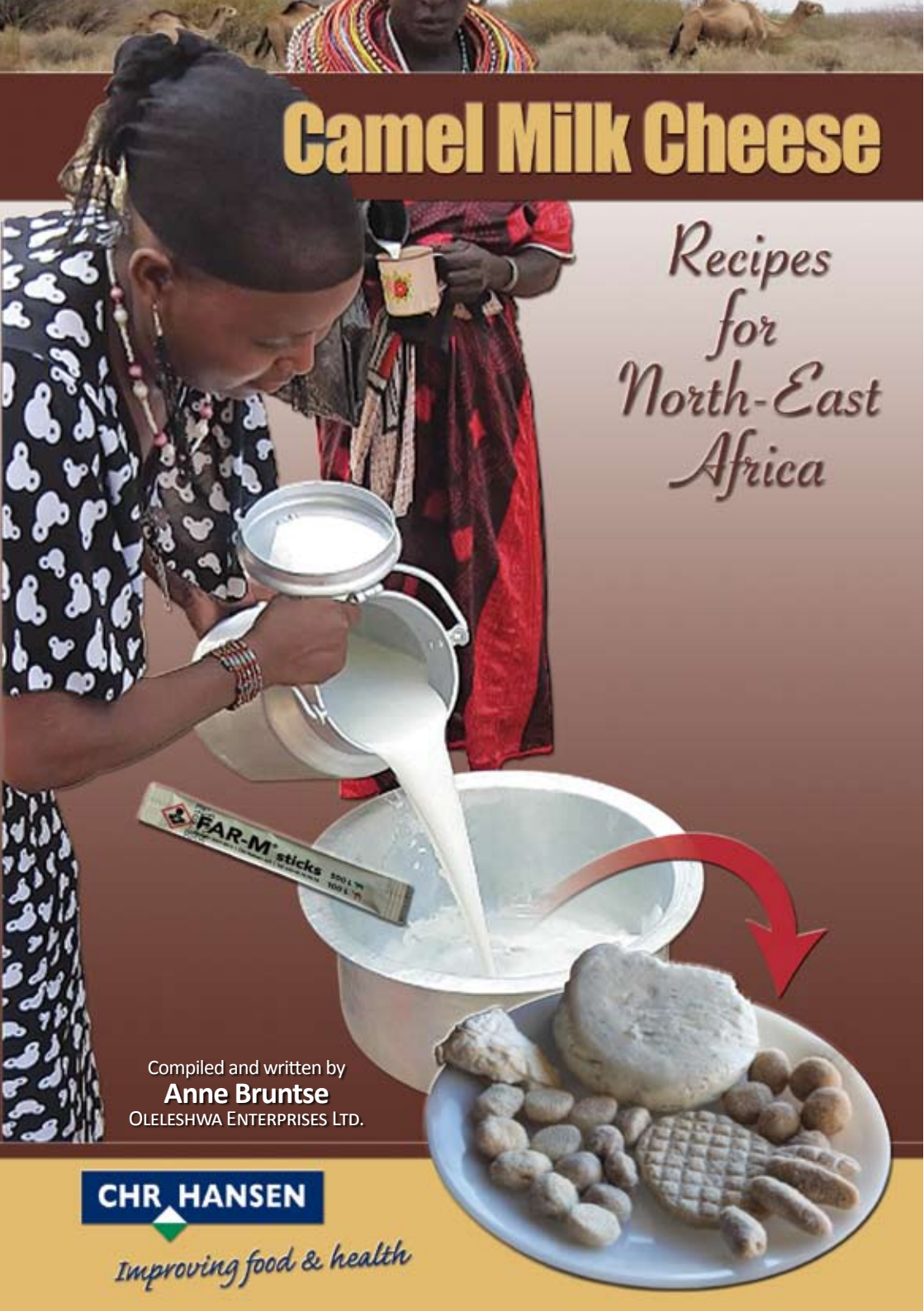
Camel Milk Cheese

Recipes for North-East Africa



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Improving food & health

Acknowledgments

- A new camel milk coagulant FAR-M® developed by **Chr Hansen A/S,** Denmark in collaboration with Dr. Zacharia Farah, ETH Zurich, Institute of Food Science and Nutrition, Switzerland.
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Contents

Introduction

Camel milk is one of the main sustaining food stuffs for pastoralists in Northern Kenya, but is only really abundant during and shortly after the rainy seasons. It therefore becomes desirable to preserve part of the abundant production to use during droughts and thereby helping to improve the quality of life for pastoralists.

Chr Hansen A/S has developed a new coagulant to produce delicious cheese from camel milk. Oleleshwa Enterprises Ltd. Kenya has developed recipes for preservation which will be shared with this booklet.

According to initial research a pastoralist household could easily have 20–40 litres of camel milk per day during times of abundance in addition to cow and goat milk. During this time it is easy for the families to consume the cow and goat milk and use the camel milk for processing. It was therefore decided to base the recipe on 20 litres of milk at a time, as this quantity is easy to handle and not too much work for the household. It is also easy to double a portion if there is enough milk.

Different cultures were tested on camel milk at ambient temperatures of 20–25°C at Oleleshwa premises, and at temperaratures of 30–35°C in Northern Kenya while training group representatives from 7 different locations in Northern Kenya during the Biovision-funded training in October 2013. The women groups were given a small cheese making kit and 5 coagulant sticks each for experimentation at home and encouraged to preserve any excess camel milk they produce.

An unexpected bonus was the delicious whey that was drained off the cheese. Added a little sugar it became an instant hit as a soft drink and the women competed for a chance to take it home for cooking porridge.

Items needed for home cheese production

Home cheese maker kit for processing 20 litres of milk:

- 20 litres of camel milk
- Culture *(see below for home production of culture)*
- 2 x 10 litre milk cans
- 1 x 20 litre cooking pot or larger *(40–50 litres if the milk to be processed per day is more)*
- 1 litre measure or one cup for measuring milk
- wooden spon *(mwiko)* for stirring milk
- sieves
- 1 long knife
- trays and cloths for draining and drying the cheese
- FAR-M® coagulant
- Detergent and soaps for cleaning
- Chlorine
- Salt and/or sugar for preservation.

Home cheese makers equipment for producing cheese from 20 litres of milk daily

Cheese cultures

In field study by Dr. Z. Farah and A. Bruntse in 2004, it was noted that camel milk would not coagulate with acidity higher than pH 5.5. The pH (acidity) of normal fresh milk is in the range of 6.6–6.8, so for coagulants to work the milk should first go through fermentation to lower the pH.

It was also once again confirmed that camel milk looses its ability to coagulate if pasteurised to temperatures above 65°C. Temperature control is very important in cheese making processes. Please see page 7 for description of available types of thermometers.

Chr Hansen A/S has developed numerous commercial cultures over the years – each with their own specific properties in terms of flavour and consistency of the final product. The mesophilic cultures (lower temperature ranges) will be known to you as the flavours of Mala (*Maziwa lala*) and most of the common brands of cheese. Camel milk does not work well with mesophilic cultures – they leave an unpleasant mouth feel in the final cheese product.

Chr Hansen thermophilic cultures

On the other hand, thermophilic (heat loving) cultures work well with camel milk. These cultures are normally used in yoghurts and mozarella cheese among others.

In our tests, the first real recipe winner – camel cream cheese – is made with yoghurt cultures. Also Mozarella culture works well and gives a pleasant tasting soft cheese when drained early. Tested against local ASAL cultures, we found similar properties and very pleasant taste and mouthfeel even with non-skimmed camel milk. The cheese process is also much faster when using thermophilic cultures and temperature ranges.

Commercial cultures come in freeze-dried in sealed pouches and must be stored in deep freezers. When the letters DVS are written on, then it means they can be used directly to start fermentation (DVS = Direct Vat Set).

Cheese cultures

In ASAL-pastoralist areas, deep freezers are not presently available so it is not possible to make several batches of camel cheese using commercial cultures.

Camel milk is much more resistant to fermentation than cow or goat milk. We found that we could greatly speed up the camel cheese process by using the DVS cultures to make **mother cultures** the day before the planned cheese production or use ”kibui” cultures.

To make a mother culture for one batch:

- Boil 1/2 litre of milk and keep covered with lid.
- Cool the milk in basin of cold water until 45°C (hot but not burning feel of the container).
- Add small pinch of DVS culture and stir.
- Cover and leave in warm place till the following day.

The recipes in this book employ the use of mother cultures and DVS interchangeably. Kibui culture works the same way as mother cultures.

Gadgets for temperature control:

WAPI – cheap and durable, requires care in use for cheese production

Food thermometer – made of glass, so breaks easily. Sometimes not easy to read

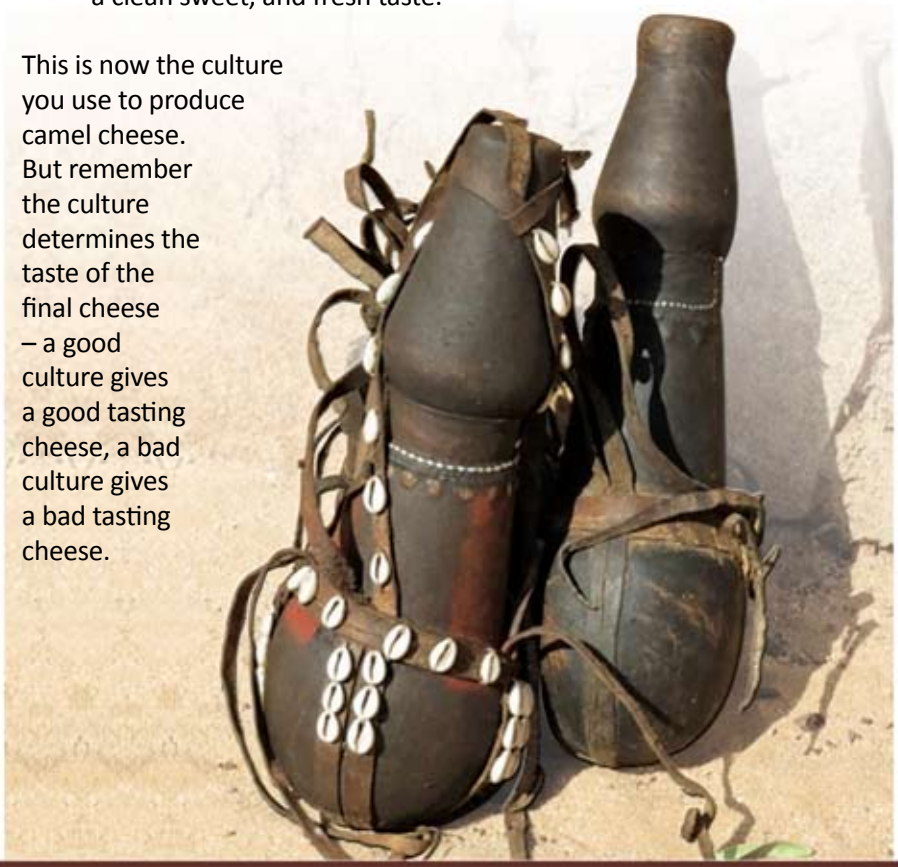
Digital thermometer – most reliable, but also the most expensive temperature control help. Occasionally needs a new battery. Recommended for the serious cheese maker

Production of "Kibui" cultures

Pastoralists have a valuable resource in their locally produced milk containers. These kibui's are made from either wood or leather, coated with colostrum for water proofing and rinsed and smoked to clean and sterilise for every time they have carried milk. Over time these containers produce very good fermented milk – a feature that can be used in production of cheese culture.

1. Rinse a (seasoned) traditionally clean kibui and its lid with hot water (not boiling).
2. Pasteurise about 1 litre of milk and cool to room temperature.
3. Pour the pasteurised and cooled milk into the kibui and cover with the lid.
4. Leave for 24 hours or until properly fermented and check that it has a clean sweet, and fresh taste.

This is now the culture you use to produce camel cheese. But remember the culture determines the taste of the final cheese – a good culture gives a good tasting cheese, a bad culture gives a bad tasting cheese.



Home cheese production

1. Wash hands with soap and clean water.

2. Put cooking pot with clean water on fire to start boiling.

3. Sterilise the whole cheese making kit in hot boiling water, including spoons, knives, cloths, sieves, etc. Put upside down on clean table or rack to dry away from dust. ***NOTE: (1)*** *Do NOT dry containers inside with any cloth. Cloths may be very dirty and can add serious contamination to an otherwise clean container, and* ***(2)*** *Do not touch sterilised containers inside with cloths or hands.*

4. Measure and sieve the cheese milk through fine netted cloth into your milk jug. A boiled pillow case will work very well. if milk is sourced from different people – a simple record is useful.

Payments or sharing of cheese is easy when records are kept

5. Place the jug with sieved milk in the hot water left from sterilising the utensils and heat.

6. Immerse WAPI (green) completely inside the milk, tie its string onto the can to secure it in place and stir occasionally. Check WAPI frequently till you see the beginning of the green wax melting (the milk will have reached 65°C). Ten to twenty litres will take 10–20 minutes to heat so do not walk away. Over-heated milk will not coagulate.

7. Remove milk jug and cooking pot wih hot water and leave for 20 minutes in a warm place.

8. Remove milk jug from the hot water and place in a cold water bath. The cold water bath warms quickly and may need to be replaced till jug reaches 45°C (hot to the touch but no burning sensation).

9. Pour pasteurised milk into sterilised cheese pot.

10. Add 100–150 ml (1/2 cup) Kibui or mother culture for every 10 litres of milk. Stir well and cover. Leave in warm place for 1 hour.

11. Measure coagulant. 1 coagulant stick will coagulate 100 litres of camel milk, so to make cheese from 10 litres, this needs to be divided 10 times. For 20 litres, divide into 5 parts. The easiest way is to draw a box on a lineated piece of paper coverng 10 lines and arrange the coagulant inside the box. Then cut off one square for every 10 litres with a dry knife. Return the remaining coagulant powder to the pouch, close with masking tape, indicating amount left in pouch. Dissolve the measured coagulant in a small amount of clean (boiled and cooled) water and add to cheese milk. Stir well and cover.


12. In hot areas, the cheese milk will start coagulating in 40–90 minutes. Check readiness for cutting – where your knife can lift a section of curd aside.

13. When ready – cut cheese milk into a pattern of squares – first one way then cross-wise, and lastly sideways as far as possible and cover. This will help speed up the separation of cheese curds and whey. Waiting time according to recipe. For production of dried cheese powder, simply leave the cut cheese milk to separate overnight to let curds harden. No need to stir – they will not mat together again.


14. When cheese curds are strong enough for draining, first pour off the whey from the top, and collect in a container. The whey from camel cheese fermented with thermophilic cultures is very delicious and nutritious. It can be consumed as a soft drink immediately with a bit of sugar added, or used to make delicious porridge.

15. When curds have the required consistency – soft for soft cheese, hard for dried cheese – gently pour then into preferred draining tool. If meant for cream cheese or drying, the colander is fine. If for round formed cheeses a cheese mould/form can be used. Forms like the one shown below is made by cutting the bottom off a jug and using a thin hot wire to pierce many little holes for draining in the sides. Wash and sterilise before use. Cover curds while draining to keep out dust.

16. When drained to desired consistency, set out for drying or pack in containers for selling. Sweetened cheese can be rolled in sugar, and cheese for other uses should be slightly salted to prevent moulding.

17. Cheeses formed in moulds should be turned in the mould every 2 hours and drained completely before being removed from the mould, otherwise they will not keep their shape. Then sprinkle coarse grained salt lightly on all surfaces and let dry for a day or so before packing and refrigeration.

18. Cream cheese to be packed immediately in clean sterilised containers with lids. Will keep for a maximum of 4 days without refrigeration in ambient temperatures of 30–35°C. Refrigeration will extend shelf life to 2–3 weeks.

19. Wash all utensils:

(a) First rinse cloths and utensils with cold water to remove any milk or cheese left over.
(b) Wash all cloths and utensils with warm water and dish soap or bar soap.
(c) Rinse in cold clean water.
(d) If hot water is available, sterilise all.
(e) Dry cloths and utensils on a clean table or rack and store under cover away from dust.






Cheese recipes

There are 3 possibilities for pastoralists with no access to cooling facilities:

1. Make fresh cheese for home consumption
2. Make dried cheese sweets
3. Make dried powdered cheese for storage and adding to food during dry seasons

Dried cheese sweets – can be spiced if preferred. Recommended spices: Fennel seeds, cardamon, were the most popular spices tested

Dried cheese powder for long time storage to add to food during dry seasons

1. Dried cheese and cheese sweets

Note to cheese makers used to cow milk:

"Never stir the curds of camel milk cheese!!! Stirring will spoil the curds and reduce your cheese yield considerably"

- Pasteurise your milk up to 65°C for 20 minutes.
- Cool to 45°C.
- Add half cup of Kibui culture for every 10 litres of milk.
- Wait 1 hour.
- Add FAR-M® coagulant – wait 2 hours or when ready to cut.
- Cut in squares as per illustrations.
- Leave until curds have the desired consistency – 1 to 2 hours.
- Drain whey off the top.
- Drain curds in colander lined with sterilised cloth and placed over draining basin. Cover while the curds drain.
- Check consistency of curds, and when dry enough, shape into desired sweet sizes.
- Roll in sugar and set out in trays for drying.
- If dried cheese powder is desired, simply leave curds in whey till evening or following morning and drain off all whey. These curds can then be further cut and placed in tray to dry.
- When properly dry the cheese can be pounded to powder, dried some more and kept in a dry sealed container or packed in plastic bags.

2. Feta type cheese and fresh soft cheese

Commercial Feta type cheese and spiced soft cheeses (same recipe, but different level of draining and drying can be made from whole or semi skimmed camel milk according to market demands).

The processes for fresh soft cheese and feta are similar, but the fresh cheese is drained at an earlier stage to retain more liquid. The recipe produces approximately 500 g cheese per 5 litres (more if it is drained less to produce soft cheese). Thus if 250 g cheeses are required, 4 forms should be prepared for 20 litres of milk and the curds distributed evenly.

- For low fat cheese separate half the cheese milk to get semi skimmed milk
- Herbs or spices can be added at this point. Rosemary goes very well with the taste of camel feta
- Pasteurise to 65°C for 20 minutes
- Cool to 40°C
- Add culture ¼ g freeze dried culture (for example CHR HANSEN ST-M5) or half cup mother culture per 10 litre milk
- Wait 2 hours
- Add FAR-M® coagulant as per illustration on page 11.
- Wait 2 hours
- Cut in squares
- Leave overnight if ambient temperatures are 20–25°C. In hot areas 2–3 hours will be enough
- Drain in adequate forms
- Turn the form over every 2 hours till all whey has completely drained off. If removed from forms before draining is finished the cheeses will not keep the shape properly
- When removing from forms add 2 g salt per 500 g cheese sprinkled on all sides
- Dry for 1–2 days depending on temperature
- Store in vegetable oil or brine

- Keep refrigerated 4°C (expect shelf life of about 5–6 months if stored in vegetable oil. Brine = salty water. Brine strength for camel cheese has not been tested as pastoralists generally do not like salt, and oil keeps much longer. So if you choose to try storing in brine, test recipe with customers as well as its shelf life first and regulate salt content according to demand).

3. Camel Cream Cheese

- Use yoghurt cultures
- Pasteurise to 65°C over 20 minutes and cool to 40°C
- Add freeze dried yoghurt culture ¼ g freeze dried culture (for example CHR HANSEN YC-X11 or half cup mother culture)
- Wait 2 hours
- Add FAR-M® coagulant
- At 20–25°C leave overnight. At 30–25°C leave for 3–4 hours.
- Drain to desired consistency
- Add salt to taste and any herbs preferred (garlic and herbs are nice for dips)
- Pack in suitable containers and refrigerate at 4°C
(estimated shelf life: refrigerated — about 2 weeks, ambient temperature 30–35°C — max. 4 days).

Cream cheese with mandazi – a delicious snack

4. Soft cheese (Camelbert) *only tested in ambient temperatures of 20–25°C*

For adventurous commercial cheese makers with hotel markets, a very delicious camel camelbert can also be manufactured.

Basically the feta recipe with semi-skimmed milk is used and Chr Hansen Penicillum candidum added along with the coagulant.

The cheeses should be drained in suitable forms to become about 3 cm thick. Development of the white mould is encouraged by ensuring the cheeses are kept in high relative humidity. This can be done on small scale with the help of frequently changed clean wet towels covering the trays where the cheese is maturing. Put the cheeses on clean disinfected plastic grills to enable the white brie mould to develop all over. Turn 1–2 times per day. After 4–5 days (ambient temperatures 20–25°C) the mould should have covered the cheeses completely and they will start getting soft.

It is recommended that these camelbert cheeses are frozen immediately they get soft, and only thawed just before consumption. Treated this way you get a delicious cheese. If left to ripen a bit longer they become very strong – both in smell and flavour. Only a few days separate the perfect stage from the too ripe stage.

Pack camelberts in aluminum foil or specially designated perforated plastic and enclose in plastic bag for freezing.

Conclusion

This study on uses of FAR-M® coagulant to make camel cheese went through several stages to come up with recipes included in this manual.

We found that thermophilic cultures and temperature ranges gave far superior products compared to those produced with mesophilic cultures. The temperature ranges can be used to regulate consistency of final cheese product:

- Cream cheese should be produced at 40°C to retain its smooth consistency. At hight temps it becomes grainy and retains less whey.
- Also the Feta type cheese works well with 40°C production temperature – and gets a nice brittle texture. At higher temperatures, the curds become more spongy and plastic and the final product does not resemble feta type cheese.
- Fresh cheeses can however be manufactured with any of the cultures used including "kibui"cultures at 45°C. These can then either be sold and consumed as fresh cheese or be dried and kept for long.
- If a "greasy mouth feel" is experienced in the cheese you produce, the milk needs to be partially skimmed to make good cheese. Fat content of camel milk differs depending on which foodstuff the camels eat.

It is envisaged that future tests and experiments will give a whole new range of camel cheese products, different from cow and goat cheese, with their own market place. The thermophilic culture and temperature ranges opens new exiting possibilities for camel cheese products. It makes some kind of logical sense: Camels are hot climate animals – and their milk is best processed using heat loving cultures and temperature ranges.

Author explaining a point about Chr Hansen Cultures

camel brie cheese

dried camel cheese

the popular camel cream cheese/dip

camel feta with rosemary preserved in veg oil

camel fresh cheese with thyme, preserved in veg oil

dry mature camel cheese with thyme. Taste similar to parmesan

dried powdered camel cheese (similar to parmesan)

Dried cheese sweets - plain

Fresh cheese, slightly salted can be spiced with garlic and/or herbs

Variety of camel cheese products

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Pictures by A. Bruntse and P. Luethi

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