Cooking with fire: DRE solutions for Family Farming context in Argentina

Edurne Battista
National Institute of Agriculture Technology - INTA
battista.edurne@inta.gob.ar
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Argentinean Family Farming context

- A country basically agro-based
- More than 335,000 agriculture exploitations
- Almost 70% occupied by Family Farming (FF)
- FF access to only 13% of the lands

(Font: INDEC 2002 / Obstchatko 2007)
Energy matrix and access

- More than 97% access to electrical grid

- A deeper definition about access encompass a set of minimum access to electricity and to a relatively clean, safe means of cooking (World Energy Outlook, 2015)

Primary energy matrix (Energy Ministry, 2010)
Real energy demand

- Over the last decade public policies in energy field aim to the “electrification” of the rural areas (DRE)

- But farmers needs are related to functions that are not necessarily linked with electricity

- **Question:** electrification or energification of FF?
Why an improved cookstove?

- Bottled gas is the most common fuel off-the grid, BUT when farmers cannot afford its increasing price they turn to wood energy for cooking and water heating.

- Practices around fire have a very long socio-technical trajectory (Garrido, 2010; Thomas, 2009).
A cookstove for Pampeana Region

- Studying 10 representative cases of the area, the design emerges as a response to satisfy energy demands of cooking, fostering a better manage of wood as a renewable resource.

Questions tackled:

- Which aspects are considerate to establish the design guidelines?
- How this aspects can turn into design criteria for the current cookstove?
Methodology

1. Determining key aspects to establish the function of the device: 80% of the farmers interviewed farmers established cooking as the first wood usage.

2. Analysis of the current equipment present in the households: including current equipment and its nature, classifying them in self-construction, adapted and bought.
Methodology

3. Analyzing social practices around fire

**USAGE**
- 30% COOKING AND WATER HEATING
- 30% COOKING
- 20% COOKING AND HEATING
- 10% WATER HEATING

**DEVICE**
- 30% HEATER AND CLAY OVEN
- 30% SAVING-FUEL KITCHEN
- 30% HEATER
- 10% WATER HEATER AND SAVING-FUEL KITCHEN

**LOCATION**
- 40% INSIDE HOUSEHOLD
- 20% INSIDE AND OUT OF THE HOUSEHOLD
- 40% OUT OF THE HOUSEHOLD

**SEASONALITY**
- 60% IN WINTER
- 40% ALL YEAR
Design criteria

1. Including the possibility of moving the heater, regarding different usage situations
2. Limiting fuel entrance, using it in a more efficient way (reducing the size of the fuel)
3. Dimensioning the combustion chamber to distribute the air entrance
4. Placing the 9 liters pot inside the combustion chamber
Testing the prototype: The Water Boiling Test (WBT)

- A simplified simulation of the cooking process.
- To measure how efficiently a stove uses fuel to heat water in a cooking pot.
- Three phases: 1) The cold-start high-power phase to boil 5 liters of water 2) the hot-start high-power phase; 3) The simmer phase, boiling the water for 45 minutes.
- Results: Rate of consumption around 0.7 kg/h.
- Percent of heat utilized: 37%.
Testing the prototype with farmers
Discussion and further activities

Dimensions:

1. Towards a P-SS Design approach in RE field: leading the creation of a manufacturer’s chamber (CAMAF) from prototypes to marketable products

2. Efficiency issue: aims to solve technical specifications that require creativity and involve a multidisciplinary approach

3. Participatory action methods enables to co-design products, looking for usability criteria

4. How to transform wood fuels into a real, safety and sustainable option
Thank you!

*Edurne Battista*

*National Institute of Agriculture Technology - INTA*

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