DANONE APPROACH ON GHG MEASUREMENT AND REDUCTION AT FARM LEVEL

Axelle Bodoy – Global milk GHG manager
06/12/2017
“ONE PLANET, ONE HEALTH”

The milk cycle
key contributor to the alimentation revolution

- Fostering sustainable agriculture
- Fighting climate change
PRIORITY OBJECTIVE: DANONE CLIMATE POLICY

1. CUT EMISSIONS FULL SCOPE
2. FOSTER "CARBON POSITIVE" SOLUTIONS
3. ELIMINATE DEFORESTATION FROM OUR SUPPLY CHAIN BY 2020
4. BUILD RESILIENCE IN OUR FOOD & WATER CYCLES
5. OFFER HEALTHIER AND SUSTAINABLE DIET SOLUTIONS
DIRECT RESPONSIBILITY

-42% IN INTENSITY SINCE 2007

SHARED RESPONSIBILITY
CO-BUILDING SOLUTIONS WITH FARMERS AND SUPPLIERS

- 2% END OF LIFE
- 6% RETAIL HOME
- 10% LOGISTICS
- 10% MANUFACTURING
- 13% PACKAGING
- 8% OTHER RAW MATERIALS
- 51% MILK
Decoupling growth and GHG emission => Increasing milk production efficiency:

“Produce more, with less!”
THE COOL FARM TOOL

Cool Farm Alliance: 38 business, non profit and academic members

- 2008: First excel GHG calculator for annual crops
- 2012: Creation of the supporting organization CFA
- 2016: New metric: biodiversity
- 2017: Dairy module, water metric
- 2018: Perennials module, other livestock module

Five principles of Cool Farm Tool:
- Farmer focussed
- Global
- Science based
- Crops & livestock
- Industry backed
Example of results from the Cool Farm Tool

**Live Results**

**Product:**
Spain/Asturias/2017/Edelmira/Holstein  
(cattle, 2017)

**Finished product:**
239,244 kilograms

**GHG emissions**

**Total:**
375,987 kg CO2e

**Per kilogram:**
1.67 kg CO2e

**Summary**

- **Total emissions:** 375,987 kg CO2e
- **Emissions per kg FPCM:** 1.67 kg CO2e
- **Emissions per kg:** 1.57 kg CO2e

**Total emissions**

<table>
<thead>
<tr>
<th>Category</th>
<th>CO2 (kg)</th>
<th>N2O (kg)</th>
<th>CH4 (kg)</th>
<th>Total CO2eq</th>
<th>Per kg</th>
<th>Per kg FPCM</th>
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<tbody>
<tr>
<td>Direct energy use</td>
<td>6848</td>
<td></td>
<td></td>
<td>6848</td>
<td>0.03</td>
<td>0.03</td>
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<tr>
<td>Enteric fermentation</td>
<td></td>
<td>5823</td>
<td></td>
<td>145583</td>
<td>0.61</td>
<td>0.65</td>
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<tr>
<td>Feed production</td>
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<td></td>
<td>108174</td>
<td>0.45</td>
<td>0.48</td>
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<tr>
<td>Grazing</td>
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<td></td>
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<td>33705</td>
<td>0.14</td>
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<tr>
<td>Manure management</td>
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<td></td>
<td></td>
<td>128487</td>
<td>0.54</td>
<td>0.57</td>
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<td>Off-farm transport</td>
<td>1144</td>
<td></td>
<td></td>
<td>1144</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td>Total</td>
<td>278358</td>
<td>0</td>
<td>5823</td>
<td>375987</td>
<td>1.57</td>
<td>1.67</td>
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</table>
Process of implementation of the tool with farmers

<table>
<thead>
<tr>
<th>GHG Milk Baseline</th>
<th>Cool Farm Tool implementation</th>
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<tbody>
<tr>
<td>June 2017</td>
<td>CFT Dairy module development</td>
</tr>
<tr>
<td></td>
<td>• Team trainings</td>
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<tr>
<td></td>
<td>• Farms portfolio segmentation</td>
</tr>
<tr>
<td></td>
<td>• Sampling</td>
</tr>
<tr>
<td>July 2017</td>
<td>Farm data collection</td>
</tr>
<tr>
<td>Aug 2017</td>
<td>Data input into CFT</td>
</tr>
<tr>
<td>Sept 2017</td>
<td>Corrections, aggregation</td>
</tr>
<tr>
<td>Oct 2017</td>
<td>Scenarios simulations</td>
</tr>
<tr>
<td>Nov – Dec</td>
<td>Data collection started</td>
</tr>
<tr>
<td>Q1 2018</td>
<td>Brazil (IBS)</td>
</tr>
</tbody>
</table>

- 100% done

Q1 2017
Q2 2017
June 2017
July 2017
Aug 2017
Sept 2017
Oct 2017
Nov – Dec
Q1 2018

Brazil (IBS)
### Intermediary results of the Cool Farm Tool

<table>
<thead>
<tr>
<th>% complete</th>
<th>Nb of farms modeled</th>
<th>2016 FP Kg CO2eq / kg milk</th>
<th>Lowest footprint</th>
<th>Highest footprint</th>
<th>Weighted average</th>
<th>GAP</th>
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</thead>
<tbody>
<tr>
<td>90%</td>
<td>400+68</td>
<td>1,10</td>
<td>NA</td>
<td>NA</td>
<td>1,09</td>
<td>-3%</td>
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<tr>
<td>96%</td>
<td>36</td>
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<td>0,74</td>
<td>0,87</td>
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<tr>
<td>100%</td>
<td>29</td>
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<td>0,742</td>
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<td>83%</td>
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<td>1,057</td>
<td>1,057</td>
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<tr>
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<td>1,09</td>
<td>1,09</td>
<td>1,18</td>
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<tr>
<td>64%</td>
<td>6 + 5</td>
<td>0,917</td>
<td>3,20</td>
<td>3,20</td>
<td>1,67</td>
<td>+78%</td>
</tr>
<tr>
<td>74%</td>
<td>38</td>
<td>3,20</td>
<td>3,20</td>
<td>3,20</td>
<td>1,67</td>
<td>+78%</td>
</tr>
<tr>
<td>10%</td>
<td>23</td>
<td>3,20</td>
<td>3,20</td>
<td>3,20</td>
<td>1,67</td>
<td>+78%</td>
</tr>
<tr>
<td>100%</td>
<td>44</td>
<td>3,20</td>
<td>3,20</td>
<td>3,20</td>
<td>1,67</td>
<td>+78%</td>
</tr>
<tr>
<td>78%</td>
<td>48</td>
<td>3,20</td>
<td>3,20</td>
<td>3,20</td>
<td>1,67</td>
<td>+78%</td>
</tr>
<tr>
<td>64%</td>
<td>16</td>
<td>3,20</td>
<td>3,20</td>
<td>3,20</td>
<td>1,67</td>
<td>+78%</td>
</tr>
<tr>
<td>100%</td>
<td>37</td>
<td>1,05</td>
<td>1,05</td>
<td>1,05</td>
<td>1,67</td>
<td>+78%</td>
</tr>
<tr>
<td>69%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73%</td>
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<td></td>
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</table>
### GHG mitigation levers

<table>
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<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Diet</td>
<td>2.1 Aliments composition</td>
<td>3.2 Transformation</td>
<td>4.1 Energy saving</td>
<td>5.1 Above ground</td>
</tr>
<tr>
<td>1.2 Production</td>
<td>2.2 KPI techniques</td>
<td>3.1 Storage &amp; application</td>
<td>4.2 Energy production</td>
<td>5.2 Below ground</td>
</tr>
</tbody>
</table>

#### Focus 2017

- Produce list of GHG reduction levers and scale of impact -> Cow Act project with Wageningen University
- Screening of field SWOT in each country
- Definition of specific actions from the list of levers by farm types in each country
- Test of innovative mitigation levers (ex: manure fermentation)
Milk farming efficiency & sustainability matrix

Yield / cow

30L
• Advanced cow nutrition
• Support to farm size development / Co investment
• Regenerative agriculture, water and reforestation, biodiversity

20L
• Increase Yield with feed production and efficiency
• Agroecological feed diversification
• Cow housing / comfort
• Co training level 2

15L
• Train basic
• Increase yield water / feed
• Basic quality

10L
• CO2 specific projects
• Innovative tools
• Solids increase
• Soy replacement

Low productive professional family farms
• Efficiency improvement focusing on feed and reproduction
• Solids increase

Under performing farms
NOT IN SOURCING TARGET

High productive professional family farms

Intensive large scales dairies
• High investment technologies (manure), hard & soft innovation
• Solids increase
• Soy replacement
• Social programs workers

Extensive large scales dairies
• Regenerative agriculture and climate resilience, water management
• Grassland management optimization
• Yield increase
• Reproduction
• Social programs workers

Farm size (# heads)

Secure our license to operate
Increase farmers income

Support general interest on the environment (climate, soil health, and biodiversity...)
Inclusive value creation with employees
### MAIN GHG reduction levers per region

<table>
<thead>
<tr>
<th>Region</th>
<th>Efficiency KPIs + yield &amp; solids</th>
<th>Soy replacement</th>
<th>Manure cracking (Belgium)</th>
<th>Reforestation + Agro-ecology (Romania + Germany)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asia</td>
<td>Focus on YIELD improvement</td>
<td>Soy replacement (DanFarm) Feed yields &amp; autonomy</td>
<td></td>
<td>Reforestation + soil health (SA)</td>
</tr>
<tr>
<td>North America</td>
<td>Focus on YIELD improvement (Mexico)</td>
<td></td>
<td>Biodigestor Wake US Manure management (Mexico)</td>
<td>Windmill US Mc Carthy Solar pannels margarita + big farms Mex?</td>
</tr>
<tr>
<td>South America</td>
<td>Efficiency KPIs + yield &amp; solids</td>
<td>Grasslands management optimization</td>
<td>Manure management (Argentina)</td>
<td>Reforestation (Brazil) + agro-ecology</td>
</tr>
</tbody>
</table>
GHG REDUCTION LEVERS SELECTED FOR MARGARITA - MEXICO

Increase milk yield:
- Water ad-libitum
- Training in diet and feeding
- Feeders in farms barn
- IA rustic cattle breeds

Increase feed quality:
- Development of Feed purchasing platform

Biodigester:
- One pilot implementation with BIOBOLSA (>40 cows)

Solar panels:
- One pilot implementation with BIOBOLSA (>40 cows)

Reforestation:
- 30 trees / dairy cow = 840 trees per farm on average => Co-benefits: shading + forage + biodiversity

Soil C sequestration:
- Introduce conservation agriculture / agro-ecological practices (>40 cows)

“Margarita To The Max”