



# Better calf keeping with the NARO calf pen



# Local calf keeping



Many farmers, especially those in rural areas, keep calves in open spaces. There are a number of problems that can come from keeping calves this way.

- Calves are exposed to adverse weather conditions that become harmful to their health when it is too hot, too cold or when there is heavy rain.
- Bare ground that becomes muddy and gathers waste from the calves is a source of disease.
- Mud and puddles will attract flies and other vectors carrying diseases that can spread to calves.
- Feed placed on bare ground is unclean and becomes contaminated.
- Open spaces have no enclosure to prevent wild animals and stray dogs from attacking the calves or exposing them to ticks and diseases.
- Tethering can lead to injuries and stress in calves, affecting their feeding and slowing their growth.
- Calves kept in open spaces take long to wean and consume large quantities of milk.

# Local calf keeping



# Local group housing

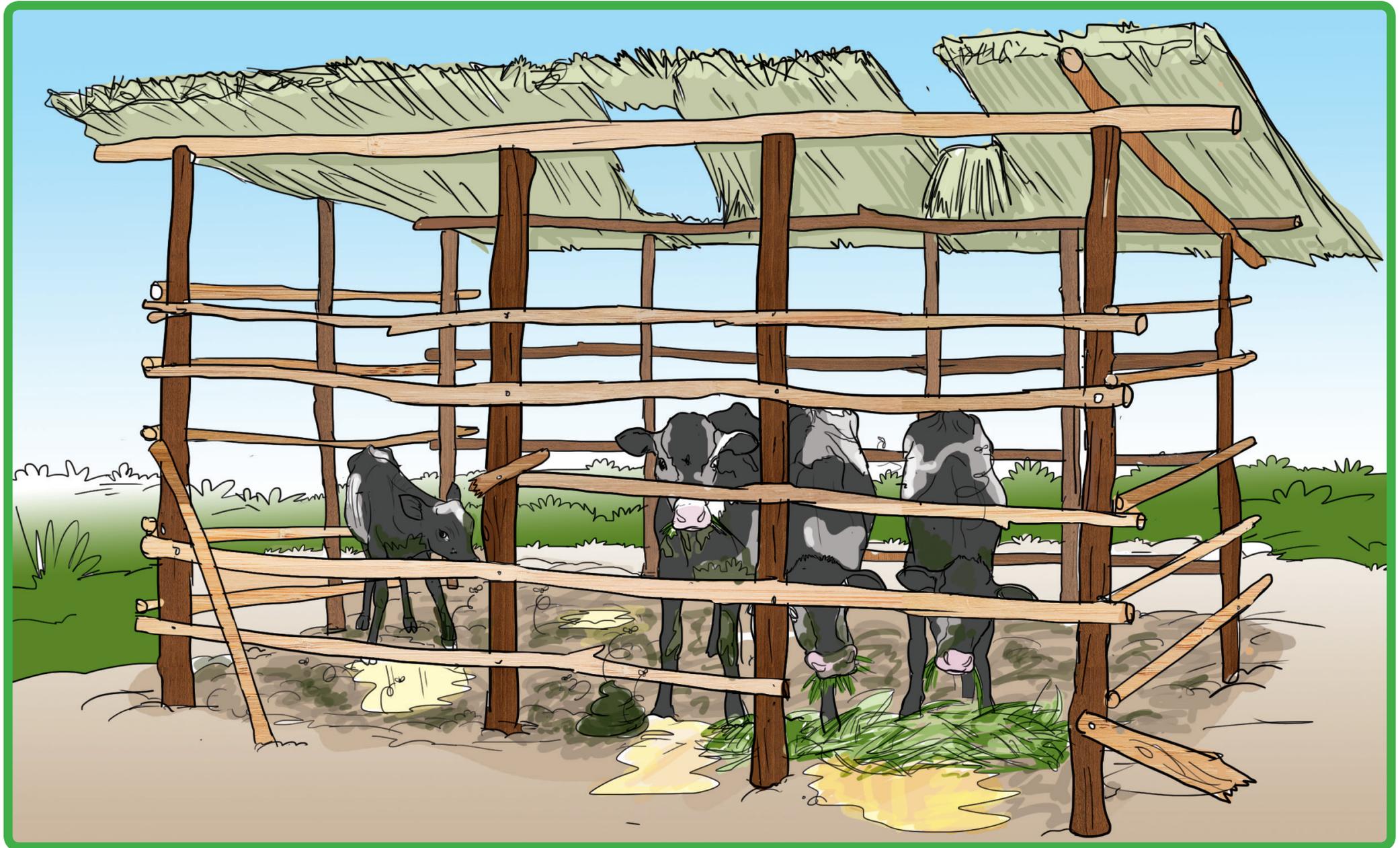


Most calves kept on dairy farms are housed in groups with other calves. Group housing presents a number of risks to a growing calf. Group housing leads to overcrowding, which can cause the following:

- Flooring will gather urine and dung from all the calves. If the floor is bare ground, it becomes wet and cannot be cleaned easily. Calves that lie on such flooring become soiled and dirty.
- There may not be enough space for calves to lie down and rest or they may become stressed and forced to rest on a dirty floor.
- It is difficult to control vectors in group housing. The dirty environment of group housing attracts many flies and other vectors that will quickly spread disease and infection among the calves (e.g. diarrhoea).
- It is difficult to control the spread of illness between calves in group housing. Calves that are sick with bacterial infections such as pneumonia will spread their illness to other calves quickly and easily if they are kept together.
- Calf feeding cannot be controlled easily. The calves are fed together, so they must fend for feed from each other. Bigger calves deny weaker ones access to feed and water, so the weaker calves take long to develop and become healthy.
- The climate of group housing can be difficult to control. Calves may be too exposed to cold or hot conditions that may bring them stress or illness.



# Local group housing





## Design of the NARO calf pen

The NARO calf pen has been designed to provide a healthy environment for the proper growth of a calf.

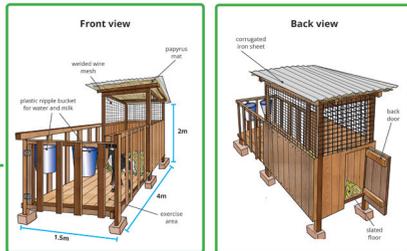
- The pen has two distinct areas:
  - A shaded area where bedding is laid and the calf is able to rest. It can keep cool on a hot day or dry and warm when it is raining.
  - An exercise area where the calf can move around and play while receiving vitamin D from sunshine.
- The NARO calf pen is made for one calf. An individual calf pen has several advantages:
  - The calf will not be in direct contact with other animals that may carry vectors and diseases, reducing the risk of contamination.
  - If a calf in the pen becomes sick, it is easy to prevent the spread of illness to other calves.
  - The calf does not have to compete with other animals for feed, so it is easy to meet the individual calf's nutritional requirements.
  - A young calf cannot be bullied by older calves.
- The pen is raised above the ground and placed on bricks or a hard surface to prevent attack by termites. The pen floor is slated and does not contact the ground, so it remains dry and mud cannot make the calf or its feed dirty.
- A cleaner pen means less flies and vectors will gather around the calf.
- The pen is secure, so the calf is well protected from predators and wild animals which would disturb it.





# Design of the NARO calf pen





# Additional features of the NARO calf pen

A calf pen must be built with high standards and good features in mind.

## Front view:

- The NARO calf pen measures 1.2 metres wide x 4 metres long x 2 metres tall. This gives a calf more than the suggested space of 2 square metres to move.
- A slatted floor lets waste and water drain easily. The pen is placed on bricks or a hard surface to allow drainage to run off and to keep the pen dry and reduce exposure to termites.
- A 10 gauge welded wire mesh is fixed to the upper sides and back of the pen. This allows optimal ventilation of the shelter.
- Handles at the front of the pen hold plastic buckets to make feeding a calf easy.
- Two buckets are used for feeding: one for milk or water and one for feed. The milk bucket has a special nipple that simulates a mother cow's udder for easier feeding.

## Back view:

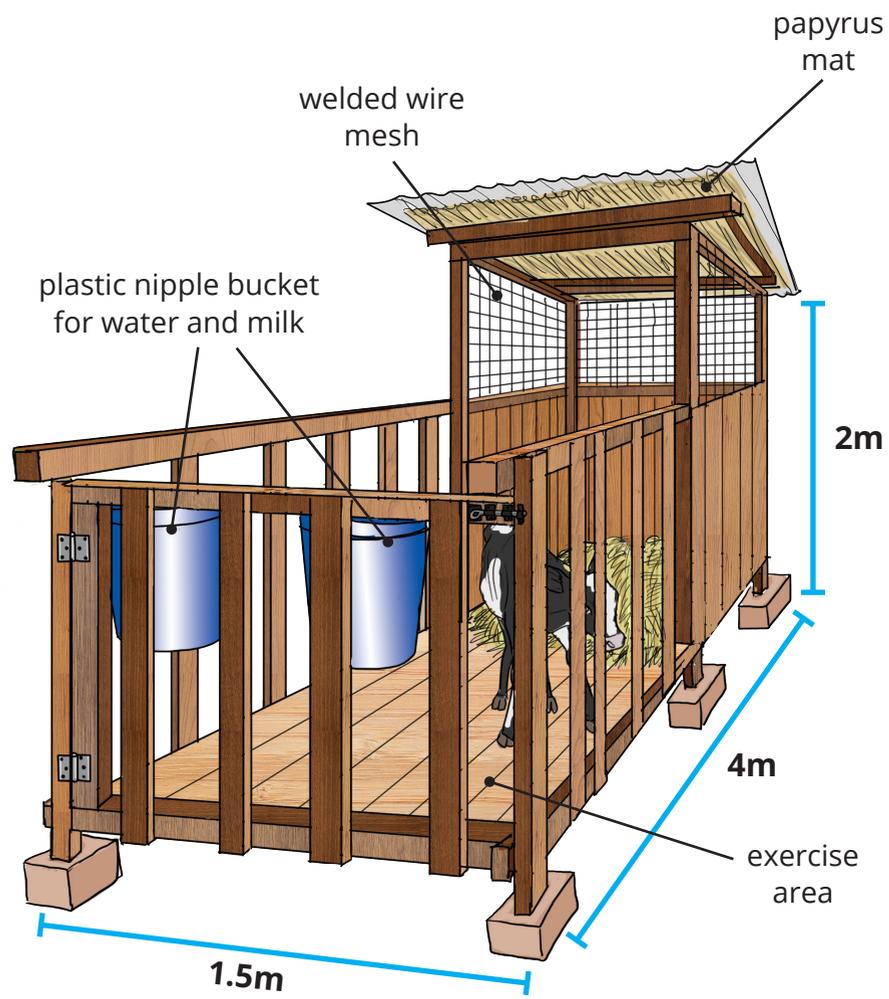
- Corrugated iron sheet is strong and provides shade. A papyrus mat placed under the iron sheet reduces the amount of heat that comes in contact with the calf inside the pen.
- Grass and other bedding material placed in the pen keeps dry because moisture drains through the slatted floor.
- A back door gives easy access to the pen so tasks like changing the bedding can be done without disturbing the calf.
- The pen is built so that it can be taken apart and assembled easily. This makes it easy to transport the pen and to store when not in use.





# Additional features of the NARO calf pen

## Front view



## Back view





# NARO calf pen made from local materials

The original version of the NARO calf pen has been designed to be built with the best durability and functionality. If it is too expensive for a dairy farmer, a cheaper version of the NARO calf pen can be made.

Some features must be preserved to keep the integrity and benefits of a NARO calf pen:

- Large enough space for a calf to move freely (2 square metres at a minimum).
- A floor that drains easily and will not cause the calf to be in contact with the bare ground or waste. Placing the pen on bricks or a hard surface prevents direct contact between the pen and the bare ground.
- An open area for play and a shaded area for shelter. Ventilation should be provided to control the temperature of the shaded portion.
- Provide strong enough support to the perimeter of the pen. The pen must provide adequate containment for the security of the calf, so it must be built using sturdy materials that will protect the calf inside.
- Buckets or other suitable containers to control feeding and to ensure sanitary feed is available for the calf.

The following are possible substitutions that will allow for a NARO calf pen to be built at a cheaper cost:

- Timber can be replaced with locally sourced wood such as eucalyptus poles or timber off cuts.
- The iron sheet on the roof can be replaced with kaveera or tarpaulin roofing material. It is still recommended to place a papyrus mat under the top most roof material to help reduce the heat generated by the roof.
- The wire mesh used for ventilation in the shaded part of the pen can be replaced with chicken mesh.
- Nuts and bolts can be replaced with nails of different sizes.



# NARO calf pen made from cheaper local materials





# Materials for assembling a NARO calf pen

The NARO calf pen is built to be strong. It can be taken apart and put together again easily, so it is easy to transport the pen or to store it when not in use. A lower cost version of the NARO calf pen can be made using locally available materials, such as those suggested below. Any calf pen can be made using simple materials:

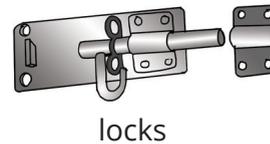
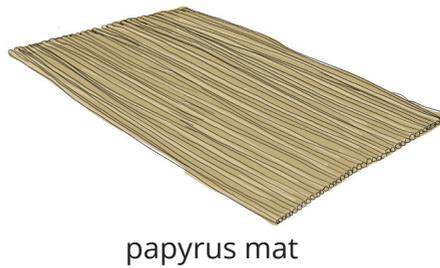
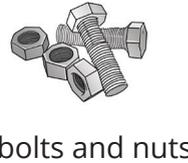
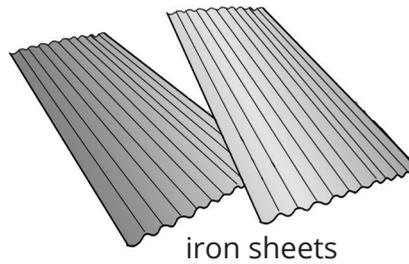
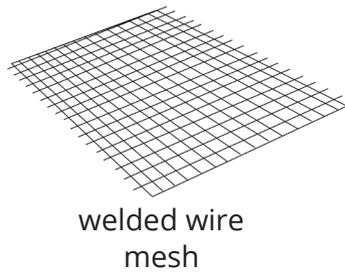
Original NARO Recommend Materials	Qty	Local Material Alternatives for Lower Cost Pen
Seasoned timber	10	Eucalyptus or other timber
Iron sheet	2	Kaveera or tarpaulin large enough to make a roof
Papyrus mat	1	Papyrus mat
Nails	1 kg	Nails
Hinges	5 pairs	(optional)
Bolts and nuts	5 kg	Various sizes of nails
Plastic nipple bucket	1 or 2	Bucket or container suitable for feeding
Locks	5	(optional)
Welded wire mesh	3	Chicken wire mesh

- A calf kept in a pen has better welfare, reducing the cost of health management.
- A well fed calf kept in a NARO calf pen can grow quickly, reaching a weaning target weight of 90-100 kg in as early as 3 months. If a calf is weaned earlier, the milk produced by the mother cow can be saved for dairy production.
- An increased growth rate of dairy cattle makes milk production become more profitable.

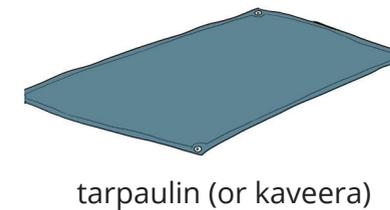
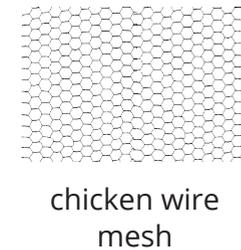
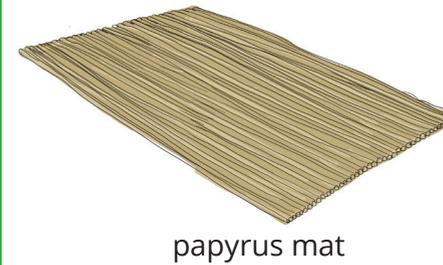
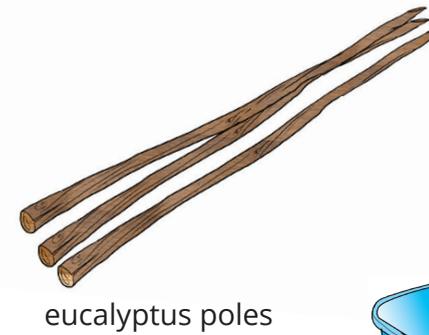


# Materials for assembling a NARO calf pen

## Original NARO recommended materials



## Local material options for lower cost



# Acknowledgements

## Contributing authors:

- Nakiganda Annuciate - NARO/NALIRRI
- Steven G. Byenkya – NARO-Bulindi ZARDI
- Kiggundu Muhammad-NARO/NALIRRI
- Nviiri Geofrey - NARO-Ngetta ZARDI
- Nimusiima Susan – NARO- Mbarara ZARDI
- Abraham Ahabwe – NARO-Rwebitaba
- Alice Endraa-NARO NaFFIRI

## Farmer representatives:

- Koire Asuman – Butaleja district
- Asimwe Joseph - Kyazanga- Lwengo district
- Wafana Yahaya - Kayunga district
- Acan Eunice – Farmer, Kitgum
- Nakalembe Dorothy – Farmer, Mukono
- Jennifer Opio – Farmer, Dokolo district
- Barisiyoy Jemimah – Wakiso District Farmers association

## Extension staff representatives:

- Fredrick Kabango – DAO, Masaka
- Namubiru Sarah – DAO, Luwero
- Alloo Eunice – Senior DAO, Tororo
- Nsubuga Zaccheaeus Mukasa – DAO, Kayunga
- David Kiryabwire – DVO, Mukono
- Khauka Busiku Samuel – DAO, Mbale

## Reviewers:

- Christine Aloit – CABI
- Abigael Mchana – CABI
- James Watiti – CABI
- Daniel Karanja – CABI
- Barbara Mugwanya Zawedde – NARO Secretariat
- Imelda N. Kashaija - NARO Secretariat

## With support from:



**THE WORLD BANK**



For more information contact:  
National Agricultural Research Organisation (NARO)  
P.O. Box 295, Entebbe, Uganda  
E-mail: [dgnaro@naro.go.ug](mailto:dgnaro@naro.go.ug)  
[www.naro.go.ug](http://www.naro.go.ug)  
Tel: +256 414 3201041



Illustrated and designed by

**MANGO TREE**  
communicate · design · educate

## Design of the NARO calf pen

