PRESSURE COOKER TRAINING

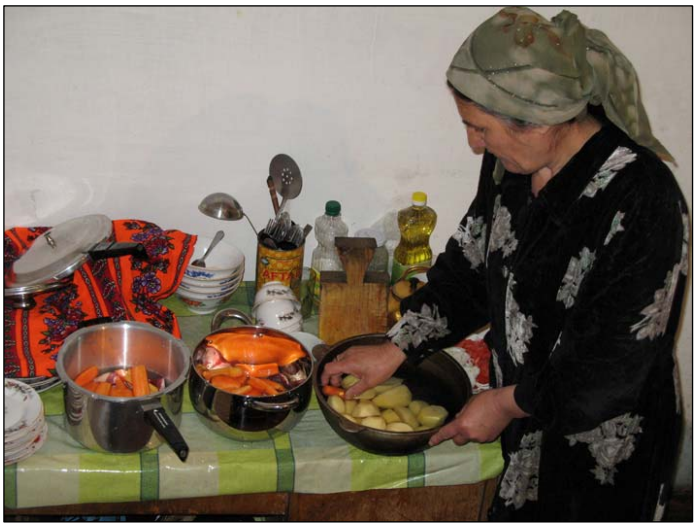
Traditional cooking and bread baking methods in the Zeravshan Valley in northern Tajikistan are extremely inefficient in terms of biomass consumption. This is the case in other areas of the country as well and several development projects are focussing on improving the stoves and cooking methods.

The Zeravshan Valley climbs from 1500 m altitude in the West to about 2500 m in the East with some houses even over 3000 m altitude where winter temperatures fall to as low as minus 40 degrees Celsius. Although I was involved in advising on house thermal insulation and introducing some renewable energy solutions, inevitably one gets involved in the cooking process as this is directly linked to the house heating system in the winter. During the summer, cooking takes place outdoors because the inside cooking stove emits too much heat. Bread is made in outside ovens using about 30% of the annual household firewood and cow dung consumption.

Because houses are poorly insulated (in particular the ceilings/roofs and windows), the cooking stove is stoked for many hours in an effort to provide some warmth in the winter, consuming massive amounts of firewood, dried cow dung (*tapack*) and coal. Only the richer people are able to afford purchasing about one ton of coal per bedroom, while the poorer people (the majority) are dependent on firewood and cow dung cakes for cooking and space heating. Most low-income families scavenge biomass materials and sleep together in one 3 m x 4 m room, sometimes with six persons. Floors are seldom insulated.

About three-fourths of the heat from the cast iron (Soviet relics) cooking stoves goes out of the chimney; the remainder is used for space heating, cooking and water heating. Several improvements are being introduced to reduce the massive heat waste – thermal insulation (roof, window, floor, wall), heat exchanger cum bread oven on the chimney pipe, back boiler, Serai cooker and haybox (heat-retention box), to name a few.

The pressure cooker is particularly useful for villages over 1000 m altitude. A short training session was held in Ayni village located at 1500 m.a.s.l. The purpose of the training session was to demonstrate the energy saving aspect of the pressure cooker by comparing the same dish (soup) cooked according to the traditional method and using the pressure cooker and haybox (heat-retention box).



(1) The meat and vegetables (carrots, potatoes, tomatoes and onions) were cleaned and divided equally between the pressure cooker and cooking pot.

The vegetables were not chopped into small pieces, but followed the traditional method of keeping the potatoes whole and the vegetables chunky.

(2) The amount of water (for the soup) in the pressure cooker was just above the vegetables, while the amount of water in the common cooking pot was well above the vegetables.

In addition, because the traditional method requires two hours of simmering after being brought to boil, an additional two cups of water were added during the cooking process.

(3) The two pots were placed on a double pit gas stove, assuring that the flame under the pots was about equal.

Although the pressure cooker has a larger mass in terms of the amount of metal, it came to the boiling point faster than the cooking pot because of the lesser amount of water (of course).

(4) The pressure cooker came on pressure in 17 minutes, while the pot with the glass lid took 25 minutes to begin to boil. Once the pressure cooker came to full pressure, it was taken off the stove and placed in a haybox.

The haybox was made from a cardboard box lined with three layers of metalized foil with a Polyethylene (PE) backing of 3 mm. The highly reflective surface was placed towards the heat source. This foil is commonly used under laminate floors and is now widely available.

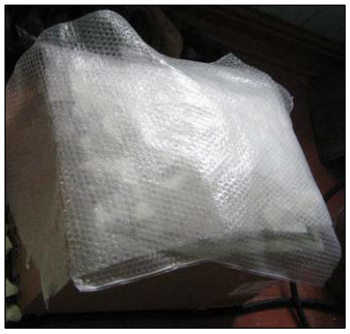
Heat-retention cookers are commonly made from insulation materials such as Expanded Polystyrene (EPS λ=0.04 W/m.K), loose wool (λ=0.05 W/m.K), straw (λ=0.08 W/m.K) or even less insulating materials. However, the highly reflective metalized foils are far more effective and require less space.

For a total heat resistance of R= 3.0 m.K/W, a material thickness of 12 cm EPS is needed or 24 cm loose straw, making it a voluminous box.

Each reflective foil with 3 mm PE backing has an R value of about 0.8 m.K/W. Hence, only four foils are needed to reach R=3.2 m.K/W, being only 2 cm in thickness.

(5) After placing the pressure cooker in the haybox, it was covered with broken pieces of EPS computer packing material, followed by a layer of bubble foil. By this time (25 minutes), the traditional cooking pot had started to boil and the gas flame under the pot was lowered slightly.

(6) After two hours, during which two cups of water had been added, the traditional dish was ready. The pressure cooker was taken out of the haybox. The pressure cooker had retained some of its pressure, meaning it had actually continued to cook the ingredients at a higher temperature than the traditional cooking pot.



(7) Comparing the two soups, all the project staff agreed that the soup cooked in the pressure cooker tasted better and the carrots were softer. One female staff commented: *"Now I do not need to get home two hours before lunch in order to start cooking, I can make the soup in the morning and it is still warm at lunch."*

(8) The pressure cooker used only 17 minutes of gas while the traditional pot took 25 minutes (high flame to come to the boil) and 120 minutes (simmering time); in total 145 minutes. This meant that the pressure cooker used only 12% of the gas (or other cooking fuel such as firewood) as compared to the traditional cooking method.

The exercise demonstrated that the combination of the pressure cooker and haybox (heat-retention box) results in considerable savings of cooking fuel. Actually one-eighth of the amount of fuel. The high saving is partly due to the inefficient cooking method of the traditional dish requiring long cooking times. This correlates with houses being poorly insulated and requiring constant heating during the winter.

The exercise was concluded with a training session on the technology of the pressure cooker and haybox. It was suggested to make a cotton heat-retention bag (big tea cosy) with several reflective foils to reduce its volume when stored away. The following recommendations resulted from the training session:

- Have such cooking demonstrations in the villages, with tasting the dishes for comparison.
- Explain the operation of the pressure cooker with its advantages and disadvantages.
- Develop a cookbook with easy tasty recipes using the pressure cooker.
- Make the pressure cooker available through local shop outlets in the villages, selling it only with an instruction manual and cookbook.
- Make the heat-retention bag also available through local shop outlets and include an instruction manual for the types of food that can be cooked with the aid of the bag.
- Explain the relation between traditional long cooking times and house insulation.

Behavioural change related to cooking and traditional dishes is difficult. The notion that "new cooking methods do not taste good" is not always correct and often merely an expression of resistance to change.

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