The Liquefied Concentrated Porridge Concept

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The LCP concept is based on the use of local amylases which, once added to the warm, thick porridge, enables its liquefaction. Natural amylases degrade starch (1) to make porridges become smooth and digestible without altering the protein-energy quality.

Germinated cereals, some sweet potatoes, breast milk or mother's saliva, are the main sources of natural amylases.

Liquefaction of thick porridges helps to avoid catastrophic dilutions of porridges with water.

1° The LCP concept takes into account the particular physiology of young children:

- Their oral immaturity does not enable them to "eat everything",
- Their amylase, salivary and pancreatic enzymatic immaturity limits their ability to eat and digest starch,
- Their small gastric volume does not enable them to eat large quantities at each meal,
- However, their needs in energy and proteins are very high.

2° The LCP concept draws attention to "porridge" as food. Indeed, **young children eat porridge, they do not eat flour!** Porridge is often its ‘’first food’’ supplementing mother's milk. The nutritional quality of a porridge is mainly determined by:

- the **amount** of flour it contains, that is the amount of dry matter (DM) actually consumed. This amount depends on the proportion of flour/water (2).
- The **quality** of the flour used in its preparation. The composition of this flour will comply with the guidelines of the Codex Alimentarius FAO-WHO (3).

The nutritional quality of a porridge is not correlated with its consistency.

3° The LCP concept consists in proposing the preparation of **Porridges** that **combine high protein-energy density and low viscosity** (4).

- The ‘concentration’ allows a high protein-energy density per unit volume. Compared to ordinary porridge of the same volume, the amount of DM is multiplied by three or four. ‘’Concentration’’ thus avoids the large volumes that the child should theoretically eat if the thick porridge had been diluted. (Reduced bulk).
- The ‘low viscosity’’ allows the porridge to be quickly and completely eaten by the child.
- Predigestion of the amylaceous component (dextrinsing) allows the porridge to be quickly digested. This allows the child to be quickly breastfed afterwards.

4° The LCP concept provides a solution that is "**simple, local, autonomous, replicable everywhere, economically viable, sustainable and with a low carbon impact**" to the question of the first complementary foods. It is an alternative to industrial food used in the prevention against malnutrition. This alternative **respects the socio-economic context** of communities.

5° The LCP concept is a tool that can be used as a nutrition **education theme.**

6° The LCP concept uses traditional practices and relies on scientific publications, the oldest dating back to 1983 [5].

The LCP concept joins the concept of "Ideal complementary porridge" stated in 1991 by JC DILLON (Professor of human nutrition, National Agronomic Institute, INA Paris-Grignon)

The « ideal supplementing porridge »,

- Comes as a **complement** to maternal milk,
- Brings, along with the maternal milk, **all the nutrients** necessary to the growth and development of children between 6 months and two years of age,
- Takes the mother's **habits** into account,
- Is made from **local** produce,
- Is **easy** (quick**)** to ingest in its entirety,
- Is **easy** to digest,
- Is easy to prepare and not too long to cook,
- its **price** is affordable.

And concerning the preparation of this porridge, the author adds :

«It is possible to liquefy a porridge by adding small quantities of flour rich in amylases [...]: It is observed that a porridge with 30% dry matter liquefies instantly and that the caloric density reaches 1 Kcal per gram of porridge».

« Expected characteristics for complementary food supplementing breastfeeding (1) »
JC Dillon, Séminaire-Atelier sur les bouillies de sevrage en Afrique Centrale,
ORSTOM (IRD) - Brazzaville, 21-24 mai 1991

BAMiSA porridge is an example of Liquefied Concentrated Porridge (LCP).

The LCP BAMiSA helps to promote

« The rights of people to feed themselves »
« The rights of families to feed themselves, their children »

Notes

(1) Starch degradation

In many cultures, porridges are called ‘’cassé’’ (broken) when their consistency unexplainably changes from a thick to a liquid state. This phenomenon is wrongly considered as causing a porridge to lose its nutritional value, the «solid being nourishing when the liquid would no longer be nourishing». Unknowingly, it is an enzyme, amylase, that degrades starch. Curiously, this term "broken" can be used to refer to the action of amylase which degrades or 'breaks down" the starch molecule.

(2) Flour/water ratio

Most ordinary or improved porridges have flour/water proportions of the order of 1 volume of flour per 6 volumes of water, whether this water is put at the beginning or added at the end so as to obtain a consistency acceptable to the young child. These are diluted porridges. Their DM content is in the range of 8 to 15%.

In concentrated porridge, such as LCP BAMiSA, the flour/water ratio is 1 volume of flour to 2 volumes of water. The DM content then reaches 30% (porridge with 30% of DM),

(3) Wheat quality

The document CXS 74-1981 of FAO-WHO gives « Standards for Processed Cereal-Based-Foods for Infants and Young Children ».

https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXS%2B74-1981%252FCXS_074e.pdf

The document CAC/GL 8-1991 of FAO-WHO completes the information and gives « Guidelines on Formulated Complementary Foods for Older Infants and Young Children ». Paragraph 5.4 of this document notes:

« *The action of the natural amylases contained in the [germinated] grains result in the predigestion of the starchy portion of the grain (dextrinization) thus reducing the bulk of the food when prepared for feeding and, ultimately, increasing the nutrient density of the food. »*"

https://www.fao.org/fao-who-codexalimentarius/sh-proxy/fr/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXG%2B8-1991%252FCXG_008e.pdf

4) High protein-energy density and low viscosity

It seems accepted that porridges given to young children should have a high nutritional value without their consistency being an obstacle to their rapid and total consumption.

In order to reach an energy density greater than 100 Kcal/100 ml these porridges must be ''concentrated'' and to have a liquid or fluid consistency, [that mean a viscosity less than 1600 centipoises, or less than 1.6 Pascal/sec or a flow rate greater than 60 mm in 30 seconds] they must be ''liquefied'' . No bibliographic references supporting these values could be found.

The very low energy density of porridges could explain a number of malnutrition cases, as paradoxically, there are in geographically rich agricultural areas or in families without particular economic difficulties.

(5) Scientific studies

Document 05i of www.bamisagora.org "The BCL, Scientific Literature", contains a few publications that provide the basis for this concept.

https://bamisagora.org/05i-BCL-Revue_de_la_litterature_structurant_le_concept.html

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