered/year/cow (%)
  - Weight slaughtered/cow/year
- Small ruminants
  - Milk per ewe-goat/day (year)
  - % survived offspring at weaning
  - No. of off-spring sold or slaughtered/ewe
  - Kg weaned offspring/dam/year
- Pigs
  - No. of piglets weaned/sow/year

YIELD/PERIOD
- Aquaculture & Poultry
  - No. of production cycles/year
  - No. Eggs/hen/period
  - Chicken for slaughter/period
### Economic evaluation

#### Economic indicators

<table>
<thead>
<tr>
<th>Reference units</th>
<th>Enterprise level</th>
<th>Whole-farm level</th>
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<tbody>
<tr>
<td>- Cow-calf, beef finishing, sheep</td>
<td>per animal, kg live weight or carcass weight per ha</td>
<td>per enterprise per ha</td>
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</table>

#### Returns / Receipts (quantity * price)

- Total returns
- Market returns
- Government payments (subsidies)
- Social returns (where possible)

#### Costs (where possible quantity * price)

- Total costs, breakdown into up to 50 items
- Feed costs (incl. purchase feed, fertilizer costs)
- Other costs
- Social prices and costs (where possible)

#### Profitability

- Margin over feed costs
- Margin over cash costs
- Medium-term profitability 1)
- Long-term profitability 2)
- Social profitability (where possible)

1) total returns less cash costs less depreciation
2) medium-term profitability less opportunity costs
3. EM - Sustainability - Vertical evaluation

ANIMAL WELFARE

Resources measures

- Housing quality including shelter from environmental extremes e.g. cold / wet / heat
- Light/dark schedule relevant to species’ needs
- Resources to facilitate comfort e.g. foraging substrates, bedding substrates
- Access to and quality of feed and water
- Space and facilities to exercise, move, rest and perform important behaviours
- Handling facilities and practices
- Provision for sick and injured animals
- Provision for humane transport and slaughter

Outcome measures

- Body condition
- Presence/absence of disease in an individual animal (or flock incidence)
- Presence/absence of injury and / or routine mutilations
- Mortality and morbidity
- Presence/absence of parasites
- Ability to move normally / walk normally / measures of lameness
- Associated measures of health including longevity, fertility, replacement rate
- Absence of negative behavior (e.g. reflecting fear/ aggression / sickness / stereotypy / other abnormal behaviour)
- Ability to perform behaviours important to the species (and species subtype e.g. mothers or offspring), using appropriate resources
- Absence of behavioural restriction
- Ability to rest/sleep adequately
- Presence of behaviours reflecting positive welfare (e.g. play behavior, rest, foraging)
3. Efficiency matrix exercise

- We have a contextual document
- It is an open exercise, for refinement and adjustments
- A testing phase will take place
  - Consistency between areas
  - Animal species
  - Indicators to measure
1. Objectives and actions

2. Working areas

3. Efficiency Matrix exercise

4. Pilots
4. FA1 pilots

- Pilots have been classified according to the interaction with the Focus Area
- A criteria list has been developed
- A set of proposals have been presented
- FA1 is in the process of selecting pilots and defining level of interaction in terms of:
  - Information Exchange
  - Interventions required
  - Resources required
## 4. FA1 pilots - Classification

<table>
<thead>
<tr>
<th>I</th>
<th>Currently running projects</th>
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<tbody>
<tr>
<td></td>
<td>• NRUE monitoring and evaluation</td>
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<td></td>
<td>• Testing and input for the EM</td>
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<td>• Practical lessons gained from improving NRUE</td>
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<table>
<thead>
<tr>
<th>II</th>
<th>New FA1 projects</th>
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<tr>
<td></td>
<td>• New projects designed and funded through FA1</td>
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<td></td>
<td>• To test NRUE improvement in areas with particularly high potential for social, economic and environmental gains</td>
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<tr>
<th>III</th>
<th>Complementary projects</th>
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<td></td>
<td>• Specific methodological exchange for improving the EM</td>
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<td>• Opening new fields of monitoring and evaluation activities</td>
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<th>IV</th>
<th>Pre-feasibility projects</th>
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<td></td>
<td>• which can use the FA1 platform for funding and implementation</td>
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<td></td>
<td>• Targeted inputs and support to the development of new pilots and projects.</td>
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### 4. FA1 pilots - Criteria list

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<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>1. Focalization</td>
<td>The project is mainly addressing NRUE issues</td>
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<tr>
<td>2. Possibility of intervention</td>
<td>The project has clear possibilities to a FA1 intervention in terms of win-win relationship, elements to complement, availability of results and information exchange</td>
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<tr>
<td>3. Regional and livestock biodiversity</td>
<td>Project coverage in terms of production systems and regions</td>
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<tr>
<td>4. Capacity building</td>
<td>Stakeholders involved and stakeholders benefited</td>
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<td>5. Impact</td>
<td>Possibilities of scaling up the process</td>
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<tr>
<td>6. Implementacion capacity</td>
<td>Availability of resources (e.g. funding and services)</td>
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<tr>
<td>7. Synergies</td>
<td>Complementary synergies with other FAs of the Agenda</td>
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4. FA1 pilots

**NOVUS** China on-farm Assessment for Improved Milk Production

**NOVUS** 300 eggs club
Uganda - Feeding
4. FA1 pilots

Enhancing efficiency beef value chain
Rangeland Management

Reducing efficiency gap in the sheep value chain
4. FA1 pilots

Silvopastoral systems

Improving NRUE farming systems
4. FA1 pilots

Environmental sustainability roadmap for the pig industry
4. FA1 pilots

Agrohyd - water resource management – farm level
3. FA1 pilots

Enhancing efficiency of the beef value chain improving rangeland management in Botswana

Reducing efficiency gap in the sheep value chain through a sustainable fattening system and smart marketing in Ethiopia

Novus 300 eggs club in Uganda

NOVUS C.O.W.S Cows-Oxidative balance-Well being-Sustainability. Comprehensive On-Farm Assessment for Improved Milk Production

Narrowing efficiency gaps in the natural resources use of West Africa farming systems: the case of Burkina Faso

P-BLEX Roadmap for the environmental sustainability of the English Pig Industry

AgroHyd World food consumption and water resources: an agro-hydrological perspective

Mainstreaming Biodiversity in Sustainable Cattle ranching
### Thank you!

**Global Agenda for Sustainable Livestock**

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Region</th>
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<tbody>
<tr>
<td>Luis Azevedo</td>
<td>Novus do Brasil</td>
<td>South America-Africa</td>
</tr>
<tr>
<td>Philippe Becquet</td>
<td>DSM Nutritional Products Europe Ltd</td>
<td>Switzerland</td>
</tr>
<tr>
<td>Sophie Bertrand</td>
<td>Centre Nat. Interprof. de l'Economie Laitière</td>
<td>EU - France</td>
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<tr>
<td>Julián Chará</td>
<td>The Nature Conservancy - CIPAV Foundation</td>
<td>South America - Colombia</td>
</tr>
<tr>
<td>Sune Jin Christensen</td>
<td>Danish Bacon &amp; Meat Council</td>
<td>EU - Denmark</td>
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<tr>
<td>Claus Deblitz</td>
<td>Thunen Inst. of Farm Economics-<em>agri benchmark</em></td>
<td>Global</td>
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<tr>
<td>Jeroen Dijkman</td>
<td>FAO-AGAL</td>
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<td>Pierre Gerber</td>
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<tr>
<td>Eliel Gonzalez</td>
<td>INRA - PHASE</td>
<td>EU - France</td>
</tr>
<tr>
<td>Hsin Huang</td>
<td>International Meat Secretariat</td>
<td>Global</td>
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<tr>
<td>Lesley Lambert</td>
<td>World Society for the Protection of Animals</td>
<td>EU - UK</td>
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<tr>
<td>Norman Leask</td>
<td>European Coordination Via Campesina</td>
<td>EU - UK</td>
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<tr>
<td>Philippe Lecompte</td>
<td>CIRAD INRA SupAgro</td>
<td>EU - France</td>
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<tr>
<td>Judy Libra</td>
<td><em>ATB</em> - Leibniz Instit. for Agricultural Engineering</td>
<td>EU- Germany</td>
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<tr>
<td>Ulf Magnusson</td>
<td>Swedish University of Agricultural Sciences</td>
<td>EU - Sweden</td>
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<tr>
<td>Nicolas Martin</td>
<td>European Feed Manufacturer's Federation</td>
<td>EU - Belgium</td>
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<tr>
<td>Nigel Penlington</td>
<td>Agric. &amp; Hortic. Development Board - BPEX</td>
<td>EU - UK</td>
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<td>Ernesto Reyes</td>
<td><em>agri benchmark</em></td>
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<td>CIRAD INRA SupAgro</td>
<td>EU - France</td>
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<tr>
<td>Henk Westhoek</td>
<td>PBL - Netherlands Env. Assessment Agency</td>
<td>EU - Netherlands</td>
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