



# KAWAL

## FERMENTED GREEN LEAVES

Kawal is a strong smelling Sudanese, protein-rich food prepared by fermenting the leaves of a wild African legume, *Cassia obtusifolia* and is usually cooked in stews and soups. It is used as a meat replacer or a meat extender. Its protein is of high quality, rich in sulphur amino acids which are usually obtained from either fish or meat.

### Raw material preparation

The *Sickle Pod* plant (*Cassia obtusifolia*) is a wild legume that grows in Sudan. The leaves should be collected late in the rainy season when the plant is fully grown. All the stems, pods and flowers should be removed. If they are not removed, the final product is bitter. The leaves should not be washed. It is thought that natural micro-organisms on the leaves are important for the correct fermentation.

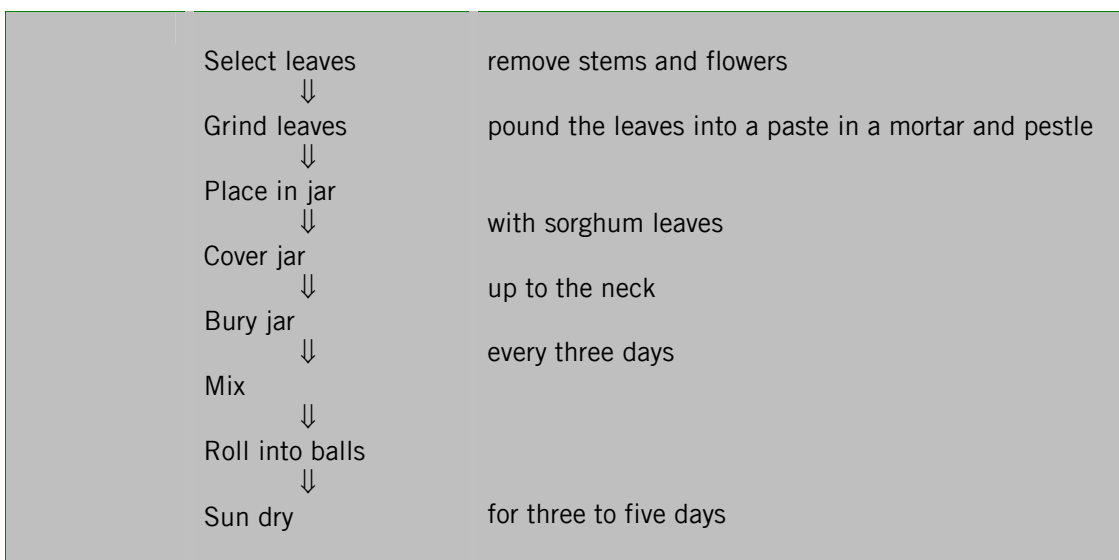
### Process and principles of preservation

The leaves of the leguminous plant are pounded into paste without releasing the juice. The paste is placed in an earthenware jar and covered with sorghum leaves. The whole jar is sealed with mud and buried in the ground up to the neck in a cool place. Every three days the contents are mixed by hand.

The fermentation takes about fourteen days. The fermentation is extremely complex. The main micro-organisms are *Bacillus subtilis* and *Propionibacterium spp.*

After about fourteen days, the strongly smelling black fermented paste is made into small balls and sun-dried for five days.

### Flow diagram



### References and further reading

- *Gundruk: Pickled Leafy Vegetable*, Practical Action Technical Brief
- *Pickled Cabbage (Kimchi)*, Practical Action Technical Brief
- *Traditional Foods: Processing for Profit* by P. Fellows, IT Publications, 1997

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technical brief