Participatory approaches conducted in Ecuador, Trinidad and Costa Rica using simple and cost effective methods to enhance the cocoa bean quality substantially

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Background

German Fine and Flavour Cocoa Chocolates Producer from „Tree to Door“

„Direct Trade“:

– It stands for **direct partnerships** with cocoa farmers (cocoa producer, cooperative or cocoa board)
– Its **primary focus is cocoa quality** and **efficient production management**. Including also a combination of ecologic, economic and social aspects
– It includes **regular visits, on farm workshops and trainings** aiming to achieve the needs of **both sides** of the partnership: **cost effective, profitable production at high cocoa quality levels with satisfying prizes**
Introduction

Capacity building, implementation...

Definition of Participatory Research:
Participatory research is a form of applied research, where the researcher becomes a facilitator in helping those being studied to also become actively engaged in the quest for information and ideas to guide future efforts (adapted from Whyte, 1991).
# Participants and Locations

<table>
<thead>
<tr>
<th></th>
<th>Costa Rica</th>
<th>Trinidad</th>
<th>Ecuador</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plantation</strong></td>
<td>40 ha</td>
<td>Ca. 400 ha</td>
<td>Average 4 ha</td>
</tr>
<tr>
<td><strong>Form</strong></td>
<td>Family owned</td>
<td>Family owned</td>
<td>Association with 12 Cooperatives (~770 small scale farmers)</td>
</tr>
<tr>
<td><strong>Fermentation stations</strong></td>
<td>1</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td><strong>Fermentation boxes</strong></td>
<td>24</td>
<td>4</td>
<td>At least 8 per fermentation station</td>
</tr>
</tbody>
</table>

![Fermentation boxes in Costa Rica](image1.png)

![Fermentation boxes in Trinidad](image2.png)

![Fermentation boxes in Ecuador](image3.png)
Methods: Different Questionnaires and Evaluations
Ecuador: Quantity and Capacity Calculation

Results of the evaluation of 12 fermentary centers

- clearly showed a discrepancy between quantities of cocoa coming in and capacity per processing unit
- First approaches to tackle this problem came up during the workshop
- Leading us to jointly conduct fermentations in order to understand why quality losses occur and where quality definitions need to be specified...
Tools to evaluate quality status

Evaluation documents
Thermometer
Cut-Test: Knife / Guillotine
Aroma Test: Roasting oven or Microwave, Milling Maschine (coffe milling maschine)
Ecuador: Conditions during the Fermentation process

Quality losses:
Field material 0-10%

Percentage of defects delivered from farmers differ from 0-10%
Ecuador: Conditions during the Fermentation process

Quality losses:
Field material 0-10%

Percentage of defects delivered from farmers differ from 0-10%
Ecuador: Conditions during the Fermentation process

1. Day of Fermentation: edges show dry seeds:
no acetic acid + air = danger of mold! Amount of seeds affected: ~10%

Quality losses:
Field material: 0-10%
1. Day: ~5-10%
Ecuador: Conditions during the Fermentation process

Quality losses:
Field material: 0-10%
1. Day: ~5-10%
3. Day: ~5-10%

3. Day before 1. Mixing: dry seeds are severely affected from mould: no acetic acid + air = mold! Amount of seeds affected: ~10%
4.-6. Day of Fermentation: dry seeds are severely affected from mould:
no acetic acid + air = mold! Amount of seeds affected: ~10%

Quality losses:
Field material: 0-10%
  1. Day: ~5-10%
  3. Day: ~5-10%
  4.-6. Day: ~5-10%
Ecuador: Conditions during the Fermentation process

Drying of mouldy seeds infect surrounding seeds. Thus multiplying the damage. Bad weather or shipping conditions facilitate another growth phase of these already mould infected seeds.

Quality losses:
Field material: 0-10%
1. Day: ~5-10%
3. Day: ~5-10%
4-6. Day: ~5-10%
Drying: ~10%
Ecuador: What did we do?

Material was grouped into dried material from edges and inner material.
Ecuador: Fermentation experiment

Separatly fermented, dried and it´s aroma tested
Ecuador: What was found to be a short term solution?

Mould was avoided nearly 100%!
It was obvious: where air came in, mould grew and gave a different smell
Ecuador: Workshop ended with a summary and introduction of first short-term solutions

<table>
<thead>
<tr>
<th>Perdida:</th>
<th>Causa:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campesino: 5-10%</td>
<td>Falta de Limpieza</td>
</tr>
<tr>
<td>Fermentation: 10-20%</td>
<td>Manejo y construcción</td>
</tr>
<tr>
<td>Secador: 10%</td>
<td>Manejo y construcción</td>
</tr>
<tr>
<td><strong>Total:</strong> 40%</td>
<td></td>
</tr>
</tbody>
</table>

Con algunas tablas pequeñas en las escinas de las cajones y algunas hojas de banana en los bordes se puede arreglar por lo menos 10% de perdida!

Estes 10-20% semillas mal fermentadas cambian el aroma en una manera que impiden la compra de algunas productores de chocolate – tienen un sabor desagradable.
Results Trinidad: Fermentation

Situation before

Situation after
Results Costa Rica: Drying speed
## Findings

<table>
<thead>
<tr>
<th>Aspect</th>
<th>New Approaches</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trinidad</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time between opening of the fruits and fill in to the boxes</td>
<td>Reorganisation of purchase/collection of seeds</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Reorganisation of purchase of sufficient plastic boxes</td>
<td>10 US/ box</td>
</tr>
<tr>
<td>Overfermentation and mould due to long drying</td>
<td>Reorganisation of fermentation and drying procedure</td>
<td>2-3 days management work</td>
</tr>
<tr>
<td></td>
<td>Greater capacity of drying beds, new solar dryer</td>
<td>a lot</td>
</tr>
<tr>
<td><strong>Ecuador</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity of boxes or drying beds</td>
<td>Reorganisation of e.g. buying dates / start of fermentation</td>
<td>2-3 days management work, implementation</td>
</tr>
<tr>
<td></td>
<td>New fermentation boxes / new drying beds</td>
<td></td>
</tr>
<tr>
<td>Fermentation quality</td>
<td>Insulation + avoidance of airflow through banana leaves</td>
<td>minor costs (if farmer provide 3-4 leaves)</td>
</tr>
<tr>
<td></td>
<td>New fermentation boxes</td>
<td>a lot</td>
</tr>
<tr>
<td><strong>Costa Rica</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washing</td>
<td>Washing after Fermentation</td>
<td>Work effort: 10 min per box</td>
</tr>
<tr>
<td></td>
<td>Less fast and less hot drying procedure</td>
<td>none to minor, if drying regime is well adapted</td>
</tr>
<tr>
<td>Drying</td>
<td>Facilitation of airflow through opening the drying process</td>
<td>none to minor, if drying regime is well adapted</td>
</tr>
</tbody>
</table>
Sumary and Conclusion

• Quality of cocoa was improved with relatively small effort
• Only tailor made, on spot and easy to establish solutions are more likely to be implemented

Knowledge and Knowledge transfer / implementation are one part, but:
• Cultural differences and personnell / organisational situations also play mayor roles
• Communication and understanding of the needs (from each side) is crucial!!
# Quality - Toolbox

## Plantation management
- **Soil conditions**
- **Agrochemical application**
- **Variety/mix of variety**
- **Yield (timing, sorting)**
- **Des eased Material**

## Fermentation
- **Time lag: opening up to start of fermentation in box**
- **Contact to animals / left overs of animals**
- **Underfermentation**
- **Overfermentation**
- **Fermentation**
- **Drying**
- **Grading**
- **Storage**
- **Shipping**

## Quality Deficit

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<thead>
<tr>
<th>Plantation management</th>
<th>Fermentation</th>
<th>Quality Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil conditions</td>
<td>x</td>
<td>slaty</td>
</tr>
<tr>
<td>Agrochemical application</td>
<td>x x</td>
<td></td>
</tr>
<tr>
<td>Variety/mix of variety</td>
<td>x x x</td>
<td></td>
</tr>
<tr>
<td>Yield (timing, sorting)</td>
<td>x x x x</td>
<td>violets</td>
</tr>
<tr>
<td>Des eased Material</td>
<td>x x x x x x</td>
<td>mouldy beans</td>
</tr>
<tr>
<td>Time lag: opening up to start of fermentation in box</td>
<td>x x x</td>
<td>insect infested</td>
</tr>
<tr>
<td>Contact to animals / left overs of animals</td>
<td>x x</td>
<td>overfermented</td>
</tr>
<tr>
<td>Underfermentation</td>
<td>x x</td>
<td>doubles</td>
</tr>
<tr>
<td>Overfermentation</td>
<td>x</td>
<td>germinated</td>
</tr>
<tr>
<td>Fermentation</td>
<td></td>
<td>different bean sizes</td>
</tr>
<tr>
<td>Drying</td>
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<tr>
<td>Grading</td>
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<td>Shipping</td>
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• Kailash and Quincy Winklaar
• Family Zeuner, Edward Perez and Cateo
Trinidad: Drying speed