Livelihood strategies in a globalizing world

Analysis of farmers' strategies in Southern Mali with emphasis on milk production

Anne Rietveld

MSc Thesis Rural Sociology and Plant Production Systems
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for quality of life

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Supervisors: Don Weenink (RSO) and Nico de Ridder (PPS)
Examiners: Han Wiskerke (RSO), Don Weenink (RSO) and Nico de Ridder (PPS)

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List of abbreviations

AfricaNUANCES	Africa Nutrient Use in ANimal and Cropping systems: Efficiencies and Scales
AOPP	Association des Organisations Professionelle Paysanne
AV	Association Villageoise
CET	Common External tariff
CFDT	Compagni Français pour le Développement des fibres Textiles
CIDR	Centre International de Développement et de recherché
CMDT	Compagni Malien pour le Développement des fibres Textiles
CNOP	Coordination Nationale Organizations Paysanne
COPACO	Compagnie Cotonniere
DAGRIS	Developpement des AGRoIndustries du Sud
DRSPR	Division de Recherche sur les Systèmes de Production Rurale
ECOWAS	Economic Community Of West African States
EPA	Economic Partnership Agreement
ESPGRN	Equipe Système de Production et Gestion de Ressources Naturelles
EU	European Union
FAO	Food and Agriculture Organization
FCFA	Franc Communauté Financiere Africaine
FDI	Foreign direct Investments
GDP	Gross Domestic Product
GIE	Groupe Interet Economique
HUICOMA	HUIlerie COtonierre du MAli
IER	Institute Economie Rurale
IMF	International Monetair Fund
KIT	Koninklijk Instituut voor de Tropen
LDC	Least Developed Countries
NGO	Non Governmental Organization
OECD	Organization for Economic Cooperation and Developments
PPS	Plant Production Systems; group of Wageningen University
RRA	Rapid Rural Appraisal
SAP	Structural Adjustment Program
SSA	Sub Sahara Africa
SNV	Stichting Nederlandse Vrijwilligers
UN	United Nations
USAID	United States Agency for International Development
WTO	World Trade Organization

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Abstract

Farmers in the Koutiala zone of Southern Mali are facing difficult times 1) They suffer from loss of income because production costs of the main cash crop cotton do not exceed low world market prices. 2) They experience rising costs of cattle management because the grazing areas of the village territory are not sufficient anymore to sustain the high numbers of cattle. Increased integration of cattle in the farm system by moving to zero-grazing systems and capitalizing milk production better is a possible strategy to relieve these difficult times.

The idea underlying this study is that farmers make efforts to improve their livelihoods. These livelihoods are influenced by household characteristics and attitudes but also by broader structures and forces which on their turn are co-shaped by processes of globalization and liberalization. The objective of this study is: *To map possibilities for farmers in the Koutiala region to improve their livelihoods within the context of globalization with an emphasis on milk production.*

For this study fieldwork was done and an extensive amount of literature was studied. The fieldwork in Southern Mali consisted mainly of the conduction of two surveys. For these surveys thirty farmers from two villages in the Koutiala zone were selected.

The main strategies that farmers follow to compensate for income losses from cotton is the deepening of activities that already exist like cereal cultivation and milk production. This deepening consists of expansion of the production and increased focus on sales opportunities. The main constraints within the household that keep farmers from engaging in specific activities are shortages in labour and in capital. External constraints are mainly the price-levels of inputs and outputs. Zero-grazing strategy is especially interesting for farmers that want to specialize in cattle rearing and milk production. The investments needed for creation of such a system however are unlikely to be made if not some form of support or credit is granted to these farmers. Protection against cheap international imports would be favourable for the local milk industry.

Key words: Livelihood strategies, farmers, globalization, liberalization, Mali, milk production, cotton, cattle,

Introduction

Introduction into the subject

Mali is one of the poorest countries in the world (Place 173 of 177 countries on the UN Human Development Index 2007). The Koutiala region in South Mali however is an area where relative prosperity prevailed for some decades thanks to the lucrative cultivation of cotton. Farmers invested their money surpluses from cotton sales mainly in cattle and modern farm equipment from the 1960's onwards. Besides from being a monetary investment and saving account, the main goal of the cattle purchase was to provide draft power. Between 1960 and today, cattle numbers have increased enormously in the area (for the Sikasso region from 1.170.000 heads in 1986 to 1.513.502 in 2002 (Roell, 1989 and Ministre d'agriculture Mali, 2004).

The animal draft power made enabled farming families to cultivate larger areas and the high returns obtained on cotton made it worthwhile to do so. Together with population growth this led to an expansion of the area under cultivation. To maintain soil fertility, soils used to be dependent on prolonged fallows but with the increase of the area under cultivation the possibility for leaving the land fallow for extended time periods diminished. In 1990 already 92% of land in Koutiala region suitable for agriculture was under cultivation (Berckmoes, 1990). Cattle therefore have become more important over the years as provider of organic manure in order to maintain soil fertility.

The prevalent high number of cattle in the region poses problems as well. The area for grazing is no longer sufficient to sustain the large numbers of cattle (Leloup & Traoré, 1989; Sidibé, 1995; Struif Bontkes 1999). In order to keep their stock alive and healthy, farmers are forced nowadays to provide fodder and/or concentrates to their cattle. This is a costly and time-consuming activity.

Farmers' livelihoods in Koutiala are connected to the world market. The prices of their main cash crop (cotton) and inputs are all subject to world market fluctuations. After years of fairly good cotton prices, cotton prices have gone down continuously since 2005. With cash revenues from cotton going down and costs for inputs going up farmers need to look for other income generating activities. One option is to deepen focus on crops like cereals, groundnuts and soya. Another option is to focus more on dairy cattle and milk production.

Farmers who own cows usually milk them for auto-consumption or direct sales. Due to increased importance of cattle manure and the necessity to generate monetary income from 'new' sources, it theoretically becomes very interesting for farmers to invest more time, money and skills in the management of their herds towards dairy farming. Milk production potentially offers an attractive income generating activity for farmers in the Koutiala region. Because of the daily base of income derived from milk sales, farmers will suffer less from 'cash low' periods as they often do before harvest time. Furthermore milk sales could pay for the management of the herd and thus for the production of manure and draft power, reinforcing the arable farming at its turn.

In practice however, the dairy sector in the Koutiala region and actually in the whole of Mali is poorly developed. The national dairy market is dominated by products made of cheap imported milk-powder. And the milk production itself is small-scale and low in terms of output per cow.

Questions arising

Above I sketched some main developments influencing farmers' livelihoods in the Koutiala region. These developments are 1) increase of cattle in the region; 2) increase in costs (in labour and capital) of cattle keeping and; 3) decrease in cotton benefits for farmers. It can be expected that farmers will anticipate to these developments and make changes in their farm system. In this study I want to find out what kind of adjustments farmers are making. I will thus look at current agricultural practise but also at developments and possibilities with regard to these practices. This all in relation to farm households' characteristics. Furthermore I want to find out to what extent globalizing and liberalizing markets constrain or enable farmers in improving their livelihoods. The overall objective of this study is to map the possibilities for farmers in the Koutiala region to improve their livelihoods. Because of the potential positive side-effects of milk production on soil fertility, the emphasis is on milk production.

Structure

In chapter 1 background information on Mali is given, with special attention to the research area and its agricultural system. A theoretical framework is provided in chapter 2. In the first section of this chapter the concept of livelihood is explored and different prototypes of agricultural strategies are described. The second and third sections are about globalization and liberalization respectively. By elaborating on these two processes I aim to position the situation of farmers in the research area in a wider framework. In chapter 3 research objective and questions are formulated. The methodology used for this study and potential biases are described in the last paragraphs of this chapter. In chapter 4 to 6 the results of data analysis are given. The data of chapter 4, mainly derived from literature study, describes the historical developments in especially the cotton sector up to today. Chapter 5 enumerates which main strategies exist and how common these are practised in the villages. Chapter 6 aims at providing more insight in how farmers combine strategies and their reasons to choose for a specific strategy. In the last part; discussion and conclusion, I present my main conclusions and elaborate on some aspects of this study.

1. Background and context

1.1 General background Mali

Mali is situated in West Africa and shares frontiers with Algeria in the north, Niger and Burkina Faso in the east, Ivory Coast and Guinea in the south and Senegal and Mauritania in the west. Since Mali is a landlocked country the ports of Dakar in Senegal and Abidjan in Ivory Coast form important supply routes. More than half of Mali's surface (1.230,190 km²) belongs to the Sahara and only 25% percent of its surface is suitable for agriculture. This 25% is partly situated in the Sudano-sahelian climate zone and partly in the Sudano-guinean climate zone. Mali is a large country but its population is rather small with 11 million inhabitants. Most of these people (80%) live in rural areas (van Dijk et al., 2004).

Administratively Mali is divided in 8 districts (regions) which on their turn are divided in communities (cercles) and sub-communities (arrondissements). The 3 Northern districts, Kidal, Timboectoe and Gao, are completely situated in the Sahara with annual rainfall less then 400 mm. The district of Mopti and Segou are part of the Sahel zone with annual rainfall between 400 and 800 mm. The southern-west district Kayes covers different rainfall zones and ranges from 400 to 1000 mm per year. In Koulikoro district, in which the capital Bamako is situated, and Sikasso district most rain-fed agriculture is situated. Annual rainfall ranges from 600 mm in the northern part to 1200 mm in the most southern part of Sikasso district.

In literature, reference is often made to Mali-Sud (Southern-Mali). It refers to the south-eastern area of Mali bordering Guinea, Ivory Coast and Burkina Faso (see map below). This area, which encompasses the whole Sikasso district and part of the Koulikoro and Segou districts, is the home of cotton production. Southern-Mali represents 9% of the Mali's surface (Joldersma et al., 1996).

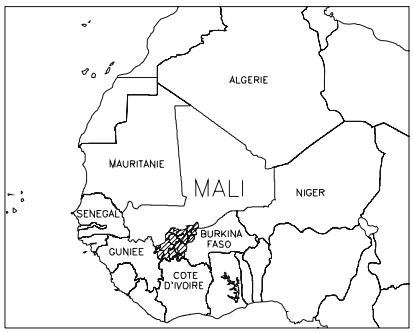
Mali is home to many different ethnicities like the Bambara, Pheul, Tuareg, Dogon, Senoufo and Minyanka. The largest group is the Bambara (30% of population). Their language Bamana is, among the 32 occurring languages in Mali, the most widely spoken in the country together with French, the official language. The Bambara are, like the Senoufo and Minyanka part of the Mande ethnic group. The Mande people live in the southern districts of Mali and also in the neighbouring countries of Guinea, Ivory Coast and Burkina Faso. They originally are sedentary farmers who mainly cultivate cereals like sorghum and millet. The Pheul, also called Fulani or Fulbe, are part of a 14 million large group living throughout West and Central Africa. They are semi-pastoralists practising transhumance in the Sahel. In the last decades more and more Pheul migrated to the southern parts of Mali where they sometimes settle down. It is estimated that there are living close to a million Pheul in Mali. The Dogon and Tuareg are probably the best-known ethnicities of Mali because of their distinctive traditional live-styles. The area where most Dogon live, the cliffs of Bandiagara, is designated as world heritage site. This 'Dogon-country' is also one of the main tourist attractions of Mali. The Dogon make up about 5% of the Malian population. The Tuareg are pastoralists who live in the desert regions of Mali. They are also called the blue men because of the indigo turbans Tuareg men wear.

Mali was colonized by the French in the beginning of the 19th century and obtained its independence in 1960. By then, it was still called French Soudan together with what is currently known as Senegal, but after the latter became an independent state; the Republic of

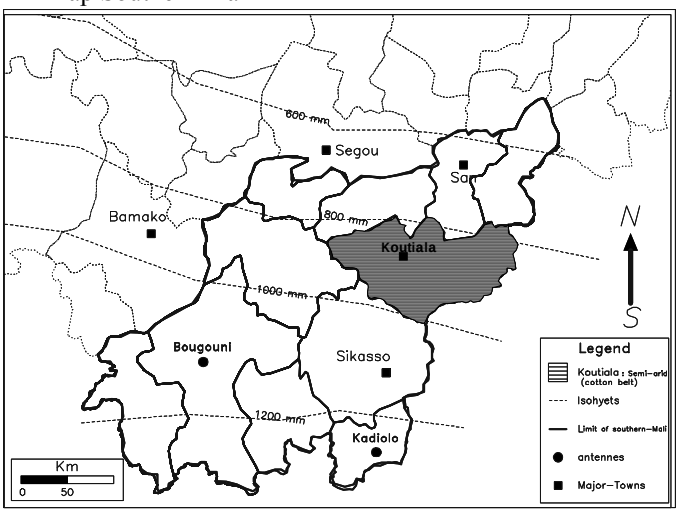
Mali was declared. Modibo Keïta became the first president of Mali. He made it a one-party state and ruled the country with his Marxist regime until 1968. The following 23 years were characterized by the military dictatorship of Moussa Traoré. A coup d'etat in 1991 lead to the leadership of Amadou Toumani Traoré (no family of Moussa). He introduced a democratic political system, was voted away during the first elections but is back as a president since 2002. He is still very popular and was re-elected last year for his second period.

Map

Map West Africa



Map Southern Mali



1.2 Research area

The research was executed in Mali-Sud in the Sikasso district. Sikasso is divided in 2 communities called after the two main cities: cercle de Sikasso and cercle de Koutiala. De cercle de Koutiala is divided into 6 sub-communities: The arrondissements of Koutiala central, Konséquela, Kouniana, Molobala, M'pessoba and Zangasso. The research took place in two villages; the village Try and the village of N'Goukan. Try is part of Molobala arrondissement and N'Goukan of Koutiala central arrondisement. To make things still more complicated both villages are part of the same rural community namely Cinsina. Brons et al. (2004) call the area around Koutiala, in which both research villages are situated the Koutiala zone (35 km around Koutiala city). This term will be used in the rest of this study to refer to this area.

The landscape of the research area is characterized by rock plateaus, small hills and slightly sloping land with valley bottoms (the bas-fonds). Up till the sixties the farming systems were still characterized by long periods of fallow (15-20 years), this changed after the introduction of animal traction and cotton cultivation. Now most land suitable for agriculture (especially close to the villages) in the cercle de Koutiala is taken into production and fields are mostly permanently cropped (Dembelé, 1995). In the fields some tree species are protected because they are of use in one way or another. The most common of these tree species are Shea-nut three (*Vitellaria paradoxa*), Neré (*Parkia biglobosa*) and Baobab (*Adansonia digitata*). The natural vegetation is a shrub-tree savannah.

The rain season lasts from June to October with rainfall peaks in August. The dry season last from November till May and can be divided into a cold and hot period which last from

November-February and March- May, respectively. In the region where the two village of research are situated annual rainfall varies around 800 mm (Joldersma et al., 1996).

Soils in the area are generally old and weathered and soil fertility therefore is inherently low. (van Dijk et al., 2004). Degradation of the natural environment is characterized by depletion of soil nutrients causing low fertility, an increase in erosion, degradation of the natural pasture lands and a decrease in wood availability for fuel and construction (Joldersma et al., 1996). The causes of degradation are the increase of land under cotton and cereal cultivation after the introduction of animal traction, the growing population pressure, the enlargement of cattle herds and decreases in annual rainfall.

The research area is inhabited by the Minyanka. Their main livelihood exists of agriculture. Originally the Minyanka cultivated mainly cereals like sorghum and millet but in time they have also started to grow cotton, groundnuts and maize. Social hierarchy is patriarchal; the eldest man of a household is also the head of the household. With household, the social group which resides in the same place, shares the same meals, and makes joint or co-ordinated decisions over resource-allocation and income pooling, is meant (Ellis, 2000; 18). Households are often extended, which means that they exist out of more than one nuclear unit (man, wife, children) that live together on a compound. These households are multigenerational, joint families in which junior members live and work under the authority of the group's eldest male member, the household head (Van den Broek, 2007). Often the household is formed by the household head and his family together with the families of his adult sons or his brothers. Since men have one to three wives these extended households can become very large; up to a hundred members. In such large and complex households decision-making can be hard and management skills therefore, are an important asset for a household head (Carswell, 2000; 20). Living in such large groups has advantages for its members, like protection against risks, capacity to diversify activities and generation of surpluses for investment in again other activities (Toulmin et al, 2000). But living in such a domestic group also requires that its members *"abide by the customary norms"* (Toulmin et al, 1992). This implies that household members live up to the expectations that they have from each other and fulfil their specific duties in order to reach collective goals. One of the main determinants within a household to divide rights and responsibilities is gender (Zwarteveen, 1997). Also Van den Broek (2007) emphasises that the production process within a household is marked by very clear gender relations that are controlled by men. In contrary to Bambara or Senoufo women, Minyanka women are not allowed to cultivate their own fields. A proverb says that if you give a woman her own field she will be soon demanding the position of household head (Nikiema, 1999). Sometimes women are allowed to cultivate small pieces of land to grow vegetables like tomatoes, onions and peppers. But it is forbidden for women to cultivate cereals. Women are supposed to work on the family fields. Only elderly women and in some cases (when there is no labour shortage in the family) women with many young children are excused. Women are allowed to be active in small merchandise; like selling sjoh (bean beignets) on the weekly market, selling collected branches as toothbrush etc. They seldom earn more than a few hundred FCFA's per day. In taking decisions about farm and / or household management women fulfil a secondary role the most. Getting as much children as possible is the main goal of women in which male children are favoured over female children and women that give birth to boys over girls are valued more highly. Women are responsible for the preparation of dinners for which men provide the staple food (cereals). Women themselves are responsible for obtaining ingredients for the sauce. Nikiema (1999) estimates that women dispense between 200 and 500 FCFA per day on ingredients for the sauce. This means that the income women generate with their commercial activities is often completely spent on the collective.

Village decisions are taken by the chef of the village together with the elder men of the village. In the formal administration -region, cercle, arrondissement, villages- there is also a village chief. Both the traditional and the administrative chiefs are assisted by a council of elder men.

Land rights in Southern Mali are based on land-use and backed up by customary law vested in the founding lineage of the village (Van den Broek, 2007). This means that the oldest and largest families in the village usually own most land. Landless people or households that need more land are free to clear land in uncultivated bush regions if they ask the village chief. The village chief usually also has the final say in conflicts about land.

1.3 Agricultural system

Crops and Management
Of the cultivated land in the research area the largest share is allocated to cereal production. Sorghum (*Sorghum bicolour*) and millet (*Pennisetum glaucum*) are cultivated most but maize (*Zea mays*) is also important. Rice (*Oryza sativa*) is cultivated in the valley bottoms (Bas-fonds) of the villages, but since these are fairly small it is not an important crop in the research villages. The cereals are grown in a biennale or triennial rotation with cash crop cotton (*Gossypium spp.*) with the following order: cotton-maize-millet/sorghum or cotton-maize/millet/sorghum. Fertilizer and pesticides are applied to the cotton and sometimes also to the maize crops. Millet and sorghum usually do not receive fertilizer but they sometimes benefit from the applications to the cotton in earlier years. Sorghum and millet are mainly auto-consumed but often farmers also sell a part. The proportion of maize that is sold on the market is usually larger than for sorghum and millet. Other important crops are groundnuts (*Arachis hypogaea*) and cowpeas (*Vigna unguiculata*). Groundnuts are part of the cereal rotation but the area which is planted is much smaller (usually between 0,2 and 1 ha). Groundnuts are partly auto-consumed and partly sold and the foliage forms a high quality fodder which is directly fed to livestock or dried and supplied to livestock in the dry season. Cowpeas are either grown for the bean and thus human consumption or for the high quality fodder that the foliage provides. Different varieties to optimize either the one or the other option exist. Often (fodder) cowpea is grown in association with maize. After the maize cobs are harvested the maize stover together with the cowpeas and foliage and stems form again a fodder to be fed to livestock in the dry season. Cowpeas are also grown in pure stands but in the villages these stands do not exceed 1 ha. Other crops that are cultivated in the villages are Soya (*Glycine max*), Sesame (*Sesamum indicum*), Fonio (*Digitaria exilis*) and Sugar peas (*Cyperus esculentus*). These crops however are only grown by some farmers and on small plots only. Some farmers specialize in vegetable growing (‘maraîchage’) or sorghum for beer production but this is mainly on individual basis whereas the staple crops are grown on family fields. *Stylosanthus hamata*, a leguminous permanent fodder crop, is only cultivated by farmers taking part in the AfricaNUANCES research project (for description of this project see § 3.3). They cultivate 0,25 ha of this crop with various results.

Almost all farmers use animal traction for soil preparation, weeding and sowing. Many families own more than one oxen pair, cultivator or sowing machine. Still however there are farm families that do not own enough draft oxen or equipment to do all required work. They rent and lend oxen or equipment from family or neighbours or work the land manually.

Since the 1980s there have been several projects in the research area to reduce erosion and deforestation, to install soil and water conservation methods, to improve animal productivity,

and to promote intensification of the farm system. Often these projects were executed by or in cooperation with the cotton company and the Rural Economy Institute of Mali (IER) (Joldersma et al., 1996; Dembelé, 1995). Nowadays the results of these projects are still visible for instance by the stone rows or hedgerows of *Jatropha curcas* in the village territory.

Animal Production

All families in the research villages own livestock, although numbers and species differ largely. Livestock is the main asset for farmers to invest their money surpluses. Poultry is the most common livestock in the villages; all families own at least some chicken. Next to chicken also guinea fowls are found in the villages with a rare duck that sometimes pops up in the bas-fond. Most farmers keep poultry to cover for small expenses through sale, as gift giving, or to auto-consume on special occasions. Some farmers are more commercial poultry keepers; keeping up to 200 chicken to sell on the Koutiala market. There are some families, obviously the non-Islamic, who own pigs. Furthermore most households own sheep and / or goats. These either roam free in and outside the homestead or are herded by children. In the growing season they are sometimes secured in the homestead to avoid crop damage. They are sold when cash is needed and also used for offerings and auto consumption. Sheep are more valuable than goats and cattle obviously, heads the livestock ranking. Not only do cattle form an important investment and thus saving account, cattle also plays an important role in the farming system. Most farmers use animal traction to cultivate their fields. The possession of a pair of oxen for traction is seen as prerequisite for successful farming. Furthermore cattle are valued because of their contribution to soil fertility; by grazing the fields and savannah cattle collect nutrients which they consequently (partly) excrete as manure in the kraal. Farmers on their turn collect the manure and apply it on their fields to improve soil fertility. Although cattle are very important in the farming system, the rearing is generally seen as suppositious to crop cultivation. Bosma et al., (1996) refer to cattle rearing as a secondary activity for the sedentary (Minyanka) farmers in the region.

To improve the genetic capacity for milk production farmers can both select and breed with their herd or they can purchase (exotic) breeds with better milk production capacity. The most common cattle in Mali are zebu breeds (*Bos indicus*). *Bos indicus* can be distinguished from *Bos taurus* by their hump and dewlap. In general zebu's have more endocrine glands than taurus breeds which makes them better in regulating body temperature and therefore better suited for hot climates. Furthermore zebus are more suitable for migration because they have harder hoofs and lighter bone structure (http://dagris.ilri.cgiar.org). Southern Mali is home to one of the few endemic taurus breeds of Africa; the N'Dama. The N'Dama is a small cow which is remarkable resistant to sleeping disease (Tsetse infection). The milk production capacity is supposedly higher than that of zebu cattle (http://dagris.ilri.cgiar.org). Crossbreeds of Zebu * N'Dama are very common in Southern Mali. They are called Mere or, when crossed again with zebu; Mere-Wolosso. In practice deliberate breeding hardly takes place in the villages where research was conducted. Although some bull selection does take place. In the surroundings of the research area (like in the village of Kaniko, situated in between N'Goukan and Try) there are some farmers that own Montbeliard or Montbeliard crossings. Montbeliard is a French double-purpose breed which is popular in harsh environments because of its robustness. This breed is kept mainly for milk-production in Mali. The milk production potential of Montbeliard is considerably higher than that of local breeds but feed requirements are also much higher.

With regards to milk-production per lactating cow, the production in the villages is generally low. Except for genetic potential, feed quantity and quality form the most important

constraint. As Dembelé (1995; 11) says: *"Improving animal productivity has become synonym for improving the feeding of the animals".*

Knowledge of animal production, health etc. is generally low among Minyanka. The Minyanka are not pastoralists; they do not have a lot of background in animal production matters. Some young Minyanka men work or have worked for Pheul as herdsman in order to gain cattle and increase knowledge about cattle. The Pheul however do not transmit their knowledge of cattle so easily. Farmers often do not know on which traits to focus when buying cattle. Some farmers do select bulls for reproduction but they seldom make matches of bulls with specific cows.

With regards to number of cattle, the Koutiala region is among the regions with highest cattle densities. In 1994 it was estimated that there were 281.775 heads of cattle in the cercle de Koutiala (Dembelé, 1995; 33). The number of people living there was estimated at 286.244 (Dembelé, 1995; 24). In the 2005 Rapid Rural Appraisal of N'Goukan (O. Sanogo, IER) a total of 726 heads of cattle was counted and in Try a total of 1124 heads of cattle. With average number of heads of cattle per family of 16.13 and 8.92 respectively.

In 1990 a small dairy cooperation was started in Koutiala by the French NGO Centre International de Développement et de recherché (CIDR). The goal was to promote dairy production in the area and increase the revenues of dairy producers.

Conclusion

Southern Mali is among the most populated regions of Mali. In the Koutiala zone most people are from the Minyanka ethnicity. Their main livelihood consists of cereal and cotton cultivation in combination with the rearing of small ruminants and cattle. Minyanka people usually live in extended households of which the eldest male is the chief. Although some household members work on individual basis, most household labour is allocated to the household's communal fields. Villages in this area consist of several extended households with generally between 200 and 2000 inhabitants in total.

In many regards these villages are very remote from the rest of the world. They are isolated because of bad roads, lacking telecommunication facilities, absence of electricity and patchy distribution of health care and schooling facilities (Brons et al., 2004) On the other hand the village inhabitants are also very much involved in national and global networks. Households have members that have migrated to Bamako or Ivory Coast and occasionally send remittances back. People use tomato paste produced in Italy and milk powder from the Netherlands and on special days they share warm bottles of 'American' coca. Furthermore these people produce cotton for the world market and apply fertilizer and pesticides on their fields that have been developed and produced and transported in a dozen different countries. They are financially affected by price dynamics on the world market of these products and associated ones (like oil prices). Because of these linkages with the larger, outside world farmers cannot solve problems like; land degradation and decreasing prices for cotton, independently of developments on larger scales.

2. Theoretical Framework

In this chapter I will elaborate on the general concept of globalization and process of liberalization in order to understand in what way these processes influence the livelihoods of Minyanka farmers in Southern Mali. I will begin by explaining what the concept of livelihoods means for me, because this is a key concept in this study.

2.1 Livelihood and co-production

This study tries to shed light on developments that farmers in Southern Mali have been subject to, their responses to these developments and the developments that they themselves put in action. The idea underlying this study is that farmers make efforts to improve their living and increase their social and material wealth. In order to refer to this idea I use the concept of livelihood. According to Scoones (1998) livelihoods are *'the capabilities, assets (including both material and social resources) and activities required for making a living'*. The aspect of improvement however is not included in this definition. To include this aspect as well I will elaborate on the concept of Co-production, as defined by Van der Ploeg (2008). Co-production refers to the process of creating a farming system, which implies an interaction between people and (living) nature. The assumption is that characteristics of both people (households) and nature are subject to change. In fact, it is assumed that resources (either natural or human) are improved over time in order to enlarge autonomy of the household (farmer) and in this way improve the basis of the farm (Van der Ploeg, 2008; 24-25). This enlarged autonomy can be perceived as lower dependency on external factors and therefore lower risk exposure. In other words, inherent to this concept of co-production is the idea that farmers make efforts to increase their welfare by improving the very basis of their livelihoods. This may be by investing in soil fertility, cattle or farm equipment but it can also mean that farmers seek opportunities outside the (traditional) farming system. In the latter case it is also possible that farmers abandon farming altogether, then obviously the basis of their livelihood does not constitute the farm anymore but something else.

Prototype strategies

Commencing activities that deviate from traditional farming practice is referred to as livelihood diversification. Ellis (2000; 15) defines this as the construction of an *'increasingly diverse portfolio of activities and assets in order to survive and improve standards of living'*. Toulmin et al. (2000) classify different diversifying activities according to the nature of the activity and the place where the activity takes place. This is a useful classification when trying to make visible in what direction farmers seek opportunities to improve their livelihoods.

Table 2.1 Classification of rural livelihood diversification activities

Activity type	1	2	3
	Both change in activity and change in space (migration)	No change in activity, but change in space (agricultural work elsewhere)	Change in activity, but no change in space (e.g. craft work or running a shop)

Source: Toulmin et al., 2000; 9

Other prototypes of livelihood strategies are extensification and intensification (Carswel, 2000; 7). Extensification then is the extension of the area used for agriculture without increase in the ratio of inputs of labour or capital per unit of land in order to increase production (adapted from Carswell, 2000; 7). Intensification refers to any process in which output per

hectare of land is increased through increased use of inputs of labour or capital per unit of land and improved efficiency (Ramisch, 1998; Carswell, 2000). Furthermore intensification makes it possible to cultivate land more frequently without losing production (Ramisch, 1998). Carswell (2000; 7) distinguishes between 2 pathways of agricultural intensification; i) intensification led by labour and ii) intensification led by capital. The labour-led pathway of intensification is characterised by increased labour input per unit of land, indicators for this are; more weeding, greater use of manure, denser cultivation and reduced fallow. In the capital-led pathway of intensification more external inputs per unit of land are used. Examples of theses are: increased use of fertilizer, improved seeds and greater use of plough.

Determinants of nature livelihood
The ways in which farmers try to improve their livelihoods widely diverge. This heterogeneity results from household characteristics such as; differences in size or composition of households and their internal dynamics, the assets owned or the access to land or water and by land but also by local land properties, climate and the history of management (Tittonell, 2008). Farming systems are also different because farmers each make different choices in forming their farming system and follow different strategies in order to reach specific goals. Even when farmers face the same circumstances they may respond differently because of differences in attitude (Van der Ploeg cited in Struif Bontkes 1999). Differences in household characteristics, experience and attitudes however are not the only determinants in creating specific livelihoods. Bebbington (1999, cited in Baro & Batterbury 2005) says that: *'Livelihoods are embedded within broader structures and forces, including political networks'*. Baro & Batterbury (2005) add to this that in order to understand livelihoods it is not enough to consider only the household because many actions, choices and decisions are responses to external signals and constraints. For this reason I look at some broader 'structures and forces' that influence farmers livelihoods in Southern Mali. Below I will sketch a general view of globalization and liberalization.

2.2 Globalization

Globalization is a container concept; a tag put upon different phenomena by different people. I will list some of the different uses of this concept and funnel it down to a concept covering my needs.

With regards to globalization Held et al. (2007; 2) talk about *"a growing collective awareness or consciousness of the world as a shared social space"*. Waters (1995:3 cited in Binsbergen et al., 2004) calls it *"a social process in which the constraints of geography on social and cultural arrangements recede and in which people become increasingly aware that they are receding"*. The growing awareness that these authors call upon is caused by increased mobility, communication and media that make people come into contact with other cultures and other realities more and more. Globalization can then be seen as a process which consists of the sharing and exchanging of culture between peoples and countries of the world. This however is at the most only one side of globalization. The presumed awareness might be existing but this does not yet say anything about the appearances of globalization neither about its consequences for people and countries.

Often globalization is conceived as an intensification of trans-national flows (of ideas, news, goods, information, capital and technology) which connect different spaces with each other. Although there have since long been global connections in the world, the contemporary

interconnectedness is more intense and ever-growing in magnitude *"in almost every sphere of social existence from the economic to the ecological"* (Held et al., 2007; 2). According to Ferguson (2006; 40-49) these connections however are not homogenously spread over the whole world; not all places share in these connections. He therefore refers to this connectivity as being point-to-point rather than all covering. He especially mentions Africa and its partial *'patchy'* integration into *'global society'*. For him there are new interconnections in Africa, but also *"material inequalities and spatial and scalar disjunctions*". He refers for instance to the contrast between *'mineral extraction enclaves'* in SSA which do attract global capital and the disconnectedness from their (economically marginalized) national societies. Ferguson continues by saying that these new interconnections often depend on and sometimes *"help to produce*" these material inequalities and disjunctions. Also Binsbergen et al. (2004; 7) point at the inequalities accruing from increased *"global availability of objects, services and ideas"*. The *"exalted class position of some"* reinforces the *"sub-ordinate deprived and exploited situation of many others"* they say. These authors assume that 'inequality and marginalization of some' originates from globalization itself because these characteristics are inherent to it. These thoughts can be traced back to Wallerstein (1976) and his work about world-systems and power relation within such systems. *"A world-system is what Wallerstein terms a 'world economy', integrated through the market rather than a political centre, in which two or more regions are interdependent with respect to necessities like food, fuel and protection"* (Goldfrank, 2000 cited in Martinez-Vela 2001). Central to the world-system is the existence of an extensive division of labour that is geographically based (Wallerstein 1976). This division entails that one region specialises in capital-intensive production; the 'core' region and the other in labour-intensive production; the 'periphery' region (Goldfrank, 2000 cited in Martinez-Vela 2001). The 'core' region dominates and exploits the 'periphery' which leads to a systematic transfer of surplus from periphery to core. *"Since a capitalist world-economy essentially rewards accumulated capital, including human capital, at a higher rate than 'raw' labour power, the geographically maldistribution of these occupational skills involves a strong trend toward self-maintenance"* (Wallerstein, 1976). According to Wallerstein (cited in Martinez-vela, 2001) especially technology and capital are essential factors in positioning a region either in 'core' or 'periphery'.

The three elements through which globalization manifests itself are according to Ferguson (2006; 29): 1) Culture and alternative modernity's, 2) flows of private capital and 3) transformations in governance & the changing role of the nation-state. With regards to the first element it is clear that the influence of globalization can be seen in the development of cultures and the exchanges between cultures worldwide. *"People everywhere are exposed to the values of other cultures as never before"* (Silverstone, 2001 cited in Held et al., 2007; 39). Some people (Nyamnjoh, 2004) fear that cultural globalization will lead to cultural homogenization; which is mainly conceived as being a westernization of cultures around the globe or the hegemony of 'modernity'. Although western culture is certainly a dominant culture worldwide, other authors (Frederiksen, 2007; Held et al., 2007) point at the resilience of national or local culture and at the mixing of these into what can be called 'alternative modernities (Ferguson, 2006; 29-31). What Ferguson means is that different cultural trajectories can exist next to each other.

The second element, the flows of private capital or Foreign Direct Investment (FDI), indicates to what extent a country's production is linked with other countries' production (or in other words is trans-national) and thus part of the global economy. According to Bigman (2002a; 3) it is the large flows of FDI between some countries that enabled these to increase productivity and competitiveness and thus gain from globalization. Again the distribution of these flows of

FDI is very uneven. In Sub Saharan Africa (SSA) for instance FDI (inward as well as outward) has been very low and has even been declining (Bigman, 2002b; 52).

The third element Ferguson (2006; 29) mentions is the globalization of governance and its implications for the power of nation-states. The role of nation-states is changing because as Held et al. (2007; 2) put it: globalization leads to *"A Stretching of social, political and economic activities across political frontiers"*. Nation-states are increasingly permeated by trans-national networks. The relative importance of nation-states has diminished because of this (Held et al., 2007). The number of international and trans-national governmental organizations is growing as so does their influence on national policy-making. The main institutions of global governance are the World Bank, IMF, WTO, G8 and the EU (Held et al., 2007: 137). Many authors (Held et al., 2007; Harrison, 2005; Mkandawire, 2005; Stiglitz, 2003; Fok, 2000) stress the dominant role these institutions play in global economic management and policy-making. Most of them simultaneously refer to the process of liberalization as if liberalization and the institutes of global governance cannot be separated from each other but automatically go hand in hand. Mkandawire (2005) for instance, defines globalization solely in relation to liberalization. According to him globalization is *"a process whereby national and international policymakers pro-actively or re-actively promote domestic and external liberalization"*. Fok (2000) says: *"while liberalisation refers to a pathway, globalisation marks the culmination of this pathway*".

Recapitulating the different meanings that are assigned to globalization I can say that globalization can be a feeling of people, of the world as a shared place. That the world has become a shared place can have real consequences in the sense that events or habits in one locality may influence situations in total different localities and vice versa. This is the consequence of increased connectivity between localities. These connections take on different forms and are expressed through for instance media, FDI and policy. The degree to which localities are immersed into global networks of culture, economy and governance is very different and uneven. The same accounts for the power that different groups, nation-states, companies or organizations have to shape these global networks to benefit their objectives. Wallerstein's thoughts about core and peripheral regions seem very much based on colonial and imperial relations between regions and are in that respect not so up to date anymore, apart from the fact that they are also quite deterministic. Many of the regions, on the other hand, that are marginalized today and only partially integrated in global networks are the regions that were colonized before. Hence Wallerstein theory does exemplify the importance of access to technology and capital for development, of which these countries were pretty much deprived under colonial rule. Dominant furthermore in shaping, especially the economic and governmental dimensions of, globalization is the neo-liberal ideology or the process of liberalization.

2.3 Liberalization

What then does liberalization entail exactly? The core idea behind liberalization is that all measures to protect trade are removed because they trigger un-productivity. 'Free trade' will assure that resources are allocated more efficiently to productive uses. Following the neo-liberal line of thought this is because every country will produce what they do best in comparison to other countries. Low income countries for instance, with a lot of unskilled labor and low labor costs can best invest in labor-intensive industries to accelerate their growth (Bigman, 2002b). For most industrialized countries in the world, the implementation of liberal policies starting in the post-war period, has paved the path for increased exports and consequent rising Gross Domestic Products (GDPs). Also the importance of trade in determining GDP has increased; on average for all countries the ration of exports to GDP

increased from 5.5% in 1950 to 17.2% in 1998 (Held et al., 2007; 75). The set of liberal policies does not only entail the promotion of a free world market. It also means the acceptance of specific ways of state formation, global structures and organizations (Chabal et al., 2007; 12). A leading thought is that in order for a country to benefit from free trade, a country's institutions and legal system have to be adjusted and the market system strengthened. This includes for example the privatization of public enterprises (Bigman, 2002b).

Not everyone agrees on the features attributed to liberalization neither on the quality of its consequences. Although Liberalization might lead to increased productivity of certain sectors or industries; the internal mechanisms of these sectors are often altered as well. What Wiskerke (2007) calls a dominant global trend for instance is the development of production becoming less regional bounded. According to Wiskerke (2007) there are three processes[1] at the basis of this development: 1) Disconnection: The disappearance of a relation between producer and user due to scale enlargements; 2) Detachment: the disappearance of regional specific characteristics of products because of decreasing importance of the place of production; 3) Untwining: production and service chains are untwined because of increasing specialisation and scale-enlargement in these chains. Consequence of these three processes is the clustering of economic activity in certain regions (with favourable conditions for production and transport) and the marginalisation of other regions (Marsden 2007 cited by Wiskerke 2007). This is in concord with the overall idea of the authors opposing liberalization; though liberalization may be favorable for some countries or some people, this is not necessarily so for all countries or all people in the world. Bigman (2002c; 248) for example says that a *"Gradual reduction in tariffs and trade restrictions will not be enough to guarantee that the lower production costs in a country will give it a comparative advantage in the global market. Countries competitiveness will also be determined by all the costs of delivering the products to the market"* Mkandawire (2005) elaborates on the same point and advocates that *"infrastructure and human resource development are important pre-conditions for the success of pro-export policies".* Another unfavourable condition with regard to trade and production is the restricted access to markets and services that many development countries experience; Friedman (1999, cited in Binsbergen et al., 2004) for instance points at the unequal access developing countries have to capitalist financial markets. The overall message of these authors is that not all countries are up for competing in the global market. Either because they do not have access to necessary services or because they simply lack the infrastructure to employ their 'comparative advantage' on the global market.

Among the countries that have not economically benefited from globalization and its shadow liberalization, or at least less than other countries, are many SSA countries. The reasons for this 'lagging behind' can be traced back to historical settings and developments (Held et al., 2007). Below I will give a short overview of the historical developments of SSA with regards to liberalization and involvement in global trade.

Liberalization in SSA

Before the 1980's development policy in most African countries was highly interventionist and included large public spending which led to high public debts. From the 1980's onwards the International Monetary Fund (IMF) and the World Bank started policy-based lending which meant the *"correction of macro-economic imbalances and boosting productivity through structural reforms"* (Bigman, 2002b; 33). These policies were based upon the following doctrine:*"Economic growth implies using a country's scarce resources- labour,*

[1] In dutch Wiskerke (2007) refers to these three processes as: 'Ontkoppeling', 'Onthechting' and 'Ontvlechting'.

capital, natural resources, administrative and managerial capacity- more efficiently. Improving efficiency requires, first, that a country produce those things which it can best produce as compared with other countries and, second, producing them with the least use of the limited resources. The record of poor growth in most SSA countries suggests that inadequate attention has been given to policies to increase the efficiency of resource use and that action to correct this situation is urgently called for" (World bank, 1981:24, cited in Ferguson, 2006; 80). Already in 1989 the World Bank and Sub-Saharan African countries had agreed on 84 loans to correct "the poor growth of Sub-Saharan Africa" (Harrison, 2005). These loans were all granted on the condition that the countries involved would implement so-called Structural Adjustment Programs (SAPs). Although different in details for different countries, all SAPs contained a core neo-liberal agenda (Harrison, 2005). On national level this agenda consisted of a *"mix of measures including cuts in employment, reduced services and 'cost recovery' for education, health and other services, devaluation, increased tax and reduced expenditure, cuts in government support for agriculture, credit and privatization of state-owned enterprise"* (Toulmin & Wisner, 2005).

After two decades of SAPs little has changed. The promise of SAPs that African economies would become more competitive through liberalization and would therefore derive gains from expanded trade opportunities remains, up to today, largely unfulfilled (Mkandawire, 2005). According to Harrison (2005) this is because the liberal policies fail to engage in the social and historical processes and relations which constitute many developmental issues. Also the 'poisoning' of the market; through for instance the dumping of agricultural products from developed countries into development countries, deteriorated the possibilities for producers in developing countries to develop the economic incentives so needed to make the SAPs work (Lipton, 2005). It was unrealistic to expect that farmers in developing countries could compete with highly subsidized goods from Europe and America (Stiglitz, 2003). After all, even most developed, industrialized countries protected some of their industries against foreign competition when they were developing these industries. 'The free-market mantra', as Stiglitz (2003) calls it, was therefore ill-suited for most SSA countries. According to him the problem lies with the international economic institutions (World Bank, IMF and WTO) which are *"driven by the collective will of the G7 (Now G8)"*. They "*help set the rules of the game"* and *"They have done so in ways that, all too often, have served the interests of the more advanced industrialized countries- and particular interests within those countries-rather than those of the developing world"* (Stiglitz, 2003; 214).

Conclusion

Farmers' livelihoods are influenced by their household characteristics and attitudes but also by broader structures and forces which on their turn are co-shaped by processes of globalization and liberalization. These processes have led people all over the world to be increasingly aware of other cultures, peoples and lifestyles. They have also led to increased connectedness of local markets to global markets because of increased flows of products, information and capital. Furthermore these two processes have influenced and created trans-national treaties and agreements which bind national governments in their policies more and more.

It seems that although globalization and liberalization of trade and governance have had positive consequences for many countries, this is not necessarily so for all countries. It is not very clear if the marginal position of certain regions is a direct consequence of globalization

and liberalization. But it is clear that the integration of many countries / regions in global networks is patchy and power is not equally distributed. This accounts for instance for global networks as the world market, trans-national governance, international military treaties and telecommunication.

With regards to the world market, countries that are dependant on primary production of only few goods and have undeveloped industries are vulnerable. Because of trans-national engineered restrictions on protection of industries, sectors or trade these countries do not get the chance to develop their (agro-) industries because these immediately have to compete on global markets before they have reached certain size and efficiency in order to be competitive. Van der Ploeg (2008) expects that increased globalization and liberalization will lead to *"price decreases and the reintroduction of frequent price fluctuations"*. Low world market prices can have detrimental effects on national economies when they concern these few commercial goods that such countries produce. Diversification of production is often mentioned as an answer to such a problem (Bigman, 2002c; 246) but when there is no access to global financial capitalist markets to make investments, as is the case for many SSA countries, it is difficult to make this happen.

In the following chapters I will explain how globalization and liberalization influence farmers' livelihoods, for instance through low world market prices. I will focus mainly on the economic aspects of these processes. In the next chapter the research questions and methodology of this study are outlined and described.

3. Research questions and Methodology

3.1 Objective study

I presume that farmers make efforts to improve their livelihood. They create and follow certain strategies to enlarge the basis of their farm and to increase their standard of living. Following on the different positions, characteristics and wishes that farmers have, it can be expected that many different strategies exist to shape a livelihood. The nature of these strategies however is not only dependant on what farmers want or are theoretically capable of doing. They are also dependant on the world in which they live and the broader structures and policies that rule this world. In this study I want to find out what different livelihood strategies exist among households in the Koutiala region in Southern Mali and what internal and external factors play a role in shaping these strategies.

One of the implications to the assumption that farmers want to enlarge the basis of their farm and improve their livelihood is that they would want to follow strategies that are sustainable. With regards to sustainability of the farm systems, soil fertility is very important. One way to maintain and enhance soil fertility is to increase the level of integration of cattle in farm practise in order to make better use of nutrients recycled and brought into the farm system by the cattle. The culmination of such integration are strategies in which cattle is kept inside the farm system to avoid nutrient losses in the form of manure and to compensate for nutrient losses in the form of animal products. Such compensation can take place by feeding the cattle with feed from outside the system like concentrates or cut-grass or (at least for nitrogen) by feeding them with home-grown leguminous crops like cowpea or Stylosanthes. To make this kind of strategies profitable for farmers in other regards than only for improved soil fertility it is necessary to market animal products that are produced in such an integrated system. One of the most likely products to market is milk.

Although milk is produced and marketed to some extend in the region, it is hardly produced in a system as described above. When studying farmers' strategies I want to particularly focus on strategies regarding cattle and milk production to find out which factors are constraining the development of such integrated systems.

The objective of this study is:
"To map possibilities for farmers in the Koutiala region to improve their livelihoods within the context of globalization with an emphasis on milk production".

3.2 Research questions

The main research question is:
"What strategies do farmers follow to improve their livelihood in the Koutiala region in Southern Mali within the context of globalization and what role does milk production possibly play in this?"

I have divided the different elements of the main question into five different questions. The composition of the paper is such that the first question is answered in a separate chapter, but the latter four questions are treated together in the last two chapters.

1. The first question is: *Which local, national and global developments lead to the current general agricultural practice?* This question is meant to give background knowledge on the main historical developments regarding agriculture in this region. External actors that have played or still play a role in shaping agricultural practise are identified. Emphasis is on the role of cash crop cotton. This question is answered in chapter 2.

2. The second question is: *What strategies do farmers create and follow to improve their livelihoods within the context of globalization?* This question aims at giving an overview of the strategies that exist and at grouping them in order to get a better picture of the different kinds of strategies present in the region.

3. The third question is: *Which farm household characteristics determine the kind of strategy that is followed?* To answer this question a closer look at the farmers themselves and their households is taken in order to expose relations between strategy followed and household characteristics.

4. The fourth question is: *What are the main constraints, on different scale levels, that farmers encounter in pursuing their specific livelihood strategies?* Except for looking at specific characteristics of farmers and households that may be constraining in following a specific strategy, attention is given to external constraints as well.

5. The fifth question is: *To what extent is milk production of interest for farmers?* In answering questions 2-4 emphasis will be on milk production as strategy to improve farmers' livelihood.

3.3 Methodology

For the research done for this study a combination of methods was used. A period of 4 months was spent in the field to conduct surveys and gather additional information. Preceding the fieldwork a short literature study was done leading towards a proposal containing research questions. After the fieldwork much more literature was studied. In the three phases of this study (preparation, fieldwork and finalization), research questions were adjusted several times until they finally took their current form. The main change made in the research questions entails a shift in emphasis. Initially the emphasis was much more on dairy farming. This emphasis is withdrawn some what in favour of a broader look on farmers strategies to improve their livelihoods. This was decided because the role of milk production in the research villages was much more intertwined with other farmer's strategies than was thought beforehand. It seemed relevant to look at these other strategies as well to some extend, in order to get straight what possibilities for diversification exist.

The data used in this study is derived from different sources. There is primary quantitative and qualitative data collected during the fieldwork. There is secondary, quantitative data derived from the IER (Institut d'Economie Rurale) and especially from O. Sanogo who was working on his PhD during the time of research. Furthermore much literature has been studied resulting in qualitative data mostly.

Selection
The fieldwork was primarily conducted in two villages in the cercle de Koutiala, Southern Mali. These villages were selected by O. Sanogo to whose research this study had to join up.

The villages selected, Try and N'Goukan, have been the object of study before since they were part of an ESPGRN (Equipe Système de Production et Gestion de Ressources Naturelles) study. The ESPGRN is a subdivision of the IER and the IER, situated in Sikasso, conducts research in all the different cercles of the cotton zone. The ESPGRN has selected villages in these cercles were they conduct surveys with farmers over longer time periods to measure dynamics and changes. In these villages a research-assistant is present to conduct the actual surveys and assist researchers. In Try and N'Goukan 12 and 10 farmers / households respectively are part of the long-term monitoring by the IER, which means that they regularly cooperate with surveys. For the AfricaNUANCES project Try and N'Goukan were chosen to conduct experiments and surveys. In both villages 15 farmers / households cooperated with this project. For this study also 15 farmers / households were selected per village. In order to include different types of farmers / households, the CMDT typology (see table 3.1) was used to select farmers from different groups. This typology has been developed by the CMDT in order to classify farmers with respect to their cotton cultivating potential. Since this potential was associated mainly with the availability of animal draft power, the possession of equipment and cattle is the focus. The selection was made together with the research-assistant who advised on availability and willingness of farmers to cooperate. Some of the farmers interviewed are also part of the ESPGRN and / or AfricaNUANCES project. For a complete overview of all respondents see appendix 1.

Table 3.1 CMDT Typology of farmer's exploitations

A.	At least: 1 plough and 2 pairs of draft oxen	At least: 1 cart and more than 10 heads of cattle
B.	At least: 1 plough and 1 pair of draft oxen	Less than 10 heads of cattle
C.	No complete set of plough and pair of draft oxen	
D	Manual cultivation only	

Source: CMDT, 1995 from Bosma et al., 1996

The choice for the research villages was made rationally and not on basis of the presence (or absence) of special properties. Having visited many villages in this region before during my internship in 2005/2006, I can say the two villages seem representative for villages in the region. Remarkable is that N'Goukan is rather small, and consists of the descendants of its founder mainly. Try is quite a big village, and a bit complicated in the organisational aspect because of the village division, as described below.

Try

The village of Try actually exists of 2 villages, called Try 1 and Try 2. This division was caused by a brother murder around 1880. Now both Try 1 and 2 have their own chef de village. And there are 3 Associations Villageois (AV) active in whole of Try. In 1992 Try had 1299 inhabitants and a land supervision of 3410 ha (Joldersma et al., 1996). Estimates of 2006 (USAID, cited in Vetois, 2007) mention the number of 1733 inhabitants in 131 farms and a territory of 3600 ha. There are living many different lineages in Try but almost everyone is Minyanka. The main lineages are Coulibaly and Konaté. The main religion is Islam, although there still are quite some animists in the village as well. Especially elder people are animists but their children often convert to Islam. There are also some Christians in the village.

N'Goukan

N'Goukan was created in 1898 by N'Golo Traoré. Before establishing the village he lived with a family called Dembelé for a while in a nearby hamlet. He took the name of this family and so did his kin when they joined him after he had founded the village. The name of the village, N'Goukan, is a word in Minyanka saying; the hamlet of N'Golo. The chef de village has always been a direct descendant of N'Golo (Sidibé, 1997).

The number of inhabitants was estimated at 895 divided over 46 farms in 2006 (USAID, cited in Vetois, 2007). The territory is approximately 2400 ha large (Sidibé 1997; Vetois, 2007). All households of N'Goukan are headed by Dembelé. As in Try the Islam is the largest religion and is becoming more and more so in time. Still many taboos and precepts deriving from animists believe play a role in village life.

Activities

The first weeks of the fieldwork were spent in Sikasso, Koutiala and the research villages to explore the research area and to get familiar with the subject and the people. In order to do this I accompanied O. Sanogo and his colleagues a couple of times to the research villages to take soil samples and interviews and I studied literature from the IER library in Sikasso. Following this I designed a survey for farmers in the research villages. After that, the selection of farmers was made. In both villages the sample comprised 15 farmers. The survey was conducted in N'Goukan first, followed by Try. For the greater part the surveys conducted were alike. But two versions were used: one for farmers owning dairy cattle (or cows producing milk regularly) and one for farmers not owning dairy cattle. Furthermore some questions were added in the survey for Try. For copies of the surveys see appendix 2. All questions were directed to the research assistant who translated both question and farmer's response. The survey consisted of 3 parts; The first part of the survey consists of questions about household characteristics and resources. The second part is about cattle; how they are managed and valued. The third part is about agricultural production in general.

In the survey many questions about land allocation and income were asked. Farmers made estimations to answer these questions. They were asked for instance to enumerate their sources of revenues and the respective shares which added up as total income. The information derived in this way was not checked by monitoring of the household income and expenses. It is thus very well possible that the farmers' estimations are not faultless. Irrespective of this the answers given do reflect reality as seen by the farmer itself. And it is this reality on basis of which decisions about farm management etc. are made. Assuming that farmers do not completely put up shows about themselves these estimations reflect farmers' views and were therefore seen as relevant information.

In N'Goukan a second survey was conducted. This survey was done with the same sample as the first, only one farmer (Many Dembelé) did not participate because of the decease of a child. This survey was less structured and meant to gain more in-depth insight about strategies that farmers follow and aspire and their view of themselves and others as farmer. The last question of this survey asked farmers to position themselves as a farmer in comparison with the other farmers participating. This not only gave some indication on how farmers perceived their own farming strategy it also made clear what criteria they think are essential when judging themselves and others as farmers.

Table 3.2 Number of respondents per village per survey

	No. respondents in N'Goukan	**No. of respondents in Try**	**Total no. of respondents**
Survey 1	15	15	30
Survey 2	14*	0	14*

* These respondents were part of survey 1 already; they are not new respondents!

Except for the farmers surveys, interviews were done with director and other personnel of the milk cooperation Danaya Nono in Koutiala, with a local milk merchant, with an agent in Bamako of milk cooperation Danaya Nono and with a wealthy farmer in Kaniko owning exotic breed cattle. A lot of background information was gathered in conversation with the

research assistants or other people working for the IER like O. Sanogo. For a complete overview see appendix 1.

Bias

The farmers participating in the research have, almost all, been into contact with researchers before. They, or members of their household, have been participating in trials and /or surveys. Sometimes this was a mere time passing for them, sometimes they also derived direct benefits from such participation. Be it in the form of advice to improve specific practices or in the form of inputs such as seeds or feed. As a village they have once decided to allow the IER to conduct research there. They have made this decision because they expect to gain some benefit. Furthermore these farmers might have gained some insight in what kind of information researchers like to receive, and adapt their responses to this. Both these expectations and potential adaptations may colour the results obtained from the research.

To assist researchers and to conduct the regular surveys for the long term monitoring a research-assistant is placed in each village. Both research-assistants have been present in their village for quite some time. Drissa is working in N'Goukan for over ten years and Woudou in Try for three years. They are both living in Koutiala, but have lived for periods in the villages itself. They know most households. Especially Drissa, working in the much smaller village of N'Goukan knows all households and most of their members. The fact that both assistants have spent so much time with the village inhabitants implies that they have built up relations with them. These might be relations of respect, friendship and mutual aid but also of dislike or discomfort. Woudou even has family in Try since he married a woman from this village. Since the research assistants have been involved in many aspects of the fieldwork like the selection of respondents, translation of all communication and the supply of background information, it is likely that these relations have influenced the research done.

Besides that farmers or research-assistants might be biased, the researcher; me, can also be biased. The fact that the culture immersed in, is not my own, might have led to a misunderstanding or a not being sensitive of certain events, problems or structures. My non-mastering of the local language (Mianyanka) has made it impossible to have random conversation with inhabitants of the village. All communication took place via the research-assistants. This might have caused me missing important nuances or points; like doubts or other emotions.

AfricaNUANCES project

As mentioned, this study was performed under supervision and with help from people involved in the AfricaNUANCES project e.g. Nico de Ridder (PPS) and Ousmane Sanogo (IER). The aim of the AfricaNUANCES project is to develop a tool for analysis of farming systems in Africa. The emphasis is on nutrient flows in smallholder farming systems in Sub Sahara Africa (SSA) and especially on the contribution of livestock and manure to soil fertility. Research for this project was executed in 8 SSA countries including Mali. Ousmane Sanogo studied the possibilities for intensification of the farming systems by using fodder legume crops to feed cattle in order to improve milk production in the villages N'Goukan and Try in Southern Mali. Sanogo also made a classification of farmers in these villages as response to the outdated typology of the CMDT (see table 3.1). This classification is based on household characteristics as: Number of draft oxen, size labour force and area cultivated with cereals and cotton (in %). For a complete overview of this table see appendix 3.

4. Which developments lead to the current general agricultural practice in the cercle de Koutiala?

In order to understand the agricultural practices of farmers in the research area today it is necessary to have some knowledge of the main actors and developments that influenced this practise in the past. In this chapter a short historical overview is given of the developments through the years of the cash crop cotton. This chapter is written on the basis of literature study.

4.1 Current farming system

The main crops currently cultivated in the Koutiala zone are the cereals millet, sorghum & maize and cotton and groundnuts. Most (Minyanka) farmers in this area own some draft oxen or even herds of cattle. The level of integration of the crop and animal component of the farming systems differs but is usually low.

Soil fertility maintenance
The natural soil fertility in this area is low (van Dijk et al., 2004). To restore and maintain soil fertility Minyanka farmers used to rely on long fallows (> 10 years) in their crop rotation. Breman et al. (1987) estimate that in order to maintain soil fertility in this area through the use of fallow in crop rotation, at least four times more land, than the land allocated to crop production, is needed. This land is not longer available in the Koutiala zone. Already in 1990, Berckmoes et al. (1990) estimated that 92% of the land suitable for crop production in the cercle de Koutiala is taken into (semi-) permanent production. For several decades, the use of fallow to maintain soil fertility is no longer feasible. Therefore livestock's contribution to soil organic matter has become indispensable in the farming system (van Dijk et al., 2004).

Rise in cattle numbers
Before French colonial interference with agricultural practice set off in the beginning of the 20th century, cattle rearing was uncommon under Minyanka farmers. Also the crops; maize, cotton and groundnuts were of little importance. They have all been introduced under French rule in the beginning (maize & groundnuts) or middle (cotton) of the 20th century (Ramisch, 1998). Cotton cultivation was strongly promoted by the French from 1900 onwards in order to have their own supply of raw cotton fibres and not be dependant on English governed cultivation in India and later the new world. After the Second World War the French promoted the use of cattle draft power to pull the newly introduced ploughs. They also introduced taxes which obliged farmers to cultivate cash crops in order to pay these (Ramisch, 1998). Such a construction is a typical example of relations as described by Wallerstein (1976) in which core regions (e.g. France) exploit peripheral regions (e.g. French West-Africa) (see § 2.2).

The number of cattle in the area exploded in the 1970's. This was due to two main developments: 1) The southward migration of Pheul [2] with their herds and 2) The spread of cotton cultivation.

1. According to Ramisch (1998) there were hardly any Pheul to be found south of San before the 1970's. Only when severe droughts hit the Sahel zone of Mali in the 70's

[2] Other names of this people are FulBe, Fulani or Peul. I will use the name Pheul, since the Minyanka with whom I worked referred to them like this.

and 80's Pheul moved southwards with their herds. Some of them settled down in villages; adding crop cultivation to their livelihood strategies. Others kept herding cattle on transhumance, often for Bambara or Minyanka farmers. In most cases the Pheul kept emphasis on cattle rearing.

2. From the 1960's onwards the cultivation of cotton took a flight in Southern Mali. One of the clear consequences of cotton cultivation was the large rise in number of cattle. The acquisition of draft oxen, to increase productivity, was advocated by government and the cotton company[3]. Farmers also invested their cotton revenues in livestock; building herds (Roell, 1989) as investment and for social status reasons. The number of draft oxen in Southern Mali increased from 151.000 heads in 1978 to 232.000 heads in 1988 (CMDT 1988, cited in Berckmoes et al., 1990). In the Koutiala zone, traditionally the centre of cotton cultivation, livestock pressure is now highest for the whole of Mali. From almost zero, the number of heads per 100 ha of cultivated area raise to 99 in some 50 years (Brons et al., 2004).

4.2 CMDT and HUICOMA

In 1949 the Compagni Français pour le Développement des fibres Textiles (CFDT) became active in Mali (Slingerland, 2000). This enterprise with its headquarters in France was nationalised in 1960 when Mali became independent, and called the Compagni Malienne pour le Développement des fibres Textiles (CMDT). A 40% share of the CMDT stayed in the hands of the CFDT, which is called DAGRIS nowadays, up till 2004. Now DAGRIS owns a 7% share of the CMDT but is still marketing Malian cotton through its marketing division COPACO (Nouve K., 2002). Together with national research institutes, DAGRIS is also still in charge of cotton seed research and decisions regarding the use of which variety etc.

The first 30 years of its existence the CMDT was a success-story. The cotton area and total cotton output grew; production of cotton increased from 3900 tons in 1958 to 68.000 tons in 1972 and to 561.000 in 1998 (van Dijk et al., 2004). Koutiala became the centre of the cotton industry, with the largest cotton lint and seed processing plants in Mali, providing many jobs. The mission of the CMDT in these years was dual because '*a commercial mission to organize activities related to cotton'* and '*and a public mission of rural development for which the Malian government was responsible* were integrated (Bodnar, 2005). This meant that part of the profit of the CMDT was reinvested in the area in the form of rural roads, agricultural research and extension and social and natural resource management projects. Because of this the whole rural community in the CMDT intervention zone, profited from the cotton industry revenues. The rest of the CMDT profit went directly to government budget; cotton profit made up for almost 50% of state income (Traoré, 2007).

On village level the CMDT introduced associations wherein all cotton cultivators of a village could organize themselves; arranging meetings for extension, and collectively handling cotton-input supply and cotton collection (Degnbol, 1996). The so-called association villageoise (AVs) kept a percentage of cotton profit with which they realized village-level facilities like school- and health centre buildings.

As the marketing division of DAGRIS; COPACO, was exclusively entitled to all Malian cotton lint sales, cotton seeds were exclusively sold to the state-owned company HUICOMA.

[3] All cotton related activities such as: extension, transport, processing and sales have always been in hands of the Compagni Malienne pour le développement des fibres Textiles (CMDT)

HUICOMA was created in 1979 with the ambition to increase the value of cotton through commercialisation of its seed. The CMDT exclusively sold all its cotton seed to HUICOMA. The three factories of HUICOMA produce cotton oil for human use, feed concentrates and cotton cake which is also used as fodder (Bolly, 2007). During the 1980's and 1990's feed and cotton cake was partly sold back to cotton cultivating farmers for a state-subsidized price (60% of the market price) to feed their cattle in the dry, hot season. Farmers could buy a certain number of bags of feed related to the number of heads of cattle and their cotton area in hectares. On average this was 20 kg per animal (Joldersma et al., 1996) According to Berckmoes et al. (1989) and Joldersma et al., (1996) the low price of cottonseed based feed was the main reasons for farmers not to grow fodder crops themselves.

Cotton farmers are informed by the CMDT about the cotton price for the coming season. The CMDT sets this price together with the Malian government and supplies the farmers with inputs like cottonseed, fertilizer and pesticides on credit. All farmers receive the same price for their cotton; no distinction is made between farmers or their output, although transaction costs must vary. And all people share in investments made with the cotton revenues. This policy fitted very well in the Malian socialist ideology of the government up to 1991. Following the neo-liberal view this policy however stimulates inefficiency, since there is no incentive for farmers or companies to diminish transaction costs (Nouvé, 2002). Also in years when world market prices for cotton were high, Malian farmers received prices far below the international price. According to criticasters of the CMDT system; this lead to underinvestment in cotton production by farmers because of the lacking price incentive. According to Baffes (2004) this system also creates opportunities for rent-seeking and corruption. Since money earned by the CFDT was not directly remitted to farmers, opportunities for staff arise to snitch this money.

Liberalization cotton market

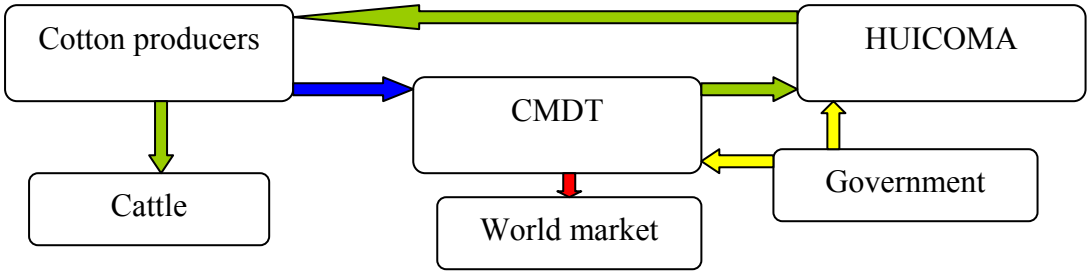
Since approximately the end of the 1990s it has gone downwards with the cotton industry in Mali. World market prices for cotton lint decreased. Consequently, profit margins of the CMDT diminished as well. Combined with mismanagement and corruption the CMDT lost its financial reserves and the government was obliged to support the CMDT budget in order to pay the pre-set prices for cotton lint to farmers. At the same time foreign pressure to liberalize the national economy increased; the CMDT should focus more on the cotton-sector itself, donors emphasised. As a result of this and the diminishment of profit, social and rural infrastructural projects were abolished. The World Bank forced the Malian government to stop settle the CMDT deficits and privatise the cotton industry; consisting of mainly the CMDT and the HUICOMA (Touré, 2005). What Bodnar (2005) called *´a public-private partnership avant la lettre´* because of the financing of rural development by cotton revenues, Malian government support and donor agencies together, thus seized to be. The privatisation of the CMDT has taken place last year (2008) and HUICOMA has been privatized on the 16th of may, 2005. HUICOMA is now part of the TOMOTA group, the largest Malian industrial company (Bolly, 2007).

Preceding the privatization of both companies the state government liberalized the cottonseed market in 2001 and abolished the state-subsidies on cotton-feed-products. Since that time the CMDT can sell its cotton seed on the international market. Although the CMDT continued to give priority to the provisioning of HUICOMA, output of HUICOMA has decreased dramatically since the liberalization. This could partly be explained by the increase in purchase price of cotton seed (prices went up from 11 FCFA/kg in 1997 to 27,5 FCFA/kg in 2007) which is now equal to world market prices (Dembelé, 2007). But HUICOMA itself states that it is due to a shortage of supply of cottonseed by the CMDT. This year (2007/2008)

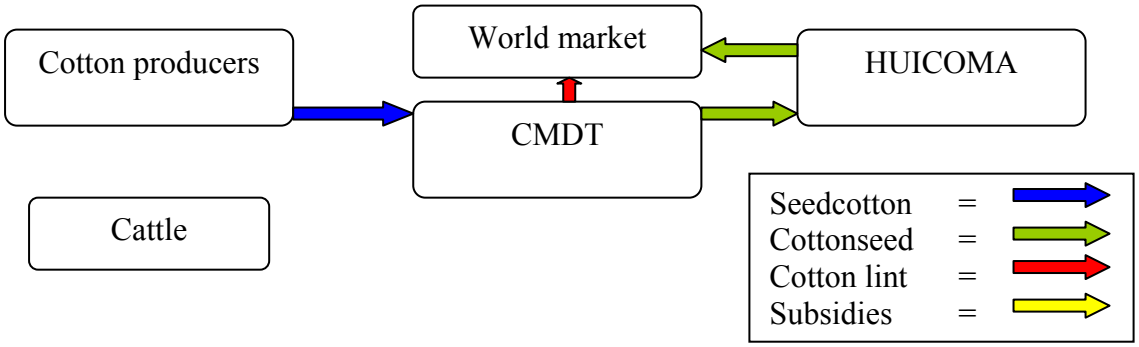
they would have only received 90.000 Tonnes of cottonseed while their capacity is 780.000 T (Tomota group, 2007). Farmers are directly influenced by these developments; in the research area farmers say that cotton seed based feed is hardly available anymore and if they can get their hands on some it is very expensive.

When world market prices for cotton continually went down, the CMDT did not have enough reserves to pay a reasonable price to the farmers (The financial reserves had been exhausted by continuing low prices, corruption and bad management). The government had to support the CMDT in order to pay the farmers the pre-set price for their produce. At the mean time the Malian government had moved more and more towards international institutes like the World Bank in order to get loans. As exchange for the loans the World Bank obliged the government to implement Structural Adjustment Programs (SAP). One of the main points in the SAP was the obligation to liberalize national markets and (partly) privatize national industries in order to stimulate international trade. One of the implications of this rule was the abolishment of subsidies on cottonseed to the HUICOMA and cattle farmers. Another was the stop of the CMDT rural development programs. The World Bank prohibited also the use of lend money to support the CMDT budget. As a consequence of this the pricing scheme to determine a season's cotton price was changed. Instead of to production costs Malian cotton prices are now linked to world prices (Behrend, 2006). When this new scheme was implemented in the season 2004/05 prices dropped from 210 FCFA/kg to 160 -175 FCFA/kg (Oxfam, 2007).

4.1 Flowchart Cottonseed movements before privatization of HUICOMA



4.2 Flowchart Cottonseed movements after privatization of HUICOMA



Conclusion

The increasing numbers of free-grazing cattle in the region, bought with cotton revenues, has exceeded the carrying capacity of the region. Cattle therefore need to be supplemented. When cotton prices were up and the CMDT was still semi-government owned, cotton rest-products were sold back to farmers for subsidized prices to serve as feed. Nowadays, with decreasing cotton prices and increasing global (World Bank) interference, these protected trade relations within the cotton sector have been abolished. This means that farmers, suffering already from low cotton prices, get a second blow because they cannot obtain feed to supplement their cattle for an affordable price.

The development of disentanglement of the different aims, branches and financing sources of the CMDT is similar to the process of untwining that Wiskerke (2007) describes (see § 2.2). As he also concludes this process is not necessarily favourable for the region in which it is taking place and neither for the actors involved.

It can be expected that farmers, anticipating on 1) the decrease in cotton prices and 2) the decrease of feed availability, change their crop and cattle management and their livelihood strategies in general. One wonders however what pathways are open for change in the current Southern Malian general farm system, which is so much directed at cotton cultivation. And what pathways do farmers themselves aspire? In what direction do farmers look for solutions for their problems and in what sectors, directions or activities do they have faith?

5. Strategies to improve livelihood

Following external changes, it can be expected that farmers in Try and N'Goukan will make adjustments in their livelihood strategies in order to maintain and / or increase their wealth. In this chapter possible old and new strategies of co-production are presented and discussed. In the first paragraph I will outline what prototypes of strategies exist and in latter paragraphs I will show how these strategies exist and are intertwined in practice.

5.1 Prototype strategies

Farmers have different options when looking for ways to improve the co-production on their farm and their livelihood in general. In this paragraph different directions in which farmers can shape their strategies are described. These directions or prototypes of strategies are: 1. Extensification; 2. Intensification; 3. Diversification; 4. Migration; and 5. Exit from agriculture.

1. Extensification
Extensification is the extension of area used for agriculture without an increase in the ratio of inputs of labour or capital per unit land. The goal of extensification is to increase production (adapted from Carswell, 2000; 7). Technological innovation is often a driver behind extensification (and intensification). In this case farmers in Koutiala region choose to extensify when animal traction became common practice around the 1960s and they were therefore able to cultivate more land with the same input of man labour. From this time more and more land was taken into cultivation and especially the area of land planted with cotton was continually expanded (Slingerland, 2000). In the latter case; cultivation of cotton, the use of inputs, as for instance fertilizer, were increased per unit of land in comparison to other crops. Here we see that extensification with regards to labour but intensification (see next paragraph) with regards to capital takes place. It is often the case that several strategies are followed at the same time which do not fit one label exactly. Still in order to indicate direction these labels can be useful and clarifying.

Now almost all land suitable for agriculture in the region has been taken into production and extension of area is hardly possible anymore. Only in Try some farmers have options to take more land into cultivation. From 15 farmers in the survey, 10 own land that has not been taken into production already. The amounts of hectares vary between 2 ha and 20 ha. These plots however usually are far away from the village or have other disadvantages as low soil fertility. This land is mainly used as grazing area. And the availability of this land as grazing area also explains why the supplementation of cattle poses farmers much more problems in N'Goukan than in Try. In N'Goukan many farmers with larger herds send their cattle on transhumance. This is a form of extensification as well because the cattle is sustained and enlarged all year round and over the years by grazing land elsewhere without needing extra inputs in labour or capital to access feed other then natural pastures. The disadvantage however is that milk and manure produced by the cattle on transhumance are lost to the farmer and the farm system. Also the large distances that the herds cover during transhumance and the associated energy losses are not beneficial to body weight, milk production and reproduction.

Because prices of inputs like fertilizer and insecticides are increasing and returns on cash crops like cotton are decreasing nowadays, farmers tend to use fewer inputs on their fields.

Sometimes farmers are forced to decrease the amount of inputs per hectare, simply because they cannot afford or obtain the desired amount of inputs. Farmers mention for example that they get fewer inputs (seeds, fertilizer, pesticides) per hectare from the CMDT on credit nowadays than is recommend by the CMDT itself. Although inputs per unit of land decrease in this example, it is not extensification because there is no incentive to increase production. In this case it is better to speak of de-intensification.

2. Intensification
Intensification refers to any process in which output per hectare of land is increased through increased use of inputs of labour or capital per unit of land and improved efficiency (Ramisch, 1998; Carswell, 2000). Furthermore intensification makes it possible to cultivate land more frequently without losing production (Ramisch, 1998).

The pathways of intensification that farmers in the research villages follow are often a combination of labour-led and capital led intensification (see § 2.4). In which the availability of labour and capital obviously is the determining factor. The broader policy context also plays a role in determining possibilities for farmers. As Carswell (2000; 26) for example points out; Credit accessing arrangements are very important for capital-led paths. The following of a capital-led path entails that households make capital investments in their activities in order to increase the productivity. With regards to cropping this generally means that fertilizer use is increased and (more) farm equipment is purchased. Capital-led intensification of the animal production part of the farm usually entails the purchase of feed and the construction of (semi) permanent stables and kraals to reduce energy losses of animals.

To make investments or counter the consequences of disaster or misfortune farmers in developed countries usually turn to the bank for credit. In Mali, the possibilities to obtain credit are much smaller. Credit is almost only available for cropping inputs meant for cotton cultivation. In the past, when animal traction was not so common yet, credit granting programs existed to purchase draft oxen. Now similar programs exist to increase the numbers of tractors. These programs however are only accessible for very wealthy households since they require payback in 3 years. This is impossible for most households. The conclusion that Carswell (2000; 26) draws; *"wealthier households are better able to follow capital-led paths of intensification"* is obvious and very plausible.

Being wealthy however is not the only prerequisite when one wants to increase external inputs per unit of land. The availability of inputs is also important. Some farmers mention for example that they are interested in improving the genetic potential of their cattle. Possibilities for this however are very limited. The same accounts for other inputs like; seeds that are improved or from an uncommon species or variety, wood and barbed wire to construct stables and kraals and of course supplement-feeds for cattle and other livestock.

3. Diversification
As mentioned before diversification is an important strategy to improve farmers' livelihoods. Following the classification of Toulmin et al., (2000) (see table 2.1) most farmers in the research villages take up type 3 activities to diversify. As type 3 activities are classified all activities that take place in, or are linked to, the village territory and entail an activity differing from traditional Minyanka farming practice. It can be argued that some of these activities have since long been part of Minyanka farming practice, nevertheless the listed activities are not commonly practised or at least not on the same scale. Poultry production for instance is only seen as type 3 activity when it entails production that is conducted at a larger

scale than commonly practised and includes (semi-) fixed sales arrangements. The same accounts for small ruminant production, horticulture and orchard production. It can be disputed if the investment in Real estate in, for instance Koutiala, accounts for activity 3 type. The investment after all, is not made within the village territory. On the other hand the person(s) making the investment do stay in the village territory. Below are listed all type 3 activities that occur in the villages:

- Poultry production
- Small ruminant production
- Milk Production
- Hiring out farm equipment
- Fodder production for sale
- Orchard production
- Horticulture
- Shop exploitation
- Real estate investment

Income derived from diversifying activities is highly diverse and variable over the year as well. Still these activities will often help a household in spreading the risks involved in following a capital-led path (Carswel, 2000).

4. Migration

Except for type 3 activities, some households or their members also engage in type 1 and type 2 activities. A notable type 1 activity (both change in activity and in space) is the establishment and exploitation of plantations in Ivory Coast. This kind of migration is quite common in the region; especially in villages more to the south many households own Ivory Coast plantations (Brock & Coulibaly 1999). In approximately half of the households one or more household members have migrated (in search) for work. The destinations and durations of the migration are highly diverse. There are households that have members living in the capital Bamako who make their living by working in bars, as driver or by running telephone cabins. Also the cultivation of rice in the 'Office du Niger' at Segou, which can be regarded as type 2 activity (No change in activity but change in place), is mentioned several times. These migrants bring back money on visits to the village but usually not more than approximately 60.000 FCFA a year. The migrants are often comprised of young men that are encouraged to explore the world and make money for several years before they marry and settle down. Both members from large households as well as from smaller ones migrate. Although labour is withdrawn from the household by the emigration of members, the household is not necessarily weakened by the leave. The remittances of the migrants allow the household to invest in the farm basis or in new activities. Sometimes the contacts or the acquired knowledge of migrants come in useful for the household.

5. Exit from agriculture

The complete exit from agriculture is regarded as diversification strategy by Rufino (2008; 3). And as long as it only concerns one or more members of a household it would be a type 1 or 3 diversification strategy according to the classification of Toulmin et al. (2000). But the increase of off-farm income impelled by one or more household members could also be the outset for the whole household to move out of agriculture. Whether it would mean that such a household would continue to reside in the village or migrate elsewhere, the classification scheme does not apply anymore. A household that would migrate completely just stops existing in the perspective of this study. But with the generally large families, the relative shortage of land and the attachment people feel for their land it is not expected that often such

exit out of agriculture of a whole household would take place. Maybe only the smaller, new-established and resource poorer households would make such a step because they do not have much to leave behind anyway. The opposite; a household living completely from off-farm income but residing in the village is also hard to imagine. Only when labour of all household members is completely spent on off-farm work such could happen. But this scenario does not seem very realistic. It could easily be imagined though that proportion of total income derived from off-farm work will increase substantially for some households. Not because they necessarily allocate more labour to off-farm work but especially because the value of off-farm activities will increase. This will be the case especially for activities like real estate investment and the exploitation of shops.

Since the extended households are very much organized to collectively work the family's land, the increase in off-farm income gained by some members could disturb the equilibrium between household members. Members that earn vast amounts of money with off-farm employment for example could be expected not to be willing anymore to cede their earnings to the household head for the greater good of the whole household. The increase of off-farm employment could therefore be a factor contributing to the increased disintegration of extended households.

5.2 Intensification, extensification and diversification in practice

Farmers can take different directions in creating their farm system and livelihood. This section explains what these different directions can entail in daily practice. An overview of the options open to farmers is given but focus is on strategies that imply a consolidation of the farm basis. Diversification strategies category 1 and 3 (see table 2.1) are therefore not taken into account. Data is presented to mark patterns and illustrate trends with regards to the strategies practised.

1. Cotton strategy
Intensification of a farm system often implicitly entails an increased focus on a specific activity. Formerly, intensification of the South Malian farm system was specifically directed at cotton cultivation. Turning to cotton cultivation used to be the best way for farmers to increase the productivity of their whole farm, gain cash revenues and be enabled to make investments in their farm. The credit facilities of the CMDT made it possible for farmers to make capital investments in seeds, fertilizer & pesticides and in equipment & cattle. The farm system was thus made into one depending on animal draft power. Labour productivity was increased which gave farmers the opportunity to invest labour in other income generating activities. Many cotton cultivating households grew large herds of cattle. The area of cotton in the whole of Mali increased from 28.360 ha in the season of 60/61 to 565.000 ha in 04/05 season.

Now, all farmers that are part of the survey both in N'Goukan and Try, have diminished the number of hectares in season 07/08 on which they cultivate cotton in comparison with the season before (06/07). The decrease varies between 25% and 100% in comparison with former seasons, with an average decrease in both villages of 73%. In N'Goukan 5 farmers in the survey have completely abandoned cotton this season and in Try 2 farmers did.

Table 5.1 Total area of cotton in hectares 2005-2008

Village / year	2005/2006	2006/2007	2007/2008
N'Goukan	195	210	68
Try 2*	213	147	103

Source: Derived from interviews with secretaries of Associations Villageoises (AVs) from N'Goukan and Try 2

*** There are 3 AV's in total in Try. This data only represents one AV**

Of the 7 farmers that have completely abandoned cotton cultivation 4 are resource-poor farmers that did not cultivate much cotton anyway. The other 3 however (Mamarou, Many and Fassidiky Coulibaly) used to cultivate large areas of cotton (varying from 4 to 12 ha). All farmers point to the low return when asked why they cultivate less cotton than before. On top of this Mamarou and Fassidiky Coulibaly both indicate that they are not happy with the organization of cotton payments and so on by the AV. Both have not received all payments on which entitled because the AV used their profit to pay back credit to the CMDT because other farmers omitted. Their decision not to cultivate cotton anymore is inspired by a fundamental discontentedness with the current situation around cotton. Nafo, one of the largest producers of N'Goukan, also complains about the current cotton situation. Still, in terms of percentage, Nafo has made the smallest decrease in cotton cultivation production namely from 12 ha to 9 ha. It is remarkable that it is especially the wealthier households that make the smallest decreases in cotton area. Of the 6 households that decreased their cotton area less than 50%, the wealthiest households of N'Goukan, with regards to number of cattle and ploughs (excluding Mamarou) are found (see table 5.2). An explanation for this is that these households can afford more to take risks because they have a more diversified income (often derived from cattle sales). Even if cotton does not pay, they have enough income. Another explanation is that the losses in cotton cultivation are taken for granted because it still allows farmers to obtain credit to buy fertilizer. In this respect cultivating cotton is an indirect way of taking care of soil fertility. Yet another explanation might be that some households are more emotionally attached to the crop than others because they have been cultivating cotton for a longer time or because it brought them so many benefits. There is no significant relation however between the age of exploitation and decrease in cotton area. In practise farmers usually hint that is a combination of these three factors that keep them continuing with cotton cultivation.

Some farmers complain about the productivity of cotton. Niquitan for instance says that the variety supplied by the CMDT the last years is not very good and therefore production is low. Yenizanga, one of the farmers in N'Goukan who has abandoned cotton cultivation completely, considers it too risky to cultivate cotton. He has a labour force of 6 (men and women together) and only 2 draft oxen. This is not enough to cultivate his 12 hectares of land. He had to choose and since return on cotton is so low, he is now focussing on millet cultivation (5 ha), accompanied by some sorghum (1 ha), maize (0.5 ha) and groundnuts (0.5). This strategy of focussing on cereal production for auto-consumption and sale of surpluses is also followed by Solo Adama and Apollinaire, who both suffer from labour shortages in their household as well. Toulmin et al. (2000; 49) found this strategy also occurring in other villages in Southern Mali. They argue that it is difficult for small, poor households to achieve the economies of scale required to maintain the assets needed for a productive cotton and cereal farm.

Table 5.2 Decreases in cotton area of less than 50% and main resources

Name	Decrease in cotton area in %	Ha of land	Family size	No of cattle	No of ploughs
Soumaila	42	29	53	65	4
Marc	45	11	12	11	2
Fatié	50	15	12	8	2
Madou	50	40	35	130	5
Nafo	25	48	30	80	5
Dahmani Coulibaly	50	25	20	30	2

Total for decreases of <50% (N=6)	Decrease in cotton area in %	Ha of land	Family size	No of cattle	No of ploughs
Means	44	28	27	54	3.3
Standard deviation	7	11	12	38	1.3

Total for decreases of >50% (N=24)	Decrease in cotton area in %	Ha of land	Family size	No of cattle	No of ploughs
Means	80	26	27	23	2
Standard deviation	12	15	17	20	0.6

Source: Data derived from survey in N'Goukan and Try

Not-cultivating cotton has consequences for other parts of the farm system as well, since credit granting for inputs is organized trough the CMDT and AV and directly linked to the number of hectares of cotton cultivated. Cultivating cotton is therefore the only straightforward option for farmers to obtain fertilizer. This fact especially influences maize production, since maize responds strongly to fertilizer. The maize seeds are also mainly distributed by the AV and therefore not ready available for non-cotton-cultivating farmers. Farmers that do not cultivate cotton therefore sometimes do not cultivate maize either or they do not use fertilizer on the maize crop. Except that this might negatively influence household income, since maize is often sold on the market, it can be expected that, when fertilized crops are not part of crop rotation anymore, soil fertility is negatively affected. Because of this dependency of maize cultivation on cotton cultivation, some farmers mention to continue with cotton cultivation in order to be able to cultivate maize.

Concluding it can be expected that area of cotton cultivated in this region will further decrease if cotton prices do not increase. Under current circumstances it is only interesting for large and resource-rich farm households to continue cotton cultivation. These households can afford to allocate land and labour to cotton cultivation in order to get credit for inputs to maintain soil fertility. They can afford this because they have enough land and labour to cultivate other crops or undertake other activities to gain cash income.

When cotton is cultivated less and less for a continued period of time it can be expected that cotton infrastructure will perish. For instance the CMDT representatives that are present in every community to give advice and promote new technologies might disappear. The AV's, that organise cotton cultivation and collection on village level, already run into problems because they cannot fully pay farmers for their produce. This is one reason for farmers as Mamarou and Fassidiky to stop cotton cultivation for the moment. These two trends: decrease of the area of cotton cultivated and deterioration of the cotton infrastructure naturally enforce each other. The only way this downward movement can be countered is by a rise in cotton prices. When cotton prices will not increase in the coming years, gaps in rural organization,

both on village level as communal and regional level, will appear and / or enlarge. On the one hand this could be seen a as doing a step backward on the other hand it might create room for other forms of organization and cooperation than organized solely around cotton.

2. Cereals strategies

Although cereals still form the main crops of farming systems in the villages, the dependency and focus on its cultivation differs between farmers. One thing that all households have in common is that cereals are their staple food and that they strive to be food secure with regards to cereals all year round, meaning that they produce enough cereals for themselves to eat. According to the Rural Rapid Appraisal (RRA) of O. Sanogo executed in the villages in 2005, almost all households in the survey are food secure year round. Only in Try, three households in the survey experience food insecurity one month a year. This means that these households have to buy cereals in this one period. The allocation of land to specific crops however has changed since 2005 (see table 3.1). The area of cotton cultivated in N'Goukan and Try has been more than halved. Farmers say that they allocate more land to cereals now. It can therefore be expected that food security is enlarged.

The preference for one type of cereal is very variable and depending mainly on; soil suitability and food preference. All farmers in the survey either allocate most land to millet or to sorghum. In N'Goukan farmers clearly have a preference for millet whilst in Try sorghum is cultivated almost as much as millet. Since there is no exact data about former seasons it is impossible to say if this is structural or only coincidence for this year. Maize is harvested first of the cereals after the rain season when food security is usually lowest. Maize is therefore valued as food just after harvest (cobs are roasted) but it is not a staple food as in many other African countries. Millet is preferred as food crop over Sorghum by most households due to food preferences whilst Maize is mainly cultivated for sale.

Table 5.3 Total area of cereals cultivated in hectares by farmers in survey season 2007/2008

	Millet	**Sorghum**	**Maize**	**Total**
N'Goukan	88.5	47	17.6	153.10
Try	75.75	74.25	37.25	187.25
Total	164.25	121.25	54.85	340.35

Source: Data derived from survey

Some, especially the resource-poorer households, produce just enough cereals for auto-consumption. Many households, like that of Mamarou, on the other hand realize large surpluses of cereals. On a whole the cercle de Koutiala is a cereal exporting region. It is for this reason that this area of Mali is called the granary of Mali (Nikièma, 1999). Especially now that cotton has become a less profitable crop and prices for cereals are rising, farmers say that they put their stakes on cereal cultivation more and more. This is a clear change in strategy; Based on data collected between 1994 and 2004 by the ESPRGN in these villages O. Sanogo (forthcoming) still found that larger, wealthier households (with more cattle, equipment and labour) allocate relatively small areas to cereals in favour of cotton. Whereas farmers now, also the wealthier farmers, deliberately produce large quantities of cereals for the market. In this respect the function of cereals as cash crop as well as food crop is becoming more important. Theoretically it might also be interesting for farmers to use cereal surpluses to feed their cattle and thus improve animal condition and milk production. For now however farmers do not feed grains to their cattle.

In both villages farmers estimate on average that 50% of their income is derived from the sale of cereals. A majority of farmers expect that if cotton prices do not improve, they will derive larger shares of their income from cereal production of which they will increase the area in future. Since cereal prices have been going up lately this seems a smart strategy and also one that does not need a lot of investment beforehand. Farmers that realize large surpluses do construct granaries do store their grain. They store grain for themselves but also to await the rising of cereal prices later after harvest in order to receive higher prices. In order to produce good yields farmers will need to, some time or another, invest in soil fertility though. Be it by using animal manure and compost, chemical fertilizer or including fallow again in rotation.

3. Groundnut strategy

27 out of 30 farmers cultivate groundnuts (*Arachis hypogaea*). They cultivate 1 hectare on average with ranges between 0.5 ha and 3 ha. Groundnuts are auto-consumed to a large extend; they form the main ingredient of the much eaten *tikédeque* (peanutsauce). But almost all groundnut cultivators sell part of the yield as well. Since groundnuts are the first crop to be harvested at the end of the rain season, farmers are usually eager to sell at least a part of the yield on the market to generate cash. Groundnuts make, up to 20% of the income of farmers. The households where the sale of groundnuts makes up more than 5% of income are usually the households that are resource-poor or are less diversified in agricultural activities. The foliage residues of groundnuts are dried in the sun and fed to cattle and donkeys. Some farmers also sell the residues. The households of Madou and Mamarou both cultivate largest area of groundnuts of 3 and 2 hectares respectively. Mamarou indicates that he has increased the area of groundnuts in order to compensate for the loss of cotton income.

4. Cattle strategies

Cattle are regarded as a main nucleus around which many things revolve. This showed when farmers in N'Goukan were asked with which farmers in the survey they associate themselves and with whom not. Often the classification of farmers by farmers was based on some factor connected to cattle. Be it the sec number of heads of cattle that is used as differentiating factor or management of cattle like if a farmer sends its cattle on transhumance or cultivates fodder. 10 out of 13 farmers that classified the other farmers that are part of the survey (all in N'Goukan) based their judgement on such factors concerning cattle.

The role that cattle play though is different in different households and is principally dependant on numbers of cattle owned. Herd sizes range from 1 to 130 heads of cattle among respondents with means of 38 and 22 for N'Goukan and Try respectively. Variation however is large and median is 15 for both villages.

Table 5.4 Cattle owned by households per village

Village / Cattle numbers	1-3 heads cattle	3-15 heads cattle	15-65 heads cattle	> 65 heads cattle
N'Goukan	4	4	4	3
Try	1	7	6	1

Source: data derived from survey

The large majority of farmers mention traction as the most important function of cattle. The ownership of a pair of draft oxen (that together with equipment form a complete set for soil cultivation) is seen as the first step towards successful farming. In households where there are no draft oxen, crop production is limited in comparison to those households owning cattle. In the survey there are no farmers included that do not own any cattle, these farmers do exist in the villages though. Furthermore there is a considerable part of households that own critical numbers of cattle (3 <). In the survey there are 5 farmers that own less than 3 heads of cattle. They are at risk of losing their draft power when faced with casualty and therefore necessity

to sell one or several heads of their cattle. 9 farmers in the survey indicate that they would want to have more oxen for traction. 4 of these 9 farmers have only 1 or 2 draft oxen and no other cattle. The other 5 farmers have more heads of cattle (ranges between 9 and 55 heads of cattle) but they want to increase the number of draft oxen. The preferred number of draft oxen is dependant on the area of land to cultivate and the available labour. The number of owned draft oxen per household ranges from 1 to 22 heads.

Cattle are not only important as provider of traction. Other functions that almost all farmers mention are: the saving account function / generation of income through sales, milk production and manure providence. The availability of cattle for offering at ceremonies is mentioned by 2 farmers. Especially for farmers with larger herds, cattle sales are a considerable part of total income per year. They sell heads of cattle when they need large amounts of cash for larger expenses. Several farmers indicate that they sell a head of cattle before the onset of the dry season in order to be able to buy feed supplements for the rest of the herd. Except for feed supplements, farmers also make expenses for their cattle to ensure animal health. Almost all farmers vaccinate their cattle to some extend. But few follow the animal health care calendar as advised by the extension services. The main reason for not (exactly) following the advised health measures is lack of financial means.

Of the 30 farmers included in the survey, 27 want to increase their number of cattle. When farmers own some oxen for traction they usually continue expanding their herd by purchasing cows. Usually when a small herd is formed, expansion takes place only by reproduction. The reason why farmers want more cattle differs. As said before traction is the most important function of cattle. Farmers that have insufficient traction capacity (as to their own judgement) therefore want extra draft oxen. Farmers with larger herds and sufficient traction capacity want larger herds because they want to produce more milk and/or manure. Some mention the saving account function of the cattle; in case of calamity they will be able to sell a head without getting into problems with traction if they have a larger herd. The most mentioned reason for farmers to want more cattle however is just because it is good business. It is always possible to sell cattle and make cash money. Farmers can sell their cattle locally to other farmers, or to butchers or tradesmen that visit the villages. Cattle are the third largest export product of Mali; tradesmen buy cattle in villages for (life) export to the coastal countries of West-Africa.

Farmers in the survey prefer to improve animal health of their cattle over increasing cattle numbers. These farmers expect that when their cattle is in better shape it will give them benefits in the form of increased milk production and lower mortality rates. When they do not need to increase the size of their herd they can profit from cattle sales more regularly. Not surprisingly these 3 farmers have reasonably large herds (21, 46 and 65 heads of cattle). The reason why they do not want to further expand their herd is because of feed constraints that manifests especially in the shortage of grazing area. In their eyes more cattle will only lead to more problems with regards to feeding the cattle. At the same time these farmers expect that improvement in health will come mainly from improved feeding. They want to improve feed intake and quality by increasing the share of cowpea in the rations.

An objective with regards to the herd which is similar to that of improving health is the wish that some respondents express to rationalize and organize the management of the herd. It is similar because it also expresses the will to improve the performance of the cattle. The respondents who say this are among the wealthiest households of the villages. In these large households there is often one man appointed to take care of the cattle. This man however is usually not the household head and the fact that he is responsible for the herd does not mean

he has the final say in matters concerning the cattle as well. Time-consuming consultations between male members of the household and differences in opinions about herd management can lead to conflict and inefficient management. According to the 'cattle men' elder household members have the tendency to want to increase the size of the herd only, which means that they never want to sell an animal, neither when an animal is sick, or old and unproductive. Also the cultivation of fodder and the costs for medical care of the cattle are disputed points. The 'cattle men' indicate that they want more freedom in taking decisions concerning the cattle. That these kinds of issues can stick in ones throat is demonstrated by Seydou Coulibaly. Seydou is responsible for the herd of 90 heads of his household. His brother Oumar Sidiké Coulibaly is the head of the household and together with another brother Seydou and Oumar, their wives and their offspring, form the largest household of the survey with 102 members. Although Seydou is far in his seventies he still gets in a state when talking about these issues. The fact that he cannot sell a head based on its own judgement frustrates him. And he would also prefer to spend more money on preventive health care and medicines for the cattle. But this money is not made available by his brothers. Also they do not want to allocate more land and labour to fodder cultivation.

Farmers face several constraints with regards to cattle farming. These constraints hamper the wellbeing and productivity of their cattle and therefore returns and / or developments in the direction of intensification. The problems and difficulties mentioned by farmers can be grouped into 5 categories: 1) The availability of natural resources; 2) The availability of labour; 3) The availability of financial means to make investments in cattle; 4) Management of the cattle; 5) Disease pressure.

1. Almost all farmers experience some shortage of natural resources. Lack of grazing area is most mentioned and also conceived as by far the most serious constraint with regards to cattle farming. Farmers are generally aware of the fact that the capacity of the village commons for grazing is currently insufficient to feed the number of cattle. But every alternative to free-grazing involves more inputs in capital, labour or land or in all three together and these inputs are usually not in abundance available. 4 farmers in N'Goukan for instance, indicate that they do not own enough land, to be able to allocate land to fodder cultivation.
2. Labour, either to cultivate fodder or to herd the cattle, is a problem especially for smaller households with few labour forces. Some farmers also have a problem with the quality of the work; they do not consider their own household members knowledgeable enough to take good care of the cattle.
3. Many farmers want to improve the management of the cattle and the cattle itself in order to increase productivity. They think of improving cattle genetics by crossing with exotic breeds, or to increase productivity of cattle by implementing zero-grazing strategy, accommodating the cattle in permanent stables and feeding them with fodder and concentrates. The implementation of such strategy or parts of it demands financial investments in construction material for stables, seed for fodder crops etc. Even if farmers do have the money, often the availability, for instance of concentrates, fodder crop seeds and / or exotic breeds is low.
4. As explained above, consent within the household about cattle management is not self-evident. Decision-making power is often in other hands that in those directly responsible for the daily management of the cattle, this can cause sub-optimal management with regards to the cattle.
5. Some farmers indicate that disease pressure on the herd has increased over the decennia. They fear cattle losses due to illness or rising health care costs. One farmer points at the danger of cattle eating the plastic that often ends up in fields nowadays.

Table 5.5 Constraints mentioned by farmers with regards to cattle rearing in survey per category

Constraint categories	Constraints specified	Number of households experiencing problem		
		N'Goukan	Try	Total
1. Natural Resources; availability, access and allocation	Grazing area	9	5	14
	Water	1	2	3
	Wood	1	0	1
	Land	4	0	4
2. Labour: availability and allocation	Fodder cultivation	2	1	3
	Herding	2	3	5
3. Making investments: Financing and availability	Genetic potential cattle	3	1	4
	Seed fodder crops	1	1	2
	Concentrates	1	7	8
	Construction material	0	1	1
	Stabilisation *	2	3	5
4. Management		1	4	5
5. Disease pressure		1	2	3

Source: data derived from survey
Most farmers mention more than one constraint with regards to cattle farming therefore total number of constraints is higher than R (= 2*15).
*: Term used by farmers to indicate certain strategy, constraints experienced concerning this strategy are: low availability of labour & fodder crop seed and investment problems with regards to construction of stable or purchase of concentrate feed.

To evade the consequences of grazing area shortage all farmers in both villages supplement their cattle with different feeds in the dry season. These are: Crop residues (mainly the stover from cereal crops and hay from groundnut), hay made of Cowpea and/or Stylosanthes, residues from food processing as rice-bran, collected tree-leaves and fruits (Nere) and purchased concentrates (mainly on cottonseed cake basis). Another strategy, that 8 farmers in the survey from N'Goukan follow, is to send the cattle on transhumance in the rainy season. The cattle then is either trusted to a herdsman (often Pheul) or to a young male member of the household.

Several farmers indicate that they would want to intensify their cattle keeping system ("faire la stabilisation"). With this they mean the accommodation of cattle (and especially of draft oxen and cows) in stables and zero-grazing (in at least the dry season). Up until now, no farmer in either of the villages has done this; mainly because of financial limitations.

5. Cowpea

Cowpea (*Vigna unguiculata L.)* or Nièbe is a crop cultivated already for a long time in the region for the purpose of its grain. In the last decades there have been several projects (DRSPR 1982-1987, AfricaNUANCES 2005) that have promoted the cultivation of new varieties of cowpea or Nièbe as a supplement fodder for cattle in order to improve health and condition of, especially draft oxen and lactating cows, in – and just after the dry season. These new varieties maximize feed quality of the foliage and are harvested before developing mature grains. This inherently means that farmers need to buy new seeds every year.
The adoption of this strategy – cultivation of fodder – is a clear break with former practice. Instead of herding the cows and letting them free-graze the village commons and fields, a choice needs to be made to allocate land to fodder cultivation. This entails a conscious choice in favour for cattle and against some other crop.

The Cowpea grown (for fodder) is either intercropped with cereals or cultivated in pure stands. The farmers in the villages that are part of the AfricaNUANCES project all cultivate at

least half a hectare of Cowpea pure. But in N'Goukan actually all farmers but one (Yenizanga) in the survey cultivate Cowpea and except for Solo Adama, they do this in pure stands. In Try at the contrary, only 9 out of 15 farmers cultivate Cowpea and 5 of these farmers are part of AfricaNUANCES project. These 5 are also the only ones cultivating Cowpea in pure stands. The other 4 farmers cultivate Cowpea intercropped with maize or sorghum. Also the area on which Cowpea is cultivated is smaller in Try on average than in N'Goukan (0,43 ha and 0,76 ha respectively). This difference can be explained by the difference in urgency to purchase feed supplements for cattle in N'Goukan and Try. Grazing area per animal is a lot lower in N'Goukan than in Try. Therefore farmers in N'Goukan must make more efforts to sufficiently feed their cattle. This finding is conforming to the remark of (Defour et al., 2000) that farmers are more likely to experiment when their system is under pressure. Still when looking at the area of Cowpea cultivated and the number of cattle owned per household it is clear that even in N'Goukan the quantity of produced fodder is not in relation to the number of cattle. Mamarou for instance, who cultivates the largest area of Cowpea has a lower ratio of area Cowpea / number of cattle than Marc. Such differences reflect different strategies with regards to feeding. Marc for instance supplements all his cattle with Cowpea whereas Mamarou saves this for the draft oxen and some milking cows. Most of his cattle is on transhumance in the dry season anyway because of the feeding constraints. Respondents in general emphasise that it is specifically important to supplement draft oxen during the hot dry season because otherwise they are not capable of working well in the onset of the raining season.

Table 5.6 The area of cowpea and number of cattle in N'Goukan and Try

Name	No ha cowpea	No cattle	Ratio cowpea / cattle
Mamarou	2	60	0,033
Seydou	0,5	110	0,005
Soumaila	1	65	0,015
Niquitan	0,5	15	0,033
Marc	0,6	11	0,055
Alou	0,5	18	0,028
Fatié	0,25	8	0,031
Many	0,5	55	0,009
Madou	2	130	0,015
Mequetan	1	2	0,500
Yelimeque	0,5	1	0,500
Apollinaire	0,5	2	0,250
Nafo	0,5	80	0,006
Mama Konaté	0,25	23	0,011
Dahmani Coulibaly	0,5	30	0,017
Drissa Bengaly	1	9	0,111
Oumar Sidiké Coulibaly	0,25	90	0,003
Fousseny Kané	0,25	6	0,042
Badjiri Coulibaly	0,25	9	0,028
Tiemoka D'jon Coulibaly	0,5	15	0,033

Source: Data derived from survey. Only farmers that actually cultivate cowpea in pure stands are included

In 1990 Berckmoes et al. remark that Cowpea cultivation has diminished since the CMDT has started to distribute rest products of the cotton industry (feeds on basis of cottoncake and cotton shells) for relatively low prices. With rising prices and decreasing availability of these industrial feeds this situation has now turned around. Many farmers signal that they are planning to increase the area of Cowpea. Seydou for instance says that his household will allocate land, now in use as individual plot or as fallow land to cultivate more fodder crops.

Marc is also planning to cultivate more Cowpea but he advocates the importance of the right variety. This season they were supplied with a variety of Cowpea that is meant for human consumption. Mamarou was rather pleased with this since he made quite a lot of profit on the sale of the beans but the quality of the Cowpea hay was bad. Fassidiky Coulibaly says that when availability of seeds is better he will once again start with Cowpea cultivation. Now it is often difficult for farmers to get their hands on the varieties of Cowpea meant for fodder. Except for land constraints and seed unavailability, labour is often mentioned as a constraint with regards to Cowpea cultivation. For Issa Traoré shortage of labour is a reason to cultivate Cowpea only intercropped with Maize which saves land preparations. Gnismé Coulibaly does not cultivate any Cowpea because of labour shortages.

Cowpea is a crop with potentially a lot of advantages to farmers. It is a dual-purpose crop which can be grown to yield beans for human consumption and to provide foliage as fodder for animal consumption. Furthermore cowpea is a leguminous crop able to fix nitrogen from the atmosphere and therefore capable of improving soil fertility and structure. Still, after years of being promoted by NGO's and research institutes, cowpea is not convincingly included in agricultural practice. It seems that constraints as labour requirements and seed price and availability are determining in this hesitancy of cultivating or not cultivating cowpea. Also farmers do not always seem to fully understand the fertilization-aspect of Cowpea cultivation. Only when benefits justify the investments of money and labour in cowpea cultivation this hesitance is likely to disappear. Since cowpea, when cultivated as a fodder, does not bring direct benefits in terms of cash income to farmers this justification needs to be found in indirect benefits. The cultivation of Cowpea as intercrop with a cereal crop is more integrated in common practice than the cultivation in pure stands. Sowing Cowpea seed in between the maize after maize seedlings have established is a relatively labour undemanding strategy to increase the crude protein content of cereal crop residues.

6. Herding cattle

Another common practice can be denoted as a category 2 type of activity; the herding of other people's cattle. In the household of Gnismé; 2 young men work as herdsman for Pheul. They are paid in cattle; after 7 months of work they will receive a bull calve. This is an important strategy for resource-poor farmers to gain more cattle moreover it is one of the few ways for Minyanka to increase their knowledge about cattle and herding. Some household heads mention to send away one of their sons with Pheul herdsmen in order for them to become more knowledgeable about cattle.

7. Dairy farming

From the survey it appears that many farmers muse about their possibilities to increase income via milk production. They all think that milk-production is a potential option to increase income in the future. According to Ely Togo, the director of the milk cooperation Danaya Nono, it is relatively new for Minyanka farmers to sell milk. Milk production and sales was reserved for Pheul herds' people. Only since the creation of the milk cooperation Minyanka farmers started selling milk themselves. All households that own cows can potentially produce and sell milk; not all households do so however. Some households could produce more milk but only milk a few litres a day for auto-consumption. Some households do produce some milk, but so little that they only consume it themselves. Some households employ a herdsman from outside the household and leave the milk to him as payment. The majority of the farmers in the survey however sell (part of) their milk production.

Table 5.7 Milk production and destination

Village / milk production	Number of households producing milk		Number of households not producing milk
	No hh selling milk	No hh not selling milk	
N'Goukan	8	2	5
Try	8	4	3

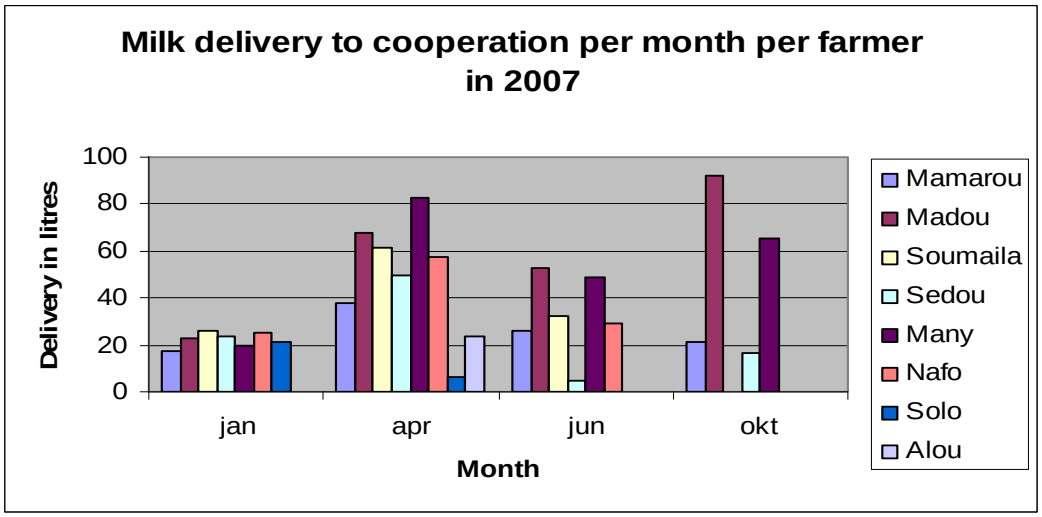
Source: data derived from survey

In N'Goukan all farmers selling milk, sell at least part of their total production to the milk cooperation Danaya Nono (see box 5.1). Some also sell milk in the village or in Koutiala city. Producers from Try cannot deliver milk to the cooperation anymore because of conflicts in the past. Five milk producing farmers in Try however have found a new buyer of their milk. This buyer is a woman, Chatou Dembelé from a nearby village. Chatou buys all that they produce to sell it as 'lait caillé' the following day in Koutiala.

The cooperation pays 165-200 FCFA per litre milk. Chatou gives Try farmers 175 FCFA per litre. When farmers sell their milk themselves they ask 200-225 FCFA per litre. Although price paid by the cooperation is relative low, farmers prefer to sell to the cooperation. Members appreciate that they get their milk revenues paid per month; this gives them the opportunity to save up some cash for larger expenses. Furthermore the milk delivery to the village collection point is less labour demanding then auto sales of the milk. Also farmers can profit from services offered by the cooperation like: credit facilities (for feed and fodder crop seed), animal health care and advice. Members of producer-group N'Goukan complain however about the price paid per litre by the cooperation, which they think is poor, and the sales opportunities (quantity that they can sell to cooperation is too low). Farmers in Try that sell milk to Chatou Dembelé are quite satisfied. They appreciate that she buys their whole offer of milk. Some of these farmers worry about the continuity of her business since she is a married woman and her husband might suddenly forbid her to continue. They also regret that she does not (yet) grand them credit for investments in feed etc. Also they prefer to be paid once a month like with the cooperation.

The quantities of milk produced by farmers vary enormously over the seasons. This is unfortunate for farmers themselves, especially when milk sales make up a large portion of their income because this means that in some season they hardly have income. For the milk cooperation this causes problems as well because their supply is so irregular. In the graph below milk delivery to the cooperation in different months per farmers (members of producer-group N'Goukan which are included in survey) is shown. Data of all months was not available.

Graph 5.1



Source: data derived from administration secretary producer-group N'Goukan

The quantity of milk that is delivered to the cooperation is depended on 2 main factors: 1) the quantity of milk produced by lactating cows and 2) quantity of milk milked. Cows have their lactating peak when calves are just born. Since most calves are conceived at the end of the rain season (August / September) when condition of the animals is high and chances for conception consequently, calving takes place mainly in April / May. At this same time the cattle is all present in the vicinity of the village and labour pressure is low. Farmers therefore have the possibility to allocate labour to milking. The quantity of milk deliverd to the cooperation is consequently high in this period. In June the rain season begins and so does the new agricultural season. Labour demand is therefore higher and farmers send (part of) their herd on transhumance. Feed availability is often low in this period (influencing milk produced by cows) because no new feed / fodder are established yet. Milk delivery is consequently going down. In October, when rains have ceased, labour pressure is high but so is feed availability for the cattle. Farmers that do have lactating cows and keep these around can produce large quantities of milk if they have enough labour available. In January, midst of the cold dry season, all cattle is present near the village again but few cows are lactating and cereals and cotton are harvested and labour availability is therefore low.

Farmers can consciously decide to allocate more labour to milking throughout the year in order to regulate milk delivery. Regulating the yearly production of milk by cows is more difficult however. In order to spread milk production more evenly over the year, farmers need to regulate the conception of their cows. The best way to do this is by keeping the cows in good condition whole-year-round by supplementing them all year. Farmers in N'Goukan and try are not all-conscious about these 'natural mechanisms' of their cattle. When cooperation Danaya Nono really wants to achieve a regular milk supply, investments in farmer's education about cattle and milk production is a necessity.

Concluding the main issues constraining milk production on personal and household level, except for those already mentioned in table 5.5 are: low levels of know-how with regards to cattle & milk among Minyanka farmers and insecure sales opportunities.

Conclusions

Farmers in N'Goukan and Try compile (most of) their livelihoods with the strategies mentioned in this chapter. Most of theses strategies followed can be ranged under intensification or diversification prototypes. With regards to intensification, Carswell (2000; 7) distinguishes between labour-led pathways and capital-led pathways. I think that it is useful to make this distinction for both these prototypes. It is useful because the factor pushing intensification or diversification says something about the circumstances in which farmers find themselves. The reasons why farmers choose a certain strategy may indirectly indicate what the constraints are of other strategies. Many farmers, for instance, say they would want to intensify their way of keeping cattle but lack the capital to make the required investments. Instead they do the opposite and send their cattle on transhumance, a strategy for which no capital investment is required. The fact however that lack of capital is often limiting plans to change the farming system or commence diversifying activities does not mean that labour is plenty available. In most households labour is constraining production at least part of the year. As Defour et al., (2000) says: *"Farmers practices usually reflect a compromise between conflicting demands on their time and resources".* In practise this means that farmers are following both capital-led and labour-led paths of intensification and diversification simultaneously or at different times. They sometimes temporarily loose both paths as well, for instance when they are confronted with emergency such as the loss of cattle or a household member.

The limited possibilities for farmers to obtain credit from financial capitalist markets constraints activities that require investments. Farmers cannot obtain credit because they are not fully integrated into global financial networks. This is a problem because they are dependant on global input markets for fertilizer, pesticides, herbicides and feed. The same accounts for the markets where they sell their output. On the world market for cotton per example these farmers compete directly with farmers that are fully integrated in financial networks as well as in strong political networks in which their interests are advocated. This partial integration of Malian farmers into global networks opposite to the full integration of their competitors is exactly what makes globalization unjust and unequal in some regards as Ferguson (2006) and Binsbergen et al. (2004) say (see § 2.2).

On the other hand globalization also widens the scope of farmers in Southern Mali. Through for instance increased communication possibilities and increased penetration of local markets with international products farmers come into contact with the outside-the-village-world more regularly and more intensive. This contact creates opportunities for farmers to diversify their activities. One of the most important diversifying opportunities is migration which means being part of a wider labour market which extends the scope of the village. Often the remittances that migrants send back, either in cash, material or qua knowledge, add something to the farming system's basis. This can be very straightforward like; enough cash to buy a draft oxen or piece of equipment but it can also be something more subtle like for instance the improved technology to cultivate a specific crop or contacts with tradesmen in town.

In the next chapter the specific circumstances of several household are examined in order to get an idea of actual composition of the livelihoods, and constraints and possibilities associated with these. Also the views and future perspectives of farmers on themselves and other farmers are elaborated.

Box 5.1 Milk cooperation Danaya Nono

In 1990 a small dairy cooperation, Danaya Nono, was created in Koutiala by the French NGO Centre International de Développement et de recherché (CIDR). The goal was to promote dairy production in the area and increase the revenues of dairy producers. The CIDR initiated the same in other cities like Segou, San and Fana. In 1996 the CIDR started to slowly withdraw from the project putting the company in hands of the employees and producers more and more and so making it a real cooperation. In 2007 the CIDR still owned 40%.

Organization

Producers need to be organized in groups on village level in order to join the milk cooperation. The board of the producer-group is responsible for distribution of milk benefits and information exchange. Board members go to Koutiala every month to collect profits and provide advice when necessary. The collection of milk takes place on village level, where producers deliver their milk to the secretary of their producer-group every morning before 8.00 o clock. The milk is collected by an employee of the cooperation, who takes the milk to Koutiala on bike. In the first years (1991-1994) the cooperation worked with 10 producer-groups from villages in the periphery of Koutiala. Later on the cooperation expanded the number of producer-groups. Until recently the cooperation also bought milk from a large producer with some 20 Montbeliard. The loam stable that this person built for his animals however, collapsed upon them in the last rain season, killing all cows. The cooperation employs 7 persons on permanent basis and has another 40 temporary employees.

Processing and sales

The milk is processed into different products including: pasteurized fresh milk, yoghurt in many sorts, ghee and cheese. The cheeses, which weigh around 0.5 kg, are made according to a French recipe for Tomme cheese which is hard, white cheese. The equipment of the factory is quite old and not always fully functioning. The cooperation has its own outlet, in the same building as the milk-factory. Here they sell all the different dairy products that they produce. Milk, drinking yoghurts and yoghurt are also sold on the street by street vendors who lease a little trolley with ice from the cooperation. These products are also sold on the markets of the larger villages around Koutiala.

Capacity

The milk factory has a capacity of 450-500 litres milk per day. This capacity however is not always fully used because large seasonal fluctuations exist in milk production. Although feed availability and therefore milk producing potential is much higher in and just after the rainy season, milk supply is low in this period (covering May to November). This is due to several circumstances; 1) Few lactating cows because of conception peaks in august / September) 2) Some farmers send their cattle on transhumance in this period depriving themselves the opportunity to milk their cows, 3) Other farmers keep their cattle around but further away from village fields to avoid damage to crops, therefore milking and milk delivery takes more time and effort and is therefore forsaken, 4) Labour demand is high is this period, leaving farmers no time to milk their cows. In the hot dry season (March –June) on the other hand the capacity of the factory is often too small to process all (potential) milk supply. The management of the factory tries to minimize fluctuations by establishing quotas for producers-groups. Producer-groups that continue delivering milk in the rainy season are rewarded with higher quotas in the dry season. Farmers are stimulated by this policy to keep some cows nearby in the rainy season to ensure a minimum level of milk production.

Prices

Two times a year, in June and December, prices and quota are negotiated by producer-groups and management. Price roughly varies between 165-200 FCFA per litre milk and is based on demand and on quantity delivered & collection costs to the specific producer-group. Sales price of one litre of fresh milk is FCFA 350,-.

Offer and demand
The offer of milk is increasing in the last years and the director of the cooperation expects that this trend will continue. The demand in Koutiala city however is decreasing because of the cotton crisis which causes a lot of problems in the cotton oriented industry in Koutiala. Milk sales are further hampered by the large availability of cheap imported dairy products. Fresh milk is imported from Burkina Faso but the largest competition comes from milk powder-based products. These products are made from imported milk-powder (mainly from Europe) and processed into dairy-products again by companies as Yoplait (Ivory Coast) and Malilait (Mali). These milk powder-based products are preferred by many retailers because the preservability is very large. Also the profit margin is often higher while sales price is lower. Consumers like these products as well because of the aforementioned reasons. Moreover, these products, especially from Yoplait, are enormously promoted through ads and TV-commercials (Pomeranz, 2006). It is difficult for local milk producers to compete against these products. In 2006 the cooperation's net results were -5%.

Sales-point Bamako
In order to increase sales opportunities for all Danaya Nono cooperations in Mali, the CIDR has created a sales point in Bamako as well in order to take advantage of the high demand for dairy products there. This sales point is called a Groupe Intérêt Economique (GIE) and is actually a logistic centre that sells dairy products from all Danaya Nono cooperations. The office of the GIE is a 2-room office in the Faladié quarter in Bamako. The dairy-products are stored in 2 large freezers that are placed in the middle of the office. Some cooling boxes filled with bags of fresh milk are standing in the corner. Since Koutiala is relatively far from Bamako only cheese and ghee are taken from there. Fresh dairy products are coming from Fana and Segou. The GIE distributes the dairy products to 23 different customers (retailers) in Bamako.

Quality
The director of the GIE complains about the quality of the cheese delivered by the Koutiala cooperation. Its quality is very variable and therefore the cheese cannot always be sold. Originally it was forecasted to sell 30kg of cheese from Koutiala per month. Danaya Nono Koutiala however is not capable of delivering this amount each month and the GIE is not capable of selling it either. For the moment an average of 18 kg cheese is bought from Koutiala per month. The cheese is only sold to private-persons now and not to restaurants or shops because of the variable quality. People in Koutiala also mention the variability in the quality of milk and yoghurt products. One explanation for this variability is the occasional use of milk powder in processing by the cooperation. This however happens only in times of acute shortages of fresh milk (usually in the rainy season). To guaranty at least the quality of the milk delivered by the producer-groups, the cooperation regularly checks water content and acidity of the milk.

Veterinary care
The cooperation employs a veterinary to improve and maintain health of the producer-groups' herds.
The veterinary visits each village some ten times a year to vaccinate and treat the cattle against Black Quarter (Charbon symptomatique), Pneumonic Pasteurellosis and Contagious Bovine Pleuro Pneumonia (CBPP). The producers only pay for the products used; the treatment itself is free of charge.

N'Goukan and Try
In 1992 a producer-group from N'Goukan joined in. In general members of this producer-group are content with the cooperation. Although Try has been part of the cooperation as well, at the moment they are not. This is due, in the end, to the lack of continuity in quantity and quality of the milk that producers in Try delivered. Because of the often low quantities of milk delivered the cooperation refused to pay the costs of milk collection any longer. The conflict that followed led to the exclusion of the producers-group of Try in the cooperation.

Source: Interviews with director and veterinary of Danaya Nono Koutiala and director of GIE, Bamako

6. Choice and Integration of strategies

6.1 Choice of strategy

According to Toulmin et al. (2000; 11) the type of activities that a household or member of a household, picks depends on access to resources and opportunities which on its turn are linked to gender, ownership of assets and ethnicity, and the knowledge, experience and networks accompanying these specific properties. This is true for the inhabitants of Try and N'Goukan; they do not all have the same opportunities to take up activities. The array of choices of diversifying activities for women for instance is limited. Women are not allowed to cultivate crops; they do not own cattle and they can only engage in (individual) activities when their tasks are finished. Typical woman activities are therefore the collection and processing of the nuts of the Shea butter tree (*Vitellaria Paradoxa*), and the sale of small assets or food items as bracelets and bananas. With regards to ownership of assets the link to opportunities is again more straightforward, since less concerned with social or cultural constraints; when you do not have a tractor you cannot rent it out to your neighbour neither.

Identity
In both research villages almost all inhabitants are from the same ethnicity; Minyanka. Consequently, within the village, ethnicity as such, is not in the first place expected to play a role in determining access to resources. On the other hand ethnicity is also important in determining self identity. And self-identity on its turn, is seen as an important factor in determining the kind of activities a person chooses to do (Toulmin et al., 2000; 11). Therefore ethnicity might play a role in determining opportunities, for instance with regards to animal production. The Minyanka are traditionally arable farmers; cattle rearing have not been part of their livelihoods more than one to two generations. Now cattle are still, in the first place, supplier of traction to facilitate arable farming. Knowledge about, as well as experience with cattle, and lactating cows in particular, is low among Minyanka farmers and self-identification with dairy farming of Minyanka farmers would in any case not be based on ethnicity. In this respect it would be strange to expect Minyanka farmers to develop into dairy production. Still there are farmers that do milk their cows, sell this milk and are concerned with the milk producing abilities of their cows. In many cases off course, the cattle are already in place; the lactating cows are there. One is thus inclined to think that when opportunity knocks, farmers open the door. Self-identity may then perhaps not always match with the situation in which people find themselves. It is difficult to assess the size of the mental step that farmers take to actually milk the cow and sell this milk on the market and, even more thorough, take up activities that increase the milking potential of the cow. Does a farmer, before doing so, needs to feel like a dairy farmer?

In this chapter farmers' reflections on themselves and to a lesser degree on other farmers in their village are described. The objective of these descriptions is to find out what different directions farmers choose to shape their livelihoods and what factors are determining herein.

6.2 Classification

Farmers assess their own situation and that of others using different criteria. The criteria that farmers use where found when asking them to classify the other farmers that were part of the sample. Brock et al. (1999) who researched farmer's perceptions of the sustainability of households in Southern Mali grouped the criteria used into 3 main categories; i) management, ii) available labour / household structure and iii) assets. More or less the same can be done with the criteria used by farmers in N'Goukan to assess the farming practise of their fellow villagers. In fact all criteria used by them can be ranged under i) management and ii) resources.

Table 6.1 Farmers' criteria to assess farming practice divided in two categories

Management	**Resources**
Orientation on cotton	Labour
Skills and knowledge with regards to cattle	Cattle
Innovation	Farm equipment
Transhumance	Land
Cultivation of fodder	

Source: Data derived from survey 2 N'Goukan
R = 13

- The degree, to which farmers are oriented on the cultivation of cotton, is an imported criterion for two farmers to assess others. According to them this criterion signals the degree of compliance of farmers: Farmers that continue to aim for cotton revenues do not think for themselves; they just follow their routine. On the other side there are the farmers who want to change with regard to cotton cultivation. In the mean time they try alternative activities to generate income. This can be the expansion of cereal area or of milk production and sales or the cultivation of a 'new' cash crop like Soya.
- Six farmers make a classification on basis of skills and expertise of farmers with regards to cattle. Indicators of this criterion are; i) if an adult member of the household is taking care of the cattle or a child or external herdsman (in other words: involvement), ii) the situation with regards to feed supplements, iii) medical care, iv) milk production, and v) the size of the herd.
- One farmer makes the classification on basis of the degree to which farmers are innovative.
- If a farmer sends his cattle on transhumance and if he cultivates fodder crops are criteria for one farmer each.
- Availability of labour and quantity of cattle, farm equipment and land owned are the basis for the classification of four farmers.

Farmers were asked to classify their co-farmers to their own criteria for two reasons: 1. to get second-hand information about them and, 2. because criteria used by farmers were expected to reflect what farmers think is imported in farming. In this second survey farmers were also invited to give their opinion about their own (and the whole households') performance with regards to farming and to share their thoughts on future developments and opportunities. The information obtained in this way, together with data from the first survey is used in the following paragraph to sketch a more thorough picture of specific farmers.

6.3 Farmers' views

In order to give a better understanding of how farmers integrate different strategies in their livelihood four households are lifted out as examples. These four households are chosen on basis of the different types of households they represent with regards to access to resources and opportunities. Specifically these four were picked because they follow a more or less clear livelihood strategy and they were able to elaborate about this. Of both research villages two farmers are taken as example. Slightly more data is available about farmers from N'Goukan but insights derived from this are also applied on the farmers from Try.

1. Mamarou

Table 6.2 overview of main characteristics household 1 and averages for all respondents on last row

Family size	labour force	Land in ha	No ploughs	No of cattle	No lact. cow	No ha cotton
55	16	20	3	60	25	0
28	10	27	2.2	29	10	2

The head of this large household is Mamarou Dembelé, since he is old-aged his younger brother Jean Dembelé takes care of actual management of the household. Jean is the so-called "chef d'exploitation" which means that he is responsible for the organization of activities in the household. The survey was therefore conducted with Jean as respondent. Jean is 58 years old and one of the few animists left in the village. Even most of his household members, especially the younger ones, have converted to Islam.

The household of Jean is quite prosperous in comparison to other households in the village. Measured according to the (somewhat outdated) standards of the CMDT (see table 3.1) or the altered classification that O. Sanogo made (Sanogo, forthcoming) this household is well-established in the highest class. Except for the fact that this household is not cultivating cotton anymore (area of cotton cultivated being a criterion in classifications).

Jean is a farmer who likes doing things on his own way. He has distinct views on how to shape the households livelihood and he is regarded as innovative by other farmers. This might also have to do something with the fact that Jean often participates in research, such as in the AfricaNUANCES project. Jean is enthusiastic to participate and he is always first to profit because his home serves as operating basis for Drissa, the research-assistant of IER. Jean has decided to stop with cotton cultivation mainly because of the disappearance of any profit on its cultivation. But also the fact that prices are this low, credit repayments are badly coordinated by the bankrupt AV and CMDT services are diminished strikes him as being unjust. He does not want to cultivate cotton anymore before these injustices are rectified. Jean slightly looks down upon the farmers that do continue to cultivate cotton. And he is one of two farmers classifying the others on basis of their orientation on cotton. The farmers that he classifies as having the same orientation as him are those that have drastically decreased their area of cotton or were not cultivating cotton anyway, in combination with an experimental attitude towards alternative activities. In this group both wealthier farmers and poorer ones are included. In the second class identified by Jean all farmers from large exploitations are included whom, according to Jean, are still oriented on cotton but produce well with regards to their total production. Lastly he puts the farmers together that according to him muddle along; they do as the aforementioned group but do not have the resources and / or management skills to do so well.

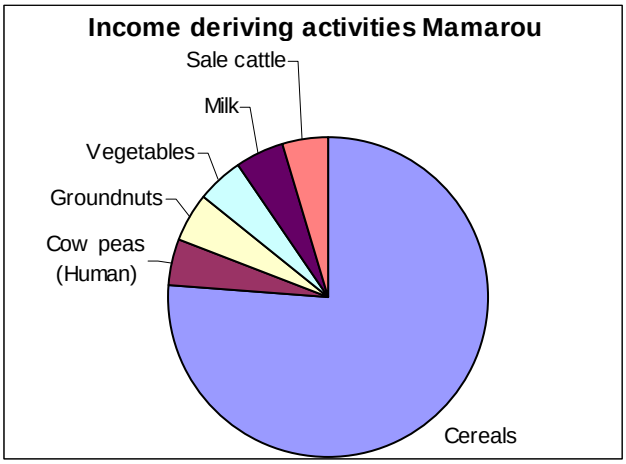
Besides from not cultivating cotton, Jean is not cultivating another commonly grown crop neither; maize. This is because providence of inputs for maize production is directly linked to cotton cultivation (see § 5.2.1). Jean allocates most of the land to millet and sorghum

cultivation, 11 and 6 hectares respectively. On the other 3 hectares he grows mainly fodder crops; 1 hectare of cowpea and 0.75 ha Stylosanthes. One hectare is allocated to groundnuts and 0.25 ha to Sugar peas. These two crops are partly auto-consumed and partly sold. Except for these common fields, several household members also have plots where they grow vegetables. These vegetables are sold on the weekly market of Koutiala.

Jean is very much concerned with the feed situation for the herd. He is aware that grazing area is not sufficient to feed the cattle. To ensure the health of the cattle, he sends the majority of the herd on transhumance during the rain season. His objectives with regards to the herd are to improve their health and their productivity, the latter especially with regards to milk. To reach these objectives he has made some changes in herd management over the last years. In the dry season he now separates lactating cows from the rest of the herd to give them more and higher quality feed supplements. Jean would like to improve the genetic milk producing potential of the cattle. At the moment however he does not see any possibilities for this. Although already cultivating the largest area of fodder crops in the village he plans to cultivate even more next year. Since seed availability for Stylosanthes is low and price is high, he considers replacing Stylosanthes with sorghum varieties suited as fodder.

Most of the household's income is derived from the sales of millet and sorghum. A quarter of total income is derived from 5 other activities. These are the sale of groundnuts, cowpeas, vegetables, milk and cattle. Jean plans to increase area of groundnuts in the coming years to increase income. The profit made on cowpea sales was accidental since instead of a cowpea variety for fodder, he cultivated a variety for human consumption. Sales of vegetables contribute to the total household income as well according to Jean. At last milk and cattle sales make up 5% of total income both.

Graph 6.1



Jean wants to increase income derived from milk sales. To ensure a minimum level of milk production he nowadays keeps some lactating cows in the village during the rain season instead of sending them on transhumance. Last year he participated in a series of feeding trials initiated by O. Sanogo and students for which 2 cows were 'stabilized' in other words; kept in zero-grazing system (Vetois, 2007). Positive results gained with regards to productivity (weight, milk production, growth calf) make Jean willing to repeat such strategy.

Jean is positive about the possibility to increase household income by means of selling milk. But he does not think that it will be through the cooperation that this income will be gained. At the moment Jean does deliver milk to the cooperation, approximately one litre per day, and

going up to 7 litres in the hot dry season. On yearly basis this means that Jean will gain around FCFA 50.000,- from selling milk to the cooperation. But demand of the cooperation is usually smaller then members of the producer-group have to offer and not all milk is consequently sold to them. Surpluses of milk (up to 20 L) are sold in Koutiala to regular clients. These clients, women who process the milk into yoghurt, are supplied by children of the household who transport the milk on bicycles. According to Jean it is no problem to sell milk surpluses in Koutiala. The household members themselves consume around 2 litres of milk per day as well.

Jean compensates for income loss caused by the banishment of cotton and maize, by increasing area of cereals mainly. He says to feel more a crop cultivator than a cattleman, advantages derived from cattle other then connected to crop cultivation (like traction and manure production) he regards as 'extra'. Jean does see the possibilities for extra income derived from milk however and that is also why he participates in the feeding trials (Vetois, 2007). Jean's well-established relations with researchers make it possible to try new strategies without needing to make large investments for them himself. Of course participation costs time but labour in this household is plenty available and Jean likes to exchange thoughts on farming. Also the fact that jean has several regular customers in Koutiala who buy milk shows that he is good in making contacts. Other farmers complain that they cannot find anyone to buy their milk. Jean takes his own path in farming and apparently he is successful; the household's herd has almost doubled in the last 5 years and most other farmers speak highly of him.

2. Nafo

Table 6.3 overview main characteristics household 2 and averages for all respondents on last row.

Family size	labour force	Land in ha	No ploughs	No of cattle	No lact. cow	No ha cotton
48	17	30	5	80	18	9
28	10	27	2.2	29	10	2

This household is run by three brothers of whom Nafo, the eldest is the head. Nafo is also the head of the village, but according to others he is not very interested in this responsibility. Nafo is not much interested in interaction with his co-villagers and the same accounts for interaction with researchers. The surveys are therefore done with his younger brother Ibrahim, who is responsible for daily management of the cattle. Ibrahim is 43 years old and a Muslim, like the other members of this household.

This household is again one of the most prosperous of the village. When measured according to classification of CMDT (see § 3.1) or O. Sanogo (see appendix 3) this household is classified in first class except that labour / land ratio is a bit low.

Nafo is considered by other farmers as taking well care of his herd. He is a big producer and innovative with regards to crop cultivation. He is very much oriented on the cultivation of cotton. This household is concerned with traction; they already have the highest number of ploughs and of draft oxen (22) of the village but this year they will also buy a tractor. This tractor is going to be the first one in the village. Labour availability is a constraint sometimes in this household. They hope that with the tractor they will be able to cultivate all their land on time. They have to pay the tractors in 3 years. Ibrahim and his brothers anticipate on the possibility to rent out the tractor to other farmers. In this way they can gain direct benefits from this large investment.

Ibrahim classifies other farmers on basis of management of the cattle. He differentiates between 3 groups; the first group is taking good care of their cattle with regards to medication

and supplementation. Unfortunately they are forced to send their herds on transhumance because of the shortage of grazing area. The second group you cannot really take seriously; they simply do not have the means to take good care of their cattle. Also they do not have that much cattle. The third group is made up of farmers that do have considerable herds and the means to well keep them but they just do not take the effort to manage their cattle well. Ibrahim classifies his own household and that of Mamarou in the first group.

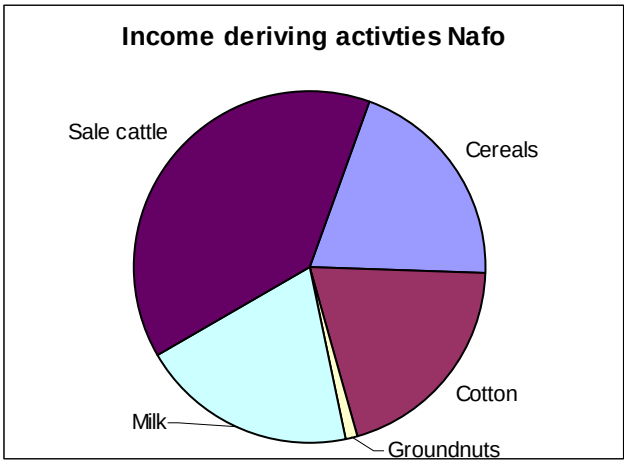
Two thirds of the land of this household is allocated to the cultivation of cereals. Millet is the largest crop; cultivated on 9 hectares, followed by sorghum with 6 hectares and maize with 2 hectares. Another 3 hectares is sown with millet and sorghum but labour was not sufficiently available to maintain these fields well. Cotton is cultivated on 9 hectares. 1 hectare is allocated to groundnuts. Cowpea is grown on 0.5 hectares and Soya is tried for the first time on 0.25 hectare.

Cattle are an important source of income for this household. The sale of heads of cattle contributes almost 40% to total income. This year 4 heads were sold for a total of FCFA 565.000,-. To a large extend however, the revenues were used to pay for expenses made on behave of the cattle like for medication and vaccination of the cattle (year total estimated on FCFA 125.000,-) and supplementation (concentrates bought for FCFA 260.000 this year). Surplus of these revenues were used for household necessities. Although quite a lot of money was spend on concentrates for the cattle already Ibrahim emphasises that he cannot buy sufficient amounts because of the low availability. Although Ibrahim is worried about the feed situation his objective with regards to the herd is expansion. According to him the herd should grow at the same rate as the household.

Milk accounts for approximately 20% of yearly income. Milk that is produced is partly delivered to the cooperation and partly sold in the village. The variability in delivery of milk to the cooperation over the year is large since no cows are kept in the vicinity of the village during the rain season. Milk is also sold however on transhumance. Ibrahim estimates that per day FCFA 500, - to 1000, - is made on milk sales. Although Ibrahim is content with the cattle he would like to have some crossings with exotic milk breeds like Montbeliard. He is not very happy with the cooperation because of the low quantities they purchase.

Cereals are mainly produced for auto-consumption, surpluses are sold. Ibrahim estimates that around 20% of income is derived from sale of cereals. He also expects cotton to make up for 20%. Cotton revenues of last year however are still not remitted by the AV.

Graph 6.2



This household already holds a prominent position in the village because of the fact that Nafo is head of the village. This position will be enforced when they are owner of a tractor as well. The purchase of the tractor will not only diminish problems with labour availability within the household it will also be a direct cash maker because of the possibilities to do paid work for other farmers. Since ownership of a tractor makes the draft oxen more or less redundant, focus with regards to herd management will be more on sales of cattle and on milk production. This household might turn out to be one of the few households for whom cultivation of cotton can be profitable under current prices because especially return on labour will increase due to the tractor. Furthermore this household can afford to make extra investments for cotton cultivation in other farming equipment and in inputs such as fertilizer even when the CMDT does not supply (enough) credit.

3. Issa Traoré

Table 6.4 overview main characteristics household 3 and averages for all respondents on last row.

Family size	labour force	Land in ha	No ploughs	No of cattle	No lact. cow	No ha cotton
10	4	10	1	16	6	0.75
28	10	27	2.2	29	10	2

Issa is an elder man of 69 years old who runs the household together with his son. Together with their wives they are the only adult labourers. They live on a homestead situated between their fields at some distance from the heart of the village. Issa is not originally from Try; he was born in another village near Sikasso but came to this place 28 years ago. On his arrival he took 2 cows with him from the herd of his late father.

According to the CMDT classification (see § 3.1) Issa belongs to the B category. Although Issa has more than 10 heads of cattle, only 3 of these are draft oxen and in order to be listed as category A you need two pairs of draft oxen. Concerning the classification that Sanogo (forthcoming) made (see appendix 3) Issa falls in between the second and the third class. Number of cattle and even of draft oxen would place him in category 2 but availability of labour and number of agricultural equipment place him in class 3.

Cattle are very important for Issa and his main objective with regards to farming is to enlarge his herd. Issa would like to commence a business that fattens old cattle for sale to butchers. He cannot make the necessary investments however needed for such an activity. In former times Issa owned up to 40 animals but due to disease, malnourishment and other misery he has lost most of these. Especially the losses caused by sleeping disease infections were severe. Issa does make expenses for vaccination and medication (around FCFA 10.000 a year) of his cattle but he does not have the financial means to exactly follow all preventive measures as subscribed by extension services. The growing shortage of grazing area worries him, especially now when prices of feed supplements are rising because of the crisis in cotton. Since 6 years now he supplements his cattle during the dry season. As feed supplements for the whole herd he uses his own crop residues. These include mixture of cowpea with maize stover. The lactating cows he supplements with powder made of Nere (*Parkia biglobosa*) fruits and cereal bran. Issa buys some cotton cake at the end of the dry season to supplement the draft oxen before and during the onset of the rain season.

The whole herd stays in the village territory all year and Issa has made a kraal of wood near to his homestead. He is able to keep his cattle near-by because he lives away from the village. This is important for him because he milks his cows twice every day and milk is his main source of income. Every day he produces between 3 and 5 litres of milk. In the dry season he

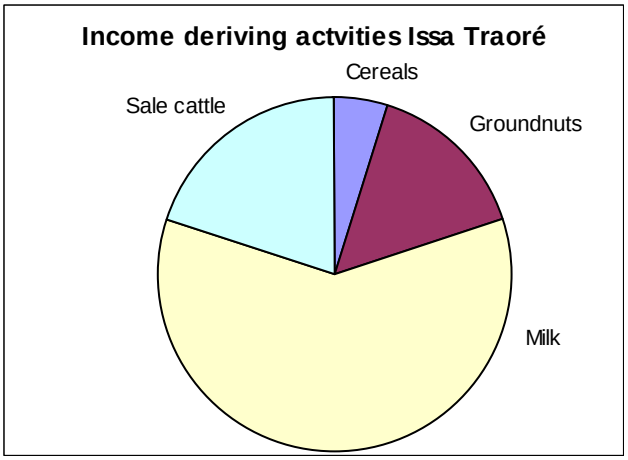
leaves more milk to the calves that are born then, than he does to the calves that are born at the end of the rain season.

Issa was part of the Danaya Nono producer-group of Mancina, a village some 6 km away. He must deliver a minimum of 2 litres of milk everyday. Last month he stopped making deliveries to this group because it is too far away for him. Issa is getting too old to make the daily deliveries on bike and no one else is available to take over. Now Issa sells his milk to one client in a hamlet nearby. Although he gets a higher price (FCFA 200 in stead of 175) he cannot profit from the cooperation's advantages anymore (see box 5.1). Issa earns about FCFA 500,- a day with milk sales.

Issa would like to cultivate more fodder crops but there is not enough labour available to do so. At this moment he does intercrop maize and cowpea on 1.5 hectares. Furthermore he cultivates 3 hectares of millet and sorghum each and 0.5 ha of groundnuts. This year he only cultivates 0.75 ha of cotton. Issa indicates that he only cultivates some cotton in order to receive inputs on credit. No profit is made and last year he says to have even lost FCFA 70.000,- on cotton.

Most income of the household is derived from milk sales (60%). The 20% that is accounted for by cattle sales is the actual sales of one draft oxen this year. Groundnuts make up for a relatively large share of income as well (15%). The cereals that are mainly cultivated for auto-consumption are sold to some extend, which accounts for approximately 20% of total income.

Graph 6.3



Issa's main problem with regards to farming is the insufficiency of labour available in the household. Issa is getting too old to perform certain tasks and his grandchildren are still too young to take over. His eldest grandson does herd the cattle and helps with milking. His son is occupied with crop cultivation. This household is not oriented on cotton cultivation at all. Issa rather sells a draft oxen (as he did this year) than a milk cow. Milk sales are very important for this household, but at this moment Issa emphasises that it is not enough to make a good living. If sales could be doubled (to 10 litres a day) the family could live well. Also the fattening of old cattle seems an interesting option too him. Both milk production and fattening he considers as activities that he could continue doing for some time in future. The investments that are necessary however to increase number of cattle or cattle productivity cannot be made by Issa alone.

4. Fousseny Kané

Table 6.5 overview main characteristics household 4 and averages for all respondents on last row.

Family size	labour force	Land in ha	No ploughs	No of cattle	No lact. cow	No ha cotton
15	7	37	1	6	0	1
28	10	27	2.2	29	10	2

This household is made up of the families of three brothers. Of these brothers Fousseny Kané, with 47 years, is the eldest and head of the household. Decisions he takes together with his two brothers. Fousseny is secretary of the AV of Try 2. This household is also part of the AfricaNUANCES project. They are all Muslims in this household.

Following CMDT classification Fousseny is a category B farmer; he has at least one pair of draft oxen and a plough but less than 10 heads of cattle. Following Sanogo's classification Fousseny, like Issa Traoré is in between the second and third category. With regards to number of cattle, draft oxen and labour force Fousseny belongs to the second category. Considering the labour force / cultivated land in ha ration however or the ratio of land cultivated / land fallow Fousseny falls into the third category.

One of the main objectives of Fousseny is to increase the production of manure. Since inputs (e.g fertilizer) are not as easy available as before because of the crisis in cotton, he is worried about the soil fertility of his fields. To increase manure production he of course needs an increase in number of cattle. The ownership of a larger herd however worries him as well because he advocates that much more labour will be needed to feed the cattle. *"Whereas in former times one could get 5 bags of cottoncake feed per head of cattle* (from CMDT) *now you are happy to receive one bag per head".* According to Fousseny this change is caused by the liberalization of the cottonseed market. Now it is necessary to collect all crop residues and to save the cottoncake for the draft oxen at the beginning of the rain season.

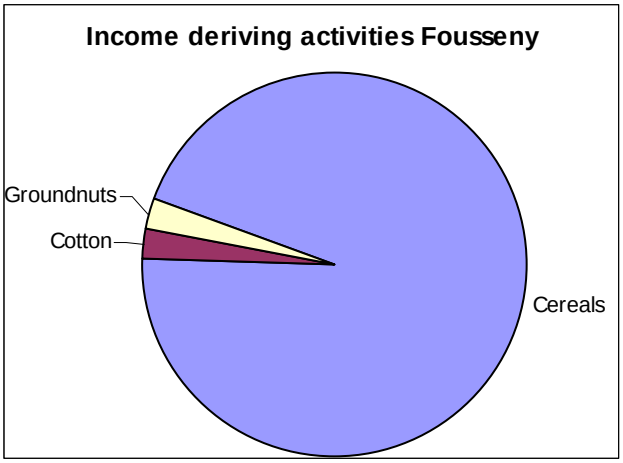
Since Fousseny is secretary of the AV he has access to more information and actualities concerning farming activities than most other farmers. Two times a year he visits meetings with other secretaries and CMDT representatives to discuss prices and market situation of crops (cotton and maize) and inputs. During the growth season of cotton he meets with extension employees every ten days to discuss cotton development. Advices received on cotton cultivation (when to spray pesticides, weed etc.) Fousseny passes on to other members of the AV.

Fousseny has drastically decreased his area of cotton as well. Whereas he used to cultivate at least 4 hectares of cotton, this season he only cultivates 1 hectare. To compensate for cotton he has increased the area of cereals and principally the area of maize. Fousseny now cultivates 5 hectares of maize where he used to cultivate 1 hectare before. For some farmers it can be a problem to obtain inputs for maize cultivation (seed) but because of Fousseny's position as secretary and the associated contact this is no problem for him. Furthermore Fousseny cultivates 5 hectares of sorghum and millet each and 0.75 hectares of groundnuts. Since Fousseny is part of the AfricaNUANCES project he also cultivates 0.5 hectares of cowpea. He says he already cultivated 0.25 ha of cowpea in pure stands years before, because of advice once received through the CMDT. Fousseny has sown sorghum on some more hectares but the crop is not developing well. Of total area of land owned by Fousseny, 37 ha, only about 20 hectares is cultivated. Some 15 hectares have not even been taken into cultivation yet. Fousseny does not have enough labour available in the household to cultivate more land. At this moment Fousseny does not own milk cows. Of 6 head of cattle, he owns 5 draft oxen and 1 heifer. He foresees to produce some milk next year when his heifer has calved. But

quantity will not be enough for some more years to really make a difference to household income.

Household income is derived mostly from the sale of cereals now. Fousseny expects that 70% of total income will come from sale of millet and 15% from sales of both maize and sorghum. Fousseny thinks that he will make a small profit on cotton sales. Groundnuts account for some percentages of income as well.

Graph 6.4



Fousseny is focussing on cultivation of cereals to compensate for cotton. He is not looking for alternative strategies to increase income. Because of his position as secretary of the AV he is first in line to receive advice on crop cultivation and be informed about market conditions. He can profit from this in decision-making about land allocation. In future Fousseny hopes to enlarge his herd. It is for this reason that he has bought a first heifer next to his 5 draft oxen. Also when the household's children grow up, he thinks that they will take more land into cultivation in order to increase total crop production.

Conclusion

The households that were part of the survey were no homogeneous group and the paths that they aspire to follow in the near and distant future are neither. Some factors influencing and shaping theses paths however are alike for all households' namely external factors such as: market conditions for cotton, milk and other crops, transport possibilities and credit facilities. Depending on their current situation and aspirations for further trajectories farmers respond differently to these factors, actively shaping them to fit their purposes. It seems as if paths of different households are diverging more than before. Whereas before or at least as categorized by the CMDT, farmers their cotton cultivating potential was most important, now more farmers deliberately choose for other livelihood strategies. It is not self-evident anymore that successful farmers are oriented on cotton cultivation as is demonstrated by the household of Mamarou. Issa is another example of a farmer that is deviating from the cotton trajectory; he is specialising in cattle rearing and specifically on milk production. His particular situation however is precarious; he needs to sell assets (one of his 4 draft oxen) in order to get by, which is not very sustainable. Furthermore he is old but his labour cannot be missed before some of his grandchildren mature. These circumstances make Issa and his household vulnerable to risks. Nafo on the other hand has quite a sustainable farm business; labour is plenty available and his income is coming both from cattle and crops in relatively equal

shares. Nafo's household is the kind of household that you envision is liked best by the CMDT extension officers because of its possibilities to make investment in cotton cultivation qua capital and labour. Fousseny, as secretary of the Try 2 AV very much involved in CMDT is, is much more average when it comes to his farming system and cotton cultivation. He does not have a lot of cattle, but for what he does; cultivating crops for self consumption and selling surpluses, he is quite sustainable. If cotton prices would go up he is likely, if not confronted with calamity, to enlarge the basis of his farm, through intensification especially in a few years when his elder children can fully be relied on for labour.

The four farmers that are out lighted in this chapter are all farmers that are working on the basis of their farm as described in § 2.1. to improve their livelihoods. Although I have chosen these four farmers because they are representative for farmers in the survey they do not represent all farmers in the survey. Some farmers in the survey for instance are much more concerned with their non-farming activities because this is where they generate most of their income. One of those farmers is Many from N'Goukan who derives the largest share of his income from the small village shop he is exploiting. What is common for most of the farmers in the survey is that they all seem to find their way. This does not mean that this way is necessarily the fastest or best way to achieve improvement of livelihood. Many households would benefit for example from enlarged credit possibilities and improved availability of inputs as fodder crop seeds and feed concentrates. Not to mention the blessing that market protection for nationally produced milk or discard of cotton subsidies elsewhere in the world would mean. But there are also farmers in the research villages, and even in the sample (like Yenizanga, Yelemeque and Apollinaire of N'Goukan), that would not really be affected by such chance because they do not or hardly own any cattle and produce only or mainly for auto-consumption. These are the really poor farmers; often poor with regards to assets & capital and to labour. These farmers are characterized by their co-villagers as *'muddling along'* (Mamarou) or *'not mastering cultivation techniques'* (Soumaila) and *'Not serious'* (Nafo)[4]. Ten years ago Nikiema (1999), who did research in N'Goukan and Try as well, already noticed that there is a tendency that rich farmers get richer and poor farmer poorer. One wonders what the future of these poor farmers looks like and if it will be in farming. Still the future of these farmers is not necessarily in off-farm employment, as also Hilhorst and Reij (2004) remark: it is often the wealthiest households who are best placed to develop new, profitable activities. It seems that without any support or offering of opportunities to these farmers, they have no other choice than continue to 'muddling along' or to migrate.

[4] Citations derived from second survey N'Goukan

Discussion and Conclusions

First I will give an overview of main conclusions of this study per question, taking questions 2-4 together again. I will continue by elaborating on the milk sector and by giving my view on the extent to which Malian farmers are integrated in global networks. I will conclude with some reflections.

The main research question is:
"What strategies do farmers follow to improve their livelihood in the Koutiala region in Southern Mali within the context of globalization and what role does milk production possibly play in this?"

1. The first question is: *Which local, national and global developments lead to the current general agricultural practice?*

The developments in Southern Mali with regards to agriculture, as described in chapter 4, have led to a present practice that is characterised by the cultivation of cereals for auto-consumption and sales and cotton for income generation. Recently however cotton production is decreasing because of low returns due to low world market prices. Animal traction is the main technology used and livestock plays various important roles in the farm system. The main bottlenecks in present agricultural practise in Koutiala zone are 1) The limited carrying capacity of the area with regards to cattle, 2) The overall orientation of agricultural organization and facilities on cotton.

1) Grazing area in the Koutiala zone is not sufficient anymore to sustain all cattle. This is due to a large increase in number of cattle and expansion of the land that is taken into permanent cultivation over the last decades. One of the push factors behind these two developments has been the cultivation of cotton that was first promoted under French rule. Now that farmers cannot rely on grazing only to maintain their herds they are obligated to provide for other feed and move towards zero-grazing systems. Examples of other possible feeds are: cottoncake based concentrates, cowpea, and groundnut foliage. All alternative feeds however imply an investment in either time and land or money or all together. This means that costs of cattle keeping are going up.

2) Extension service, credit facilities for inputs, main organization with regards to agriculture on village level (AVs); al these things are directed at and organized around cotton cultivation. The cultivation of cotton is embedded in a whole system which provides knowledge and support to farmers. The last years however, due to low world market prices, bad management and external pressure to liberalize, this system has fallen apart bit by bit. Moreover prices to farmers, are at their lowest ever with only 160 FCFA per kg of seedcotton, making profit margins dissolve. It is no wonder farmers in the whole of Mali have decreased their area of cotton lately. In season 2007/2008 only 303.000 tons of cotton were produced in Mali just a bit more than half of the 565.000 tons production in 2004/2005 (OECD, 2008). Switching to other crops or agricultural activities to generate cash income is not that easy however. No support systems (with the exception of some local projects of NGOs) exist for farmers turning to other crops as soya and sesame or increasing area of cereals. As a result it is difficult for farmers to obtain inputs necessary for successful cultivation. Since credit facilities apart from cotton, are nearly non-existing only the very wealthy households (which form a very small

group, although household size is often large) can make investments in other income-generating activities.

2. The second question is: *What strategies do farmers create and follow to improve their livelihoods within the context of globalization?*
3. The third question is: *Which farm household characteristics determine the kind of strategy that is followed?*
4. The fourth question is: *What are the main constraints, on different scale levels, that farmers encounter in pursuing their specific livelihood strategies?*

Farmers mainly follow strategies that could be described as intensification and diversification strategies. As alternative to cotton they especially focus on deepening activities that already exist like cereal cultivation and milk production. This deepening consists of expansion of the production and increased focus on sales opportunities.

The possibility to follow capital-led paths of intensification or diversification is only reserved for farmers who belong to the resource-richer farmers. The position of a household, e.g. wealthy or poor, can to a large extent be derived from four resources: 1) size of labour force; 2) ownership of agricultural equipment; 3) number of draft oxen and 4) size of herd. In general counts; the higher the numbers of these four resources, the wealthier is the household. Farmers themselves mention management and resources (mainly labour availability and size of herd) as most important in determining success in farming. Resource-poor farmers are obliged to focus on cereal cultivation in order to secure food availability through the year.

The main constraints within the household that keep farmers from engaging in specific activities are shortages in labour and in capital. External constraints are mainly the price-levels of inputs and outputs. Constraints mentioned are worsened by the bad state of roads which increase transaction costs of transport. In short; prices of inputs are often that high farmers cannot purchase any inputs or not enough. When they can purchase inputs, they do not get a return which is worthwhile because of the low prices for output.

5. The fifth question is: *To what extent is milk production of interest for farmers?*

Milk production is currently only an option for farmers that are falling in the richer categories e.g. have more resources. Logically the ownership of cows is essential to produce milk. With regard to milk sales it would be most favourable for farmers if demand of milk cooperation Danaya Nono could be increased. Now many farmers produce less than their potential production because Danaya Nono cannot purchase more. Of course some farmers look for other ways to sell their milk; directly to customers in the village or in Koutiala city for example. This is quite labour intensive however and not all households can afford to spend labour on such activity. In Try some farmers found another solution; the woman Chatou Dembelé who collects the milk herself in Try and pays a fair price as well. For now she can also purchase all milk produced by the 5 farmers participating. She however cannot provide the farmers with some benefits which the cooperation potentially can. Namely; investing in ways to increase milk production per cow and stabilize production throughout the year.

Although many milk-producing farmers complained about the low purchase power of the cooperation and the problems that the limited carrying capacity of the grazing ground poses, they are content to be producing milk. Often milk is regarded as an extra advantage of the cattle which they are keeping anyway. Some farmers are more serious towards milk production. In general the group of milk-producers can be divided into 3 groups: 1) the resource-rich farmers who consider milk production as a nice extra, 2) The resource-rich

producers that consider milk production as an potential activity to considerable increase income and 3) the farmers that are medium-rich and put their stakes at milk production as core income-generating activity. It is a thin line between farmers of group 1 and 2 since it is only a matter of interests of a farmer what distinguishes them, and interests can change quickly. However it is group 2 and 3 that are likely to make investments in milk production. Farmers from these groups are for example Mamarou (2) and Issa Traoré (3). Especially for farmers as Issa Traoré, with a small herd but very much concentrated on milk production, permanent housing and zero-grazing strategy ('stabilisation') is very interesting. This strategy implies that even with a small herd considerable quantities of milk can be produced and consequent income can be generated. The investments needed however are unlikely to be made if not some form of support or credit is granted to these farmers.

Stimulating milk production of farmers that already own cows seems most wise from an economic point of view. Gaps however between richest and poorest farmers in a village are getting bigger. The richest farmers in a village continually expand their herds and invest in purchase of tractors and real estate, while the poorest farmers continue to 'muddle along'. Support with milk production to the currently largest producers is likely to increase this gap.

Milk sector

Both CIDR reports (2007) and the director of Danaya Nono pinpoint the cotton crisis and consequent decreasing purchasing power of inhabitants of Koutiala as cause of diminishing demand for milk in the last year. In 2007 the net result of the cooperation was – 5% (CIDR report, 2007). This does not leave the cooperation much space to make extra investments in production or processing. Still these investments are essential if milk production is to become more than an activity on the side for a minority of farmers. Except for the general decrease in demand for locally produced milk which is ascribed to the cotton crisis, competition with dairy products made from imported milk-powder is severe. In 2004 dry whole cow milk (milk-powder) was the third largest import product in value of Mali (FAO statistics).

In order for the milk sector to develop into a healthy sector protection against these imports is necessary. Voices in Mali to implement such protection are becoming stronger; In May 2007 peasant organizations AOPP and CNOP formulated a declaration in which they urge the government to protect the regional economic space through a really protective external tariff. Such an external tariff would be one of the elements of the Economic Partnership Agreement (EPA) between the EU and West Africa (ECOWAS). The idea is that the whole ECOWAS region will have a Common External Tariff (CET) for different categories of import from the EU. Aim of EPA is to open markets and to create free-trade areas and promote economic development and reduction of poverty at the same time. For the Least Developed Countries (LDCs) of ECOWAS (which includes Mali) special conditions apply. One of these conditions is the possibility to extra protect 'sensitive products or sectors' against EU imports. One of the sectors defined as 'sensitive' in Mali is the local milk / dairy sector. If tariffs on milk products would be increased this could be a great stimulus for the national milk sector. No chord on the desirability of such tariff is reached within Mali however. Since national milk production is far away from being sufficient to cover national demand, increase of tariffs on milk import would lead to price-increases which directly affect the consumer. Anyway, negotiations about the EPA are still ongoing and some more time will probably pass before possible tariffs are implemented. But the outcome of these negotiations will have its effects on domestic milk prices and thus on national milk production.

As said most dairy imported in Mali is milk-powder which is directly sold as such or further processed into all kinds of dairy products. One dairy product that cannot be made from milk

powder is cheese. Since cheese production in Mali is almost zero, all demand is fulfilled by imports (from almost exclusively the EU). In 2004 cheese ranked 14th on the list of most valuable import products of Mali (FAO statistics). Because of the high transport costs, prices for cheese are much higher in Mali than in Europe, and also very high in comparison to prices of other dairy products. Demand for cheese is concentrated in Bamako and customers are mainly hotels and restaurants. To private-persons cheese is mainly marketed through the few large supermarkets present in Bamako. Such a conveniently arranged market seems easy to penetrate for nationally produced cheese. For all these reasons it is plausible that Danaya Nono Koutiala is trying to sell cheese in Bamako. I strongly believe that sale of cheese made from national produced milk is potentially very successful because margin is considerably higher. But quality, above everything, of the cheese should be high and guaranteed. Wiskerke (2007) suggests that the anchoring of a product within a specific region can lead to increased valuation of the product. This means that the product (e.g. the cheese) should not be produced and presented as a cheap substitute for European cheese but rather as region-specific delicacy. Danaya Nono cannot succeed in delivering high quality cheese in higher volumes however if no investments in processing facilities of the factory, education of employees and regulation of the milk supply is made.

In short; as long as farmers do not get access to finance opportunities to invest in their milk production, and demand is not guaranteed by Danaya Nono or any other player in the field, milk production will never be more than a minor activity. And national consumption of dairy products will remain being dominated by European originating milk-powder based products and cheese if the national market is not protected to some degree.

Integration into global networks

With regards to cotton, farmers are directly affected by world market price since that is what they get for their seedcotton nowadays (whereas before the CMDT based purchase price on production costs). They also pay world market prices for inputs as fertilizer and pesticides. Unfortunately for Malian farmers the price they pay for their inputs is much higher than cotton cultivators elsewhere pay. This is because of absence of input producing factories near-by and the high transport costs due to bad infrastructure. Subsidies given on cotton in especially the United States depress world market prices for cotton. Organizations as WTO, World Bank, IMF and EU at the same time pressure Mali to stop protection of the cotton sector resulting in direct exposure of farmers to these depressed prices.

Not only farmers are hit by depressed cotton prices. The consequent diminishing of production has its influence on many more sectors of Malian economy like the ginning and transport industry. Especially in centres of cotton collection and processing like Koutiala, unemployment rates have increased. The decreased purchase power of citizens on its turn depresses sales of other (luxury) goods like milk, affecting farmers again. The government is also affected; in the last decades cotton has been a large contributor to GDP. The decrease in economic activity and export of cotton affects government budgets.

With regards to the milk sector Mali is very much integrated in the world market as place to dump subsidized dairy products from mainly the EU. Arguing in line with Wallerstein's (1976) statements about 'the systematic transfer of surplus from periphery to core' I can add that this transfer is answered by a transfer of surplus production from core to periphery nowadays. No capital seems to be available to invest in the national milk production and dairy processing however.

One wonders what advantages Mali gained from opening its markets and liberalizing its policies. The participation in SAPs has ensured the continuation of budget payments and loans of among others the World Bank but did it also increase FDI in Mali? Peasant organization AOPP and CNOP bitterly state in their declaration against the Economic Partnership Agreement (2007) that they are *"Conscious of the falseness of the assumption according to which an increased liberalization and openness would attract foreign investment (particularly from Europe) to ensure West Africa's development. The results of the Structural Adjustment Programmes (SAPs) are there to demonstrate it."* If this statement is really true, and it looks like it, the Malian government has built her policies on false pretences. The ongoing liberalization of its policies does not lead to increased integration of farmers in global networks other than as passive price taker. The integration of farmers in the world market and other global networks is patchy to many extends and uneven in all regards, to say the least. The power that Malian state has to shape policies of organizations as the World Bank is negligible. It does only strike one as strange and unjust that Malian government is forced through financial blackmail to adopt policies that are not in their interest.

In stead of aiming at a full integration of farmers in global networks, the being part of improved regional networks could also increase farmers welfare. The idea is that through creating regional networks of public and private actors and anchoring production in place e.g. a region, social and territorial capital are put to use and processes as described by Wiskerke (2007) (see § 2.3) are countered and economic activity is stimulated (Wiskerke 2007).

Milk seems a product which could potentially be a driving force behind such regional development. This accounts then for the milk that is produced by local smallholder farmers and processed & sold by Danaya Nono or a similar organization in contrast to milk that is sold directly from producer to consumer. In some respects Danaya Nono is countering these processes of disconnection, detachment and untwining (Wiskerke 2007) already. Examples of this are: The organization of farmers in milk producer-groups at village level in similar ways as the now languishing AVs and the provision of extension, feed supplements and medical care to farmers and their cattle (intertwining of activities in chain). By doing this Danaya Nono is not only stimulating economic activity in the region but also filling parts of the gap on regional level that was created by the cotton crisis and privatization of the CMDT and preceding disposal of its non-commercial activities. Although Danaya Nono (at least at this moment) does not have the potential to completely fill the gap left by CMDT they can play an important role in improving farmers livelihoods and increasing economic stability of the region at the same time. Important precondition for this are that the milk sector is protected in some way against imports for it to be able to develop and that capital is invested by government, NGO's or companies wanting to realize their corporate social responsibility.

For the farmers of N'Goukan and Try but also for other people living in the Koutiala zone or even Southern Mali to improve their livelihoods and to increase the array of choices they have, integration into (social and economic) networks and enforcement of these networks on different scale level is desirable.

Reflections

At the moment research was done and respondents were interviewed every household had its specific characteristics: to have or have not a pair of draft oxen, a lactating cow, a favourable labour / land ratio etc. The paths that farmers subsequently follow and pave as they go along are a continuation of the characteristics and circumstances at this moment. This moment however; the situation as experienced during fieldwork is a random point in time for all

parties involved except for the researcher. Still I take this moment as departure point for my analysis. It seems to me that during the period of field work, livelihoods were very dynamic, opposite to the time previous to fieldwork in which livelihoods seem to slowly evolve the most. This feeling of mine about the contrast between current (and possible future) dynamic nature of livelihoods and broader structures and forces and the slow nothing-much happening feeling about the past is a direct consequence of the flaw in my study to historic matters. Because reasonably thinking livelihoods have been and probably always will be as dynamic as they were during my fieldwork in the villages. I regret not having asked more questions about past events that were of (great) influence on current state of livelihood in order to better understand how they reached their current state.

It would have been especially interesting to investigate further the reactions on and remainders of earlier projects in the villages, because there have been so many. These were projects of CMDT, IER, WUR, SNV and KIT to list some, often working in combinations of two or three organizations. I got the feeling that other researchers, project-managers etc. do the same as me; they fall short when it comes to knowledge about past developments that shaped current situations. They act somehow as if the villages / households / farmers have no past. With regards to technical innovations, solutions etc. they do refer to former research and projects but seldom to in what extend these projects have influenced or changed livelihoods after the duration of the specific project. For instance the integration of (leguminous) fodder crops on farming practice of Sahel farmers (rational explained in § 3.1) has been advocated by scientists since 1948 (Landais & Lhoste, 1990). Even in N'Goukan and Try itself projects associated with this integration have been implemented for at least 20 years (Leloup, 1989; Sidibe S.I., year unknown; Dembélé, 1995). There is no record however (or at least I could not find any such record) of the success rate of these projects and /or about possible constraints and limitations. One of the problems in this case is also the poor and scattered storage of documentation of local projects in Mali off course. But anyway it seems that theoretical sound technological solutions to a problem are implemented time after time without proper investigation to the reasons why earlier attempts failed. To me this seems a waste of money and effort. Although it is positive that farmers in N'Goukan and Try are part (as subject) of global scientific discourses and developmental networks, I think that they would profit much more from this when researchers and other workers of new projects would pay more attention to the preconditions needed for project success. I therefore advocate that these preconditions are unveiled before onset of future projects through technological and socio-economic research. Diawara (2000) makes a similar point and adds that local knowledge is a significant factor and that success or failure of many projects is depending on its understanding. The same accounts for future efforts in improved production, marketing and valorisation of milk. If milk production is really to become an alternative strategy for farmers, infrastructural and support facilities are needed that complement farmers' capacities and activities. Concluding I would like to quote a Bamana saying that I imagine the farmers that were part of my survey would say after listening to all this *"Our ears have heard enough; now our throats need a drop of water".*

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Appendix 1 Respondents

Village: N'Goukan

	Household Head	Respondent of household	Part of AfricaNUANCES?
1	Mamarou Dembelé	Jean	ja
2	Seydou Dembelé	Brehmen	nee
3	Soumaila Dembelé	Yoessoef	ja
4	Niquitan Dembelé	Laydin	ja
5	Marc Dembelé	Marc	ja
6	Alou Dembelé	Alou	nee
7	Fatié Dembelé	Madou	ja
8	Many Dembelé	Many	ja
9	Madou Dembelé	Bazoumana	nee
10	Yenizanga Dembelé	Amidou	nee
11	Mequetan Dembelé	Lasine	nee
12	Yelimeque Dembelé	Soumaila	ja
13	Solo Adama Dembelé	Solo Adama	nee
14	Apollinaire Dembelé	Apollinaire	ja
15	Nafo Dembelé	Ibrahim	nee

Village: Try

	Household Head	Respondent of household	Part of AfricaNUANCES?
1	Mama Konaté	Khalifa	ja
2	Tidjani Konaté	Karamogo	nee
3	Dahmani Saliah Coulibaly	Dahmani	ja
4	Drissa Bengaly	Drissa	ja
5	Brahman Coulibaly	Drahman	nee
6	Oumar Sidiké Coulibaly	Seydou	nee
7	Issa Traoré	Issa	nee
8	Gnismé Seydou Coulibaly	Salif	nee
9	Fousseny Kané	Fousseny	ja
10	Fassidiky Coulibaly	Fassidiky	nee
11	Yagony Bakary Coulibaly	Yagony	nee
12	Noumantou Konaté	Brehmen	nee
13	Embouraze Konaté	Abdullah	nee
14	Badjiri Coulibaly	Abdullah	ja
15	Tiemoka D'jon Coulibaly	Karim	nee

Other respondents

1	Name	Function	Place
2	Idrissa Diabaté	Director Groupe Interet Economique	Bamako
3	Drissa Sanogo	Research assistent N'Goukan	Koutiala
4	Ely Togo	Director Danaya Nono Koutiala	Koutiala
5	Nasser Bhakary	Veterinary Danaya Nono Koutiala	Koutiala
5	Ousmane Sanogo	PhD-student WUR and IER	Sikasso / Wageningen
6	Alou Dembelé	Secretary producer-group N'Goukan	N'Goukan
7	Drissa Dembelé	Secretary AV N'Goukan	N'Goukan
8	Fousseny Kané	Secretary AV Try 2	Try
9	Chatou Dembelé	Milk sales of farmers in Try	Hameaux Traoré (Try)
10	Sadou Sanogo	Village head and dairy farmer	Kaniko

Appendix 2 Copy of survey

Enquête sur le cadre de production du lait à Try, cercle de Koutiala

I. GENERAL (chef de famille ou chef d'exploitation)

1. Date et place
2. Nom
3. Age
4. Ethnicité
5. Religion
6. Taille de la famille (avec nombre de ménages)
7. Est-ce que les membres eu leurs activité individuelles ou c'est le chef d'exploitation qui contrôle tout les activités des membres ?

II. RESSOURCES (chef de famille ou chef d'exploitation)

1. Nombre des personnes de l'exploitation travaillant en plein temps (h + f)
2. Superficie possédée (ha)
3. Nombre des bovins (total)
4. Nombre de bœuf labour
5. Nombre des vaches laitières
6. Nombre de charrues
7. Moyen transports (par ordre d'importance)
8. Est-ce qu'il y a un lieu de garde des animaux (parc) ?
9. Quelque chose pour stockage du fourrage ?
10. Nombre d'adulte travaillant hors localité et envoyant de fond a la famille

III. BOVINS (chef de famille ou chef d'exploitation)

1. Quand vous avez pris la première vache laitière ?
1.b Comment la décision pour prendre de bœuf est fait ? (par qui et comment ?)
2. Est-ce que vous voulez énumérer toutes les raisons de prendre des bœufs par ordre de l'importance ?
2.b Qu'est ce que est le nombre de bœuf labour par hectare optimal ?
3. Est-ce que vous avez des intentions d'étendre le nombre de vaches laitières les prochaines années ? Pourquoi ?
4. À quelle façon vous élevez des vaches laitières pendant l'année ? (en rapport d'alimentation, stabilisation, médicaments, insémination) (Par période)
5. Est-ce que cette façon a changé pendant les années vous avez élevé des vaches laitières ? Comment ? OUI ? → question 6 NON ? → question 7
6. Pourquoi vous avez changé la façon d'élevage des vaches ?
6.b Comment les décisions concerné les bœufs et ses élevage sont pris ?
7. Combien de litres du lait donnes vos vaches par journée en moyenne ?
8. Combien de litres vous produisez en total par journée ?
9. Quelles races des vaches vous avez ?
10. Qu'est ce que est l'origine de vos vaches ?
11. Est-ce que vous êtes content avec ces races ? Pourquoi non / oui ?
12. Quels problèmes vous rencontrez par rapport d'élevage des vaches laitières ?
13. Qu'est-ce que vous voudriez changés en domaine des vaches et ses élevages ?

IV. LA VENTE DU LAIT

1. Quelle parti du lait est auto consumé et quelle parti est destiné pour la vente ?
1b. Est-ce que vous achetez aussi du lait quelquefois pour la consommation ?
1c. C'est quelles membres de famille en général qui consomme du lait ?
2. Est-ce que vous êtes membre d'une coopération du lait ? OUI → question 3 + 4 NON → question 5.
3. Comment fonctionne la coopération ?
4. Est-ce que vous êtes content avec le fonctionnement de la coopération ? Pourquoi oui / non ?
5. Combien gagnez-vous par journée à la vente du lait normalement ?
6. Est-ce que vous pouvez vendre toute la quantité du lait qui vous voulez vendre ?
7. Où vendez-vous du lait ?

8. Qu'est-ce que est le pris du lait ? (par débouche, par période)
9. Est-ce que vous pensez que ce prix est raisonnable ? pourquoi oui / non ?
10. Combien pourcent fait du lait de vos revenues total ?
11. Qu'est ce que sont des problèmes vous rencontrez par rapport de vente du lait ?

V. PRODUCTION TOTAL

1. Quels cultures vous cultivez ? (par ordre d'importance) avec nombre d'hectares
2. Quels sont vos sources de revenue principale ? (par ordre d'importance)
3. Est-ce que vous cultivez aussi du fourrage ? OUI ? → quoi et combien de ha ? NON ? → pourquoi ?
3b. Comment le stockage du fourrage marche ?
4. Est-ce que le pourcentage du coton de vos revenues total est changé pendant les dernière décade ? Comment ? OUI ? → question 5
5. Pourquoi c'est changé ?
6. Est-ce que vous pensez que le production du lait peut vous offre une opportunité de augmenter vos revenues dans l'avenir ? pourquoi ?
7. Est-ce que vous avez encore de remarques par rapport de quelque chose ?

Appendix 3 Classification O. Sanogo (2009)

Classes		nombre d'UBT (nombre)	bœufs de labour (nombre)	équipement agricole (nombre)	nombre d'actifs (nombre)	ratio actifs/ terre cultivée (actif ha-1)	ratio surface cultivée/jachère -	surface du coton (%)	surface du maïs (%)	surface des céréales (%)	autosuffisance alimentaire (oui/non)
1	Moyenne	38,4	6,2	7,4	17,7	1,0	4,6	41,4	6,9	52,3	oui
	N	56	56	56	56	56	56	56	56	56	56
	Std. Déviation	16,2	1,9	1,8	5,6	0,2	58,5	9,5	5,5	9,7	0,5
2	Moyenne	11,5	3,4	4,6	9,3	0,8	3,3	36,5	7,2	56,7	oui
	N	240	240	240	240	240	240	240	240	240	240
	Std. Déviation	7,6	1,2	1,2	4,5	0,3	16,8	9,1	5,6	9,6	0,4
3	Moyenne	1,7	0,6	1,4	3,2	0,7	0,4	16,5	2,2	75,1	oui
	N	30	30	30	30	30	30	30	30	30	30
	Std. Déviation	1,6	0,8	1,2	0,9	0,3	2,5	15,0	3,8	14,2	0,4
4	Moyenne	0,8	0,1	0,3	2,9	1,4	1,4	2,3	3,0	86,9	non
	N	26	26	26	26	26	26	26	26	26	26
	Std. Déviation	0,8	0,3	0,5	1,0	0,9	3,5	6,5	7,3	18,3	0,4
Valeur P		**<0,001**	**<0,001**	**<0,001**	**<0,001**	**<0,001**	**0,902**	**<0,001**	**<0,001**	**<0,001**	**<0,001**
Signification		**S**	**S**	**S**	**S**	**S**	**NS**	**S**	**S**	**S**	**S**