



HAL
open science

Inventory credit, a system to improve food security in sub-Saharan Africa

Tristan Le Cotty, Élodie Maître D'hôtel, Issoufou Porgo, Julie Subervie,
Raphaël Soubeyran

► To cite this version:

Tristan Le Cotty, Élodie Maître D'hôtel, Issoufou Porgo, Julie Subervie, Raphaël Soubeyran. Inventory credit, a system to improve food security in sub-Saharan Africa. *Perspective* (English edition), 2023, 61, pp.1-4. 10.19182/perspective/37142 . cirad-04094513

HAL Id: cirad-04094513

<https://hal.science/cirad-04094513>

Submitted on 11 May 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

Through *Perspective*, CIRAD provides an opportunity to explore new avenues for discussion and action based on research.

Inventory credit, a system to improve food security in sub-Saharan Africa

Tristan Le Cotty – Élodie Maître d’Hôtel – Issoufou Porgo –
Julie Subervie – Raphaël Soubeyran

>> Series: *Crises and food security*

Inventory credit is being developed in several Sahelian countries. This device is implemented by a farmers’ organisation and a financial institution. It consists in storing a portion of harvested grain in a warehouse for several months in exchange for an individual loan. Without this loan, farmers tend to sell their grain immediately after harvesting in order to pay off their debts or to meet their needs. The consequence is that families subsequently struggle to get through the lean season – the transition period between the depletion of food stocks and the new harvest – and to invest in their agricultural production

systems. An impact assessment study conducted in western Burkina Faso shows that inventory credit increases food availability in the lean season and boosts agricultural investment and production. To accelerate its development, three conditions must be met: providing access to suitable storage facilities; ensuring the quality of products stored; and building trust between financial institutions, producers’ organisations and traders. The latter condition is undermined by the expansion of armed conflicts in the Sahel.

The lean season: food insecurity and the poverty trap

In the Sahel, many agricultural households have already used up their grain stocks (millet, sorghum, maize) from the previous year before the new harvest arrives: this is known as the lean season, and is marked by food insecurity, since this grain is the staple food for these families. The lean season drives households to adopt different strategies to ensure their food security, such as relying on aid, reducing the number and quality of meals, resorting to temporary migration or seeking non-agricultural work to ensure access to vital resources. The lean season can last from several days to several months, depending on the years and the households considered. It lasts for three months on average in western Burkina Faso, even though this region is relatively well suited to agricultural production, with more abundant yields than in the rest of the country.

The majority of agricultural households have no savings or access to credit: financial institutions are reluctant to provide them with loans due to the risk of default and the absence of reliable collateral systems. Consequently, sales of grain are the main resource available to these households to meet their immediate needs: paying off debts, buying food, paying school

and health fees, participating in ceremonies, and potentially paying agricultural workers. This explains why farmers sell their yields immediately after harvesting, despite low prices and the risk that they may run out of grain during the year [see timeline p. 2].

For households that have used up their stocks, the lean season is even more critical in cases where they have no more livestock to sell (farmers typically breed a few chickens, goats and sheep). In order to eat, they may be obliged to borrow from traders who provide grain in kind, when prices are at their highest.

In the Sahel countries, the lean season also has structural effects on farms. It works as a poverty trap: farmers are unable to invest in their production systems and agricultural growth remains low. This period coincides with crop planting and farm work. Farmers who have no more grain to sell will struggle to buy seed and fertiliser, or to hire oxen to plough their land, and the following harvest will suffer.

Inventory credit, a storage device to address social pressures

Inventory credit is a device implemented by a producers’ organisation and a financial institution, which can be a

commercial bank that provides microloans or a cooperative savings and microcredit network. After harvesting, in exchange for storing a portion of their grain in a collective warehouse, producers receive a loan of 80% of the market value of this grain at harvest. This loan enables families to meet their cash requirements without having to sell their grain at low prices immediately after harvesting.

The grain stored serves as collateral for the financial institution. The warehouse, which is usually in the village, is secure; the producers' organisation holds one key and the financial institution another. The storage period is around six months, until the lean season [see timeline on the right]. The producers must then repay their loan (through sales of agricultural products such as cotton, grain or livestock) before retrieving their stock. They can also repay on the same day in the presence of the microfinance institution in the case of a group sale.

Inventory credit is often presented as a tool for price speculation or as a tool for access to credit, but it also protects families from the social pressures that drive them to regularly draw on their harvests, thereby jeopardising their food security in the lean season. These social pressures lead households to use more resources than they would wish, by redistributing a portion of their grain production. For example, more ceremonies are held at harvesting time (weddings, funerals, christenings) and households are expected to contribute significantly to the food required for these ceremonies. In addition, under pressure from households that have obtained poorer yields, a household may feel obliged to donate some of its own harvest to them. These pressures result in accelerated consumption of resources immediately after harvesting. When stocks are retrieved, social pressures still exist, but blocking stocks for six months helps to defer the depletion of resources at the village level and to secure at household level a portion of the grain produced and the associated income.

Inventory credit boosts agricultural production and increases food security

The impact assessment of inventory credit in western Burkina Faso shows convincing results for food security at the village level [see box p. 3]. In the short term, grain availability is increased in the lean season. In the long term, this system encourages more productive agricultural strategies, which improves food security.

Producers who use inventory credit increase their investment capacity. There are two reasons for this: the associated loan provides them with additional resources after harvesting; and being able to sell grain in the lean season means they benefit from higher prices and can launch the next agricultural season under better conditions by purchasing inputs, especially fertilisers. The system delivers results quickly: in three years, agricultural production increases and the farm begins to experience growth.

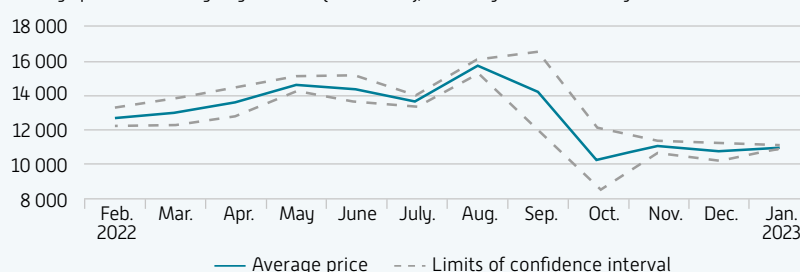
Finally, inventory credit contributes to improving the management capacities of producers' organisations and,

The timeline for inventory credit

The figure below shows how inventory credit fits into the agricultural calendar in western Burkina Faso, in relation to the main crops (cotton, grain). The lean season, from June to August, is the average period, excluding inventory credit. The prices of a 100 kg bag of maize given as an example here are those from February 2012 to January 2013 in the villages studied.

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Cotton						Ploughing, sowing, fertilising, weeding				Harvesting		
Grain						Ploughing, sowing, fertilising, weeding			Harvesting			
Lean season						Lean season						
Inventory credit	Grain storage		Release of grain stocks - Repayment of loan								Grain storage - Payment of loan	

Average price of a 100 kg bag of maize (CFA francs), February 2012 to January 2013



through the trust built between these organisations and the financial institutions, helps to consolidate social relationships, which are essential to the effective development of rural territories.

The conditions for a scaling up inventory credit

Even if inventory credit is sustainable at the economic level and is becoming more widespread, its development faces difficulties. It corresponds to only a very small proportion of agricultural production.

In the Sahel, inventory credit has emerged since the mid-2000s, under the impetus of development projects and programmes, non-governmental organisations and, increasingly, governments themselves. But it has mixed results depending on the country, the solidity of the microfinance institutions and the reliability of the inventory credit management committees. The African Development Bank indicated for 2020 that in Burkina Faso, inventory credit stood at almost 5 700 tonnes distributed across 300 warehouses, with a total annual credit of 311 million CFA francs (around 470 000 euros). However, it has almost disappeared in Niger due to a lack of liquidity, to the insolvency of microfinance institutions, or to isolated cases of theft of loan funds by the individuals in charge of distributing or transporting these sums. Aside from these cases, farmers have embraced the system, which has outlasted the projects. This dynamism can be explained by its relatively simple functioning and by the interest it generates, both for financial institutions, which secure their credit, and for producers, who improve their food security.

The impact of inventory credit assessed in western Burkina Faso

Western Burkina Faso is typical of the West African cotton production zone. The wet season, from June to October, corresponds to the cultivation of cotton and grain (maize, millet and sorghum). The sale of cotton ensures access to fertilisers, which are partly used for grain. Most households breed a few animals, sometimes cattle, and also have non-agricultural activities (gathering wood, small-scale gold panning, sewing, etc.).

The EU FARMAF project (Farm Risk Management for Africa, <http://www.farmaf.org/en/>) assessed the impact of inventory credit, following almost 1 000 households in 17 villages between 2013 and 2016. Eight villages were randomly selected, and each was given access to an inventory credit warehouse financed by the project. The nine other villages, which had initial characteristics similar to the villages chosen for the system, formed a control group.

Positive results

After three years in the villages that were experimenting inventory credit, a third of farmers were using the system and storing on average a quarter of their grain production – around one tonne of grain per household. In some villages, the warehouses were full: the producers' organisations had to reduce the maximum volume authorised per producer in order to ensure access for all.

Two key conclusions can be drawn from the assessment study conducted:

> the benefits for food security are moderate in the lean season at the level of the beneficiary villages, but high at the level of the user households. In these villages, for all households, the average stock of millet available per household at the end of the lean season is estimated at 69 kg more than in the villages without inventory credit. The lean season for user households is reduced by around two weeks and dietary diversity is higher.

> the benefits linked to productive investments are high. In the beneficiary villages, for all households, cultivated areas have increased, as has fertiliser use and cattle herd size.

Below are some average figures, for all households, given per farm:

• Total cultivated area	+ 1.8 hectares
<i>under maize</i>	+ 0.5 hectare
<i>under cotton</i>	+ 1.2 hectares
• Heads of cattle	+ 1.5 heads of cattle
• Fertiliser use	+ 167 kg

This increase in agricultural production is explained by the fact that most producers involved in the inventory credit system use the

loan to pay for workers to harvest cotton. Moreover, with inventory credit, they do not decapitalise their livestock during the lean season.

About the assessment method

The FARMAF project chose to use the randomised controlled trial method (RCT). This rigorous method produces robust scientific results, which are justification for developing inventory credit on a larger scale.

Nevertheless, this method has critics who cite ethical reasons, given that some of the villages surveyed do not have inventory credit (the "control" villages, which serve as a comparison with the beneficiary villages). However, without relying on a RCT, it would have been impossible to formally establish all of the impacts, and it was even inconceivable to assume that inventory credit would have this forced saving effect, reducing the length of the lean season.

Mechanisms for the impact of inventory credit on food security

The increase in agricultural production and the higher food consumption in the lean season lead to a certain improvement in household food security throughout the year.

Below is a calculation based on rounded figures illustrating these mechanisms. It shows only the accounting profit over a year, without taking account of the benefit linked to the protection inventory credit provides against social pressure exerted on the bags stored on the farm, or of the long-term benefit linked to an increase in production.

> For 10 bags of stored grain worth 10 000 CFA francs per bag at harvest, a farmer receives a loan of 80 000 CFA francs, which he spends on the immediate needs of his family. Next, at the beginning of the lean season (June), he sells these 10 bags for 150 000 CFA francs; he can thus repay his loan (88 000 CFA francs, with an interest rate of 10%), to which is added the storage cost of 6 000 CFA francs. Ultimately, at the beginning of the lean season, he has 56 000 CFA francs, and since he has already spent 80 000 CFA francs of credit, this corresponds to a total revenue of 136 000 CFA francs. The lean season therefore looks more promising, with greater financial resources available.

> If this farmer had not used inventory credit, he would have sold eight bags immediately after harvesting in order to obtain 80 000 CFA francs. In June, he would have sold the two remaining bags for 30 000 CFA francs. This corresponds to a total revenue of 110 000 CFA francs. The shortfall is therefore 26 000 CFA francs and the lean season will be more difficult. Ceremonies and redistributions are taken from the sale of the eight bags, since they are mostly held after harvesting rather than during the lean season.

Upscaling inventory credit, whether by implementing it in other villages or by increasing the volumes stored in the villages that are already testing it, depends on three conditions: ensuring access to suitable storage facilities; establishing quality standards for the products stored; and building trust between financial institutions, producers' organisations and traders. This latter condition is undermined by the expansion of armed conflicts in the Sahel, which can jeopardise the stocks held in village warehouses.

These warehouses must be permanent buildings (floors and walls made of cement, rather than earth as is sometimes the case), in order to reduce the risks of grain damage by pests or water ingress. In Burkina Faso, most of the storage warehouses have been built through development projects. Other modes of financing can be considered, for example through medium-term loans that mobilise partnerships between producers' organisations (co-financing), banks (credit), and the state (guarantee). The establishment of quality standards for grain is another avenue that would stimulate trade on a larger scale, with private traders and institutional buyers. The latter buy from organisations on behalf of the state, or from emergency aid structures in the context of the management of security

stocks. Technical training activities for producers could accompany this implementation (grain treatment, bagging and storage, and regular quality control).

Finally, the construction of close relationships between commercial banks, producers' organisations and traders would help to deploy inventory credit. This requires mediation efforts, which are currently being conducted in Burkina Faso by the Ministry of Agriculture, Animal Resources and Fisheries, which has set out a national strategy for the development of inventory credit.

The government of Burkina Faso is supporting this change of scale through the definition of a legal framework to secure market transactions. A form of inventory credit on a larger scale for exclusively commercial purposes is the warehouse receipt systems, where storage is managed by a third party. A professional operator is responsible for storing grain and for its quality. A fee is charged for this service – payment of workers for warehousing, regular quality controls, warehouse surveillance, inclusion of risks of potential damage, such as theft, fire and flooding. In relation to traditional village inventory credit, one key difference is that the grain can be sold at any time, according to price

fluctuations. Consequently, a shift from traditional inventory credit to third party warehousing could be considered in villages where marketing strategies for the grain stored prevail over own-consumption strategies.

The extension of inventory credit to other agricultural products and other social and geographical contexts is a possibility. The potential products are those whose production is seasonal and

which can be stored for several months: the seasonal nature of marketing strategies and the conditions for storing perishable goods must nevertheless be studied carefully. Inventory credit is suited to the Sahel because it is an effective solution to market isolation, price seasonality and early sales of food stocks, three structural challenges to agriculture in the Sahel. ■

Perspective n° 61 is based on research conducted by the authors and their partners as part of the EU FARMAF project implemented in Burkina Faso, Tanzania and Zambia [Farm Risk Management for Africa, <http://www.farmaf.org/en/>, Grant DEVCO 2011/260-875, 2012 to 2016].

In this context, CIRAD, in collaboration with the Confédération Paysanne du Faso [Burkina Faso Farmers' Confederation, <https://cpf-bf.org/>] and INRAE [National Research Institute for Agriculture, Food and Environment, France, <https://www.inrae.fr/en>], conducted an assessment of the impact of inventory credit on food security for agricultural households in Burkina Faso.

Other publications based on this work include:

Le Cotty T., Maître d'Hôtel E., Subervie J., 2023. Inventory credit to enhance food security in Burkina Faso. *World Development* 161: 106092. <https://doi.org/10.1016/j.worlddev.2022.106092>

Le Cotty T., Wissink T., Bouquet E., Bourdier T., Brunelle T., 2021. Burkina Faso, évaluation des risques agricoles / Agricultural Risk Assessment Study in Burkina Faso. Rome, Platform for Agricultural Risk Management (PARM), 116 p., [report in French]. <https://www.p4arm.org/document/agricultural-risk-assessment-study-in-burkina-faso/>

Le Cotty T., Maître d'Hôtel E., Soubeyran R., Subervie J., 2019. Inventory credit as a commitment device to save grain until the hunger season. *American Journal of Agricultural Economics* 101 (4): 1115-1139. <https://doi.org/10.1093/ajae/aaz009>

A few words about...

Tristan Le Cotty is an economist at CIRAD in the Joint Research Unit CIRED [International Centre for research on Environment and Development, <https://www.centre-cired.fr/en/>]. His work focuses on agricultural production and food security in West Africa and the Sahel.

lecotty@cirad.fr

Élodie Maître d'Hôtel is an economist at CIRAD in the Joint Research Unit MOISA [Montpellier Interdisciplinary Centre on Sustainable Agri-food Systems [social and nutritional sciences], <https://umr-moisa.cirad.fr/>]. She specialises in the functioning of food systems and the relations between decisions on agricultural production and on food consumption within households.

elodie.maitredhotel@cirad.fr

Issoufou Porgo is an animal scientist and Permanent Secretary of the Confédération Paysanne du Faso [Burkina Faso Farmers' Confederation, <https://cpf-bf.org/>]. His work focuses on access to agricultural markets for Burkinabé agricultural producers.

issoufou@yahoo.fr

Julie Subervie is an economist at INRAE [French National Research Institute for Agriculture, Food and Environment, France, <https://www.inrae.fr/en>] in the Joint Research Unit CEE-M [Centre for Environmental Economics - Montpellier, <http://www.cee-m.fr/>]. She specialises in applied econometrics, development economics and environmental economics.

julie.subervie@inrae.fr

Raphaël Soubeyran is an economist at INRAE in the Joint Research Unit CEE-M. He focuses on the theory of organisations, political economy, development economics and resource economics.

raphael.soubeyran@inrae.fr

Some links

Allen M., Boyera S., Mahamadou A., 2018. Étude de faisabilité pour investissement : contrat à terme et le réseau du warrantage en appui aux stratégies nationales / Feasibility study for investment in access to information systems in Niger. Full report [report in French]. Rome, Platform for Agricultural Risk Management (PARM), 128 p. <https://www.p4arm.org/document/feasibility-study-in-information-systems-in-niger/>

Coulter J., 2014. Study on appropriate warehousing and collateral management systems in sub-Saharan Africa - Volume 2 - Technical country reports. Wageningen, AFD, CTA, IFAD, 552 p. ISBN 978-92-9081-588-4. <https://hdl.handle.net/10568/75504>

Lefaso.net, 26 August 2021. Burkina Faso: 1 405 infrastructures de stockage et de warrantage répertoriées. <https://lefaso.net/spip.php?article107129>

Ministère de l'Agriculture, des Ressources animales et Halieutiques, 2019. La stratégie nationale de développement du warrantage au Burkina Faso. Ouagadougou, MARAH. https://pacte.agriculture.bf/wp-content/uploads/2020/03/Strate%CC%81gie-nationale-warrantage-Burkina-Faso-MAAH_Janvier-2019.pdf



42, rue Scheffer
75116 Paris • France
www.cirad.fr

Publication Director:

Élisabeth Claverie de Saint Martin,
CIRAD Chief Executive Officer

Editors: Patrick Caron,
UMR ART-Dev (Actors, Resources and Territories in Development)

Cécile Fovet-Rabot, Scientific and Technical Information Service

Étienne Hainzelin [Researcher Emeritus],
General Management

Translation: Anna Kiff

Graphic design: Laurence Laffont

Distribution: Nolwenn Langlade, Scientific and Technical Information Service

Reviewers for *Perspective n°61*:

Sandrine Dury and Philippe Petithuguenin, CIRAD, Office of the Director General in charge of Research and Strategy, as well as the senior editors for *Perspective*.

<https://revues.cirad.fr/index.php/perspective>

perspective ISSN-L 2275-9131 - Email: perspective@cirad.fr



This article is provided under the terms of the Creative Commons License CC-BY 4.0: Attribution 4.0 International <https://creativecommons.org/licenses/by/4.0>

To cite this document

Le Cotty T., Maître d'Hôtel E., Porgo I., Soubeyran R., Subervie J., 2023. Inventory credit, a system to improve food security in sub-Saharan Africa. Montpellier, CIRAD, *Perspective* 61. <https://doi.org/10.19182/perspective/37142>



<https://muse.edu.umontpellier.fr>