Labour organisation, commercial income and distribution in arid areas

A study case at Tatki (in the Senegalese Sahel)

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Abstract

The specificities of the Senegalese pastoral context (mobility, non-equilibrium environment, informal exchanges and scarcity of the resources) required a device of data collecting adapted. The investigations allowed identifying the labour inside pastoral families organised to save the productive potential through sometimes the wage-labour. The site of Tatki has relatively high wage-labour rate (35%) whereas the average in Ferlo is of 25%. This labour organisation makes it possible to the herders of Tatki to have some ruminants to exchange them on the markets in a limited and punctual way. The main motivation for selling livestock and animal products often consists in releasing money holdings that would allow the pastors to cover their usual expenses and to ensure their food safety. The receipts gained on the markets resulted however on an uneven distribution between the encampments of Tatki (Gini index: 55.8%). Like many sites of Ferlo (Senegalese Sahel), the inequalities at Tatki remain very high in comparison with national situation.

Key words: Sahel, Senegal, pastoralism, wage-labour, money holdings, inequalities

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Introduction

In Senegal, pastoralism has been recognized as a mode of valorisation of rural areas and natural resources lately in 2004 (Ministry for Agriculture, Livestock Farming and Hydraulics of Senegal, 2004; LOASP, 2004[1]). A constant axis of the national livestock policy lay on local meat and milk supplies to big urban centres. This is expressed through the willingness of the authorities to control the Ferlo Fulani herders' sales process. However, this thought has been driven out of an updated knowledge of realities in terms of family production organization and money holdings they achieve through the markets.

The economic role of pastoralism in arid areas still today is insufficiently documented. This paper aims at partially filling in that gap. Its interest would be to inform about the ability of these populations to organize themselves to maintain their productive potential ; to generate money holdings ; to provide an insight into their objectives (food safety?), actions, behaviours and constraints vis-à-vis the markets.

We consider the pastoral economy as a process which is also realised inside the market. This analysis of the commercial incomes of the Ferlo herders takes into account the uniqueness of their link to the markets. It reveals their sensitiveness towards the opportunities of the markets with the conviction that the durability of the pastoral activity is not only reliant on money holdings. It develops a certain form of contingent rationality from the herders.

This Paper is organized in three points. Firstly, it describes the method of data collecting in Senegalese extensive livestock. The second point presents three types of results: first, pastoral family organization and wage-labour to maintain productive potential; then, monetary profits carried out by the pastors through the markets; and finally, the quality of the commercial income distribution. The third point discusses the results obtained and indicates subjacent logics of the link to the market and the transformation of pastoral activities traditionally dominated by familial workforce. The site of study is the drilling of Tatki, in the most arid zone of Ferlo (under 300 mm rain yearly).

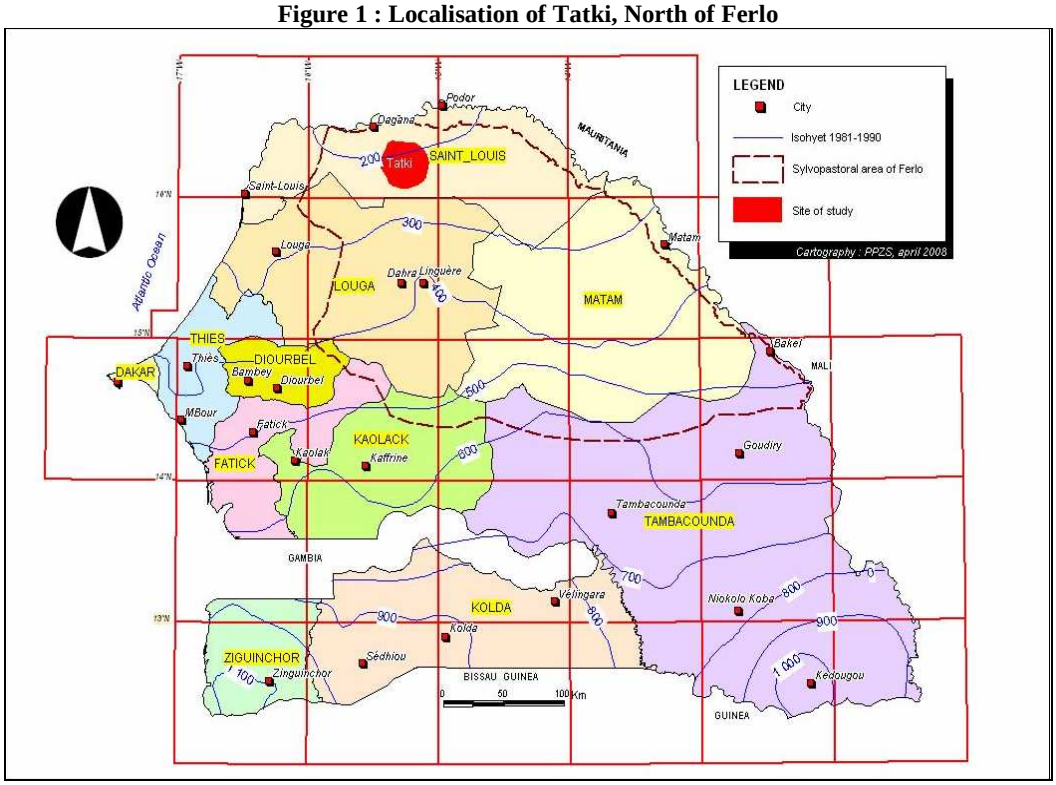
I Methods

Ferlo is about 67 610 km² wide, (PPZS, 2004), meaning nearly a third of the national territory. It is delimited by the northern valley of the river Senegal and south by the peanut basin. Rain is concentrated on 2 to 3 months between July and October with an annual

[1] Article 44 of the Agro-Sylvopastoral Guideline Law in Senegal (in French: Loi d'Orientation Agro Sylvo Pastorale) which was negotiated and passed by parliament in June 2004 spelling out action for the next 20 years

average lower than 200 mm in the extreme North and higher than 550 mm in the South (Figure 1). The index of dryness (Is = P/ETP) in Linguère, middle of the Ferlo lays between 0,18 and 0,22 over the period 1961-1996, placing Ferlo among the arid areas according to the classification of UNESCO (Ndione, 2002).

Figure 1 : Localisation of Tatki, North of Ferlo



Sources: PPZS, 2008

The economic activities in Ferlo are deeply constrained by the environmental conditions. The site of Tatki was selected because of its aridity. It is primarily pastoral and is located at the North of Ferlo. Since the 1970s, the dynamics of the landscapes and utilization of the land are marked by a regression of 70% of the areas of cultures, a contraction of the plant setting along the shoal and fossil valleys. (Touré *et al*, 2003).

The study carried out in Tatki was based on a device of data acquisition adapted to mobile populations (Wane *et al*, 2007). This approach falls under the methodology aiming at analyzing pastoralism as a economic contribution to the formation of national wealth, to study with rigorous statistical tools (Hatfield and Davis, 2006),

The economic survey related to the sales of the Sahelian area's herders between the 2005 and the 2006 rain season. It investigated 64 encampments in Tatki among 105 encampments geo-referenced by GPS (Total Positioning System) in the area of influence of the drilling. From drilling, as structuring element of the activity and location of the herders, the encampments were identified with the help of a guide. They were then classified in four main categories: "very large livestock farming", "large livestock farming", "average livestock farming" or

"small livestock farming". These categories are elaborated according to the perceived importance of the livestock farming and were qualified using criteria validated by a panel of local herders. This led to a sample statistically representative and weighted according to the importance of the livestock farming of the encampments. The interviewees of the surveys were the heads of household. The data obtained were aggregated in each encampment.

A similar method was used at the end of 2006 to investigate on wage-labour as a marker of change in pastoral practices. Seventeen encampments near Tatki were visited to determine width, motivations, forms and effects of wage-labour, and study the processes and dynamics of wage-labour.

II Main Results

Both studies resulted to the comprehension of the pastoral productive organization notably through wage-labour, the determination and distribution of the money holdings obtained from the sales made by herders in the markets.

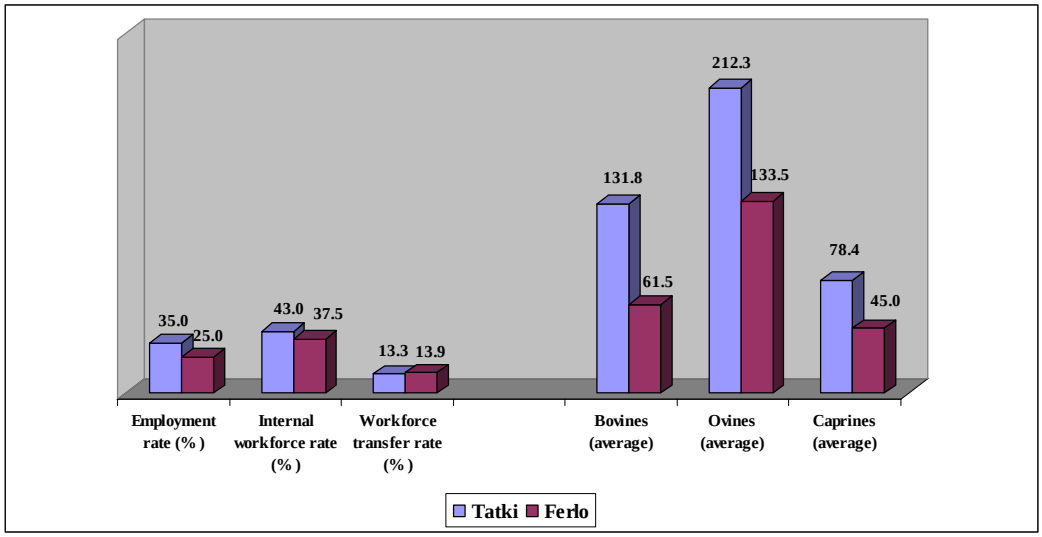
Pastoral home production and wage-labour

The Sahelian herders carry on their activities in a context of economic uncertainties and an environment in non-equilibrium (Behnke and Kerven, 1994) or in progressive increase of aridity (Nicoll, 2004). Thus, any economic activity requires contingent strategies and actions. The mobility of the herds was recognized as the best strategy (Scoones, 1999; Perrier, 1999; Touré *et al*, 2003). The herd remains central in the patrimony of the herders with 97.8% of the sales revenues in 2006 (Wane et al., 2008b). Its daily management means several tasks making it possible to ensure the continuity of the livestock production. To pasture and water the herds are the only pastoral activities requiring wage-labour. Thus, a remunerated shepherd gathers a livestock belonging to one or more owners and obtains the responsibility of the lead and the management of the herds. However, the relation to the labour appears multiform and does not exclusively means wage-labour in the extensive livestock of Ferlo.

Tatki has relatively high salaried laborer use (35%) whereas the average in Ferlo is of 25% (Wane *et al*, 2008a). At the time of the investigations, the employers declared unanimously that this recourse remained a specific means in situation of unavailability of internal workforce in the encampment. Only 43% of the people living in the encampments intervene in the management of the herds. The unemployed internal workforce can be explained by the orientation of the family members towards other economic activities than livestock farming. The workforce transfer rate of 13.3% (13.9% in the whole area) gives a first estimate of the potential of economic diversification for the pastoralists of Tatki (livestock farming, agriculture, trade, craft industry etc). The proximity of the Senegal River valley and the national road offer multiple activities and can explain this tendency. For the remainder, the

unemployed internal workforce counts individuals not in age, or necessary or reluctant to work in the present labor division. (**Figure 2**). This may be further investigated.

Figure 2 : main determinants of the wage-labour at Tatki



Sources: Processing of economic investigations in the Ferlo via the software Xlstat 7.5.2.

The massive presence of sheep in this arid area constitutes a reason to use a permanent workforce sometimes via wage-labour, which is revealing of a change in the pastoral practices in Senegalese Sahel areas. The prevalence of sheeps shows the importance of these small ruminants in the livestock farming. However, sheeps are famous for not being very autonomous and need a permanent follow-up requiring an accompaniment by herders at the time of transhumance. These movements are recurrent because of the aridity around Tatki which, in dry seasons, is a massive starting point for herds towards the south of Ferlo. This southern area, more watered, is at the same time an agro-pastoral space, a local area transit and movements around drillings, and a welcome place for the herders from many areas : in dry seasons, the migrating Fulani of the North and in harvest times, the Sereers of Saloum (south).

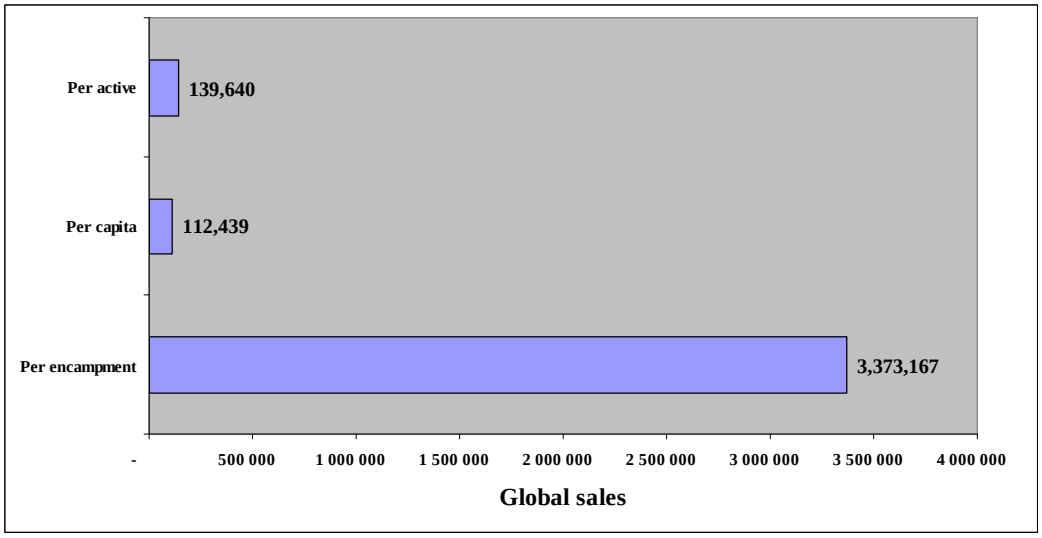
Insuring the productive potential through the wage-labour makes it possible to the herders of Tatki to exchange on the markets in a limited and punctual way.

Sales of pastoral foodstuffs

The investigations carried out in Tatki reveal that the global receipts obtained with the sales of ruminants (bovine, ovine, caprine), of agricultural and dairy foodstuffs, draft animals (asine and equine), rises up to nearly 216 million fcfa[2]. The annual average sale by encampment is 3,373,167 fcfa. Paid to the declared inhabitants of the encampments, the sales per capita of inhabitant are of 112,439 fcfa, a little less than sale by active which account for 139,640 fcfa. (**Figure 3**).

[2] 1 € = 655.957 fcfa

Figure 3 – Average global sales

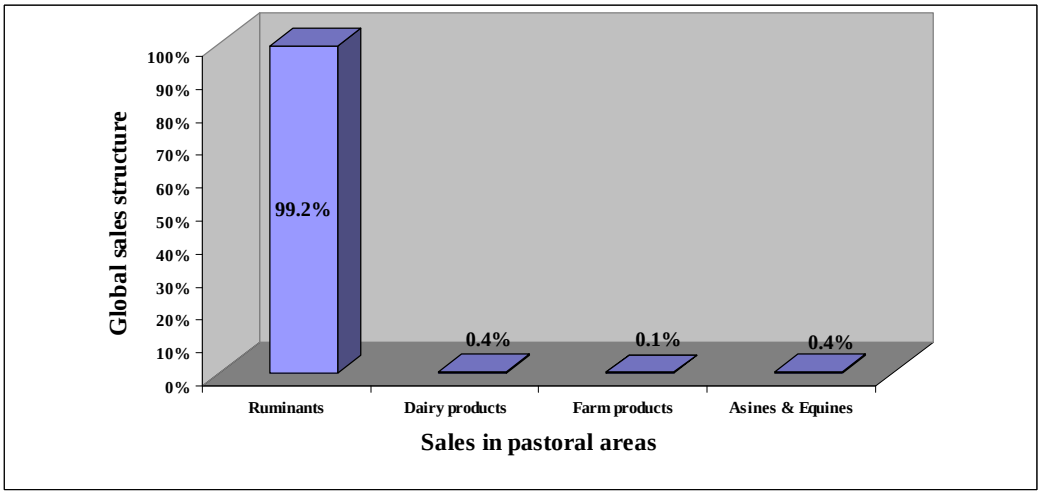


Sources: Processing of economic investigations in the Ferlo via the software Xlstat 7.5.2.

Tatki specially has an activity ratio (80%) higher than the average of the sites in Ferlo, between 25 and 46%. This relatively important activity ratio is depending at the same time on the dominating livestock farming notably the ovine species.

Most of the sales by the herders of Tatki come from the ruminants, which contribute to more than 99%; the remainder of the receipts comes equally from the sales from draft animals such as the asins and the equines and those from dairy products (0,4%). The contribution of the agricultural products is very marginal even null. The agricultural productions are mainly devoted to the family consumption. (**Figure 4**).

Figure 4 – Global sales structure of the pastors



Sources: Processing of economic investigations in the Ferlo via the software Xlstat 7.5.2.

The sales of ruminants are provided at 60% from the commercialisation marketing of sheeps (males at 82%). Cattle contribute to 34% of the sales (67% oxen). Goats make 6% of the sales with almost as many male /female sales. The market of the draft animals (primarily for the

transport and the pumping out of water) which is of 56,826 fcfa, proves to be four times more important than that of the cereals (13,266 fcfa).

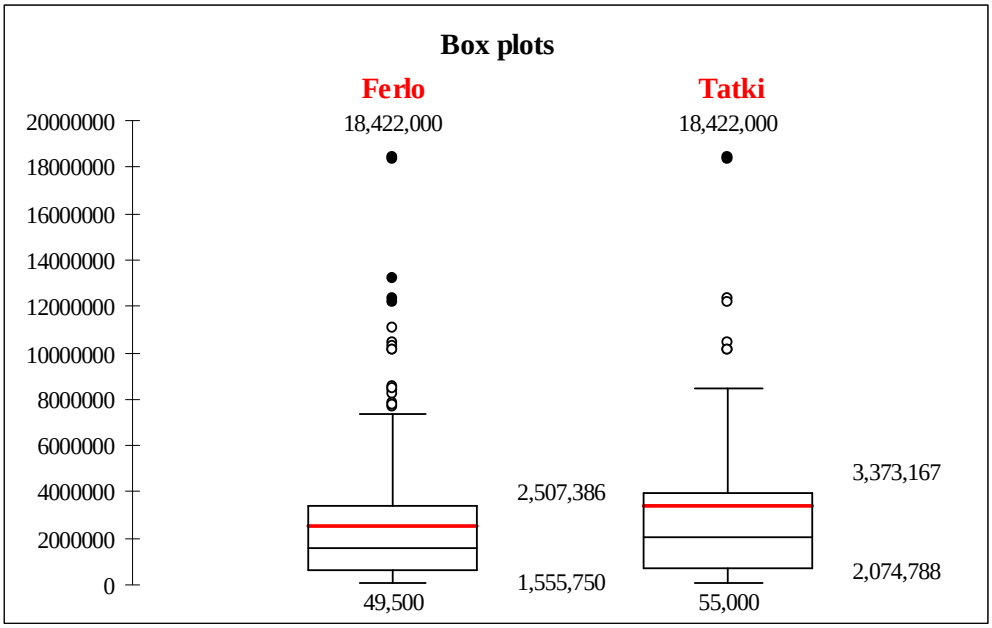
Regarding the dairy products, Tatki shows all the characteristics of the arid regions wedged with a production of milk largely undersold. Concerning the global sales of the herders, the marketing of the dairy products only goes up to 755,700 fcfa. Indeed, the products offered on the markets are relatively storable such as the butter providing 88,7% of the annual receipts. Fresh milk is almost not sold. Curdled milk is only sold in a marginal way (11,1% of the receipts of the dairy products).

The money holdings obtained from the sales of pastoral products at Tatki shows major differences between commercial incomes in the investigated set. Thus, it would be interesting to question the quality of the trade revenues.

Distribution of commercial income

The site of Tatki doesn't escape to the asymmetrical commercial income distribution of the Ferlo area. The commercial income distribution is more extended towards the higher values (the median was everywhere lower than the average). (**Figure 5**)

Figure 5: distribution of trade incomes in the Ferlo investigated area and the site of Tatki

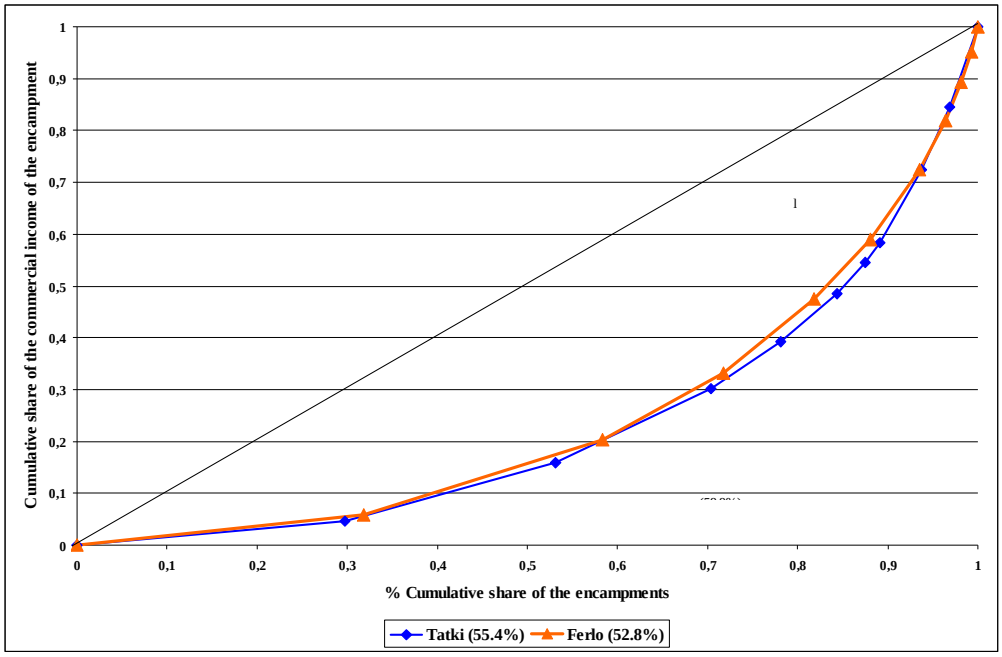


Sources: Processing of economic investigations in the Ferlo via the software Xlstat 7.5.2.

The Gini index of 52.8% was obtained for the whole investigated set[3]. The deviation between Lorentz curve of concentration and the first bisector is also very significant at Tatki where the Gini index is 55.4%. The commercial income distribution is more unequal than those obtained at the whole area of Ferlo.

[3] The calculations have been made using Lameta Laboratory Software of the University of Montpellier (France) and by C. Dagum from the University of Ottawa (Canada).

Figure 3: commercial incomes distribution at Tatki and the whole area



Sources: Processing of economic investigations in the Ferlo via the software Xlstat 7.5.2.

Comparison at national level is difficult because survey units are different: household in national statistics, and encampment in Ferlo, which comprised one or more pastoral households.

Table 3: Comparison of the inequalities at different scales

Gini Index (%)							
Household level	**National**	**Dakar**	**Other**	**Rural**	**Encampment level**	**Ferlo**	**Tatki**
ESAM 1 (1994-95)	38.6	45.8	39.7	31.7	Investigations	52.8	55.4
ESAM 2 (2001-02)	37.4	41.9	38.3	29.9			

Sources: Direction of Statistics Forecast and the World Bank. Households Senegalese Surveys (ESAM 1: 1994-95; ESAM 2: 2001-02). PPZS, Pastoral Encampments Surveys (2005-2006)

Regardless of the study scale, the commercial income distribution of Tatki showed marked disparities, all the more so as the inequalities decreased throughout the country between the two periods of national investigations. This report confirmed the results of Sutter (1987) on pastoral inequalities by extending, quantifying and updating them, and by keeping them in perspective with regard to the national economy. The inequalities of pastoral incomes are often masked by the general frugal way of life, but they actually revealed strategies and differentiated pastoral economic performances.

It remains to be seen, which main elements contributed to the global inequality observed in the Ferlo, illustrated by the Gini index. Here also, the issue was to mobilize statistical tools in order to understand pastoral, social and economic dynamics, while giving up two inverse temptations: resorting to exoticism and an “economicist” drastic cut.

III Discussions

The herd mobility in the Sahelian systems has been largely showed (Breman and of Wit, 1983; Behnke and Scoones, 1993).

The internal workforce of 43% at Tatki means that less the half of people living in the encampments devote themselves to the herd management. Whatever this influx sustain or jeopardize the viability of the mobile livestock farming in this arid area, it requires a better consideration in the national economic policies which paradoxically, privilege a modernization based on the limitation of movements of the herders (Ministry for Agriculture, Livestock Farming and Hydraulics of Senegal, 2004). However, limiting the transfers of workforce towards alternative economic activities seems to us more interesting to the national economy rather than restricting pastoral mobility which is vital for this activity. In comparison, the familial agriculture is seasonal: in dry season, the farm workers are often compelled to migrate towards more remunerative areas and/or economic activities. Thus, in arid regions, a pastoralism sustained and more involved in national economic priorities constitutes a viable alternative to maintain the populations on the spot due to the need for workforce and the evolution of opportunities from family workforce towards wage-labour.

The decomposition of the sales of the pastoral products provides an analytical accounting of the money holdings origins and at the same time, points out the singular relation with the market of the herders. The actual sales insufficiently inform about the potential of marketing of the pastors who have a self limited relation with the market. The herders generally market their animals only after having evaluated the amounts of expenses they have to face, in particular those related to the cereals supplies. They fix a target value in terms of monetary needs and put animals on the market in order to reach this amount of predetermined receipts. This behaviour is relatively far from the conceptual diagrams into force in the markets of goods and services where the strategies of optimization of monetary cash in hand prevail. The herders of Ferlo develop a procedural rationality according to Simon (1976), contingent to their dubious environment. This form of rationality is characteristic of an environment with a non-perfect information system. Thus, from their experiences and their practices, they are not compelled to work out all the possible scenarios to choose the best strategy, as it is recommended by advocates of the maximizing rationality. Taking into account the limits of information on all the conditions of nature, they choose the best strategy corresponding to an objective predetermined to reach. This behaviour rises from a general attitude observed in the pastors who take into account their needs and the levels of risks. Paradoxically, this same procedural step leads the pastors to adopt definitely speculative behaviours aiming at maximizing their profit in the situations where they can sense the favourable signals from the

market while having more information. For example, in Senegal before the main religious ceremony in particular Aïd El Kébir this recommends the sacrifice of rams.

The pastoral economic activity still depends on a number of both ecological and socio-economic uncertainties. This situation generates a careful behaviour regarding the market. Moreover, the recourse to market leads to a very uneven distribution of the commercial revenues. These inequalities are particularly significant in Tatki (Gini index: 55.4) compared to the average of the pastoral area (Gini index: 52.8) (Wane et al., 2008b). Any improvement in the acquisition of information on their ecological and economic environment would be beneficial for the local, national, even sub-regional environment. Better information on the markets, the environmental conditions and the levels of risks, would make it possible for the pastors to do, for example, more favourable arbitrations towards the markets. This is the challenge of initiatives in favour of reorganization, mutualisation and enforcement of the information systems adapted to the characteristics of the Sahel pastoralism.

Conclusion

In the nowadays well known uncertain climatic environment of pastoral arid areas, research and development policies still lack on socio-economic data and analyses explaining the commercial strategies of herders, the unemployed workforce remaining or away, the rationale of a self limited link to the opportunities and risks of the market. This assessment is necessary to ground sectoral and national policies.

To analyze those facts, strategies and choices, needs a device of data acquisition adapted to mobile populations which was experimented in Tatki and other sites in Ferlo (Senegal). This is meaningful: the herd remains central in the patrimony of the herders with 97.8% of the sales revenues in 2006. Global sales of ruminants (bovine, ovine, caprine), of agricultural and dairy foodstuffs, draft animals (asins and equine), rises up to nearly 216 million fcfa in the area. Only 43% of the people living in the encampments intervene in the management of the herds. The unemployed internal workforce counts individuals not in age, or necessary or reluctant to work in the present labor division.

The nature and distribution of income among pastoral encampments are only a part of assets which contributes to manage uncertainty. To secure this economy needs to take into account the whole strategies and needs of the herders in this context.

Bibliography

BEHNKE R. H., SCOONES I., 1993. Rethinking range ecology: Implications for rangeland management, In RH Behnke, I. Scoones C. Kerven, *Range Ecology at Disequilibrium*, Overseas Development Institute, London, England.

BEHNKE R., C. KERVEN, 1994 Redesigning for risk: tracking and buffering environmental variability in Africa's rangelands Natural Resource Perspectives *(Nouveau concept sur le risque : Suivre et tamponner la variabilité environnementale dans les parcours d'Afrique)* N°1 (1994) http://www.odi.org.uk/nrp/1.html

BREMAN H., C.T. DE WIT, 1983. Rangeland productivity and exploitation in the Sahel. *Science* 221:1341-46

HATFIELD R., J. DAVIES, 2006. *Global Review of the Economics of Pastoralism*, Report Prepared for the WISP (World Initiative for Sustainable Pastoralism) with contributions from Wane A, Kerven C, Dutilly-Diane C, Biber JP, Merega JL, Odhiambo MO, Behnke R, Gura S. IUCN: Nairobi

MINISTRY FOR AGRICULTURE, LIVESTOCK FARMING AND HYDRAULICS OF SENEGAL, 2004. Nouvelle Initiative Sectorielle pour le Développement de l'Elevage « NISDEL », *Documents de travail.*

NDIONE J.A., 2002. *Bilan climatique de l'Observatoire ROSELT du Ferlo (Sénégal).* CSE-ROSELT, 37p.

NICOLL, K., 2004. Recent environmental change and prehistoric human activity in Egypt and Northern Sudan. Quaternary Science Reviews 23, 561–580

PERRIER G., 1999. Nouvelles orientations dans la gestion des parcours en Afrique, In Ian Scoones Dir., *Nouvelles orientations du développement pastoral en Afrique. Un environnement incertain*, Coédition CTA/Karthala, p. 91-109.

SCOONES I., 1999. Les nouvelles orientations du développement pastoral en Afrique, In Ian Scoones Dir., *Nouvelles orientations du développement pastoral en Afrique. Un environnement incertain*, Coédition CTA/Karthala, pp. 17-73

SIMON H.A., 1976. From Substantive to Procedural Rationality, In : S.J. Latsis (Ed.). *Method and Appraisal in Economics*. Cambridge, MA, Cambridge University Press, pp. 129-148, Trad. fr. De la rationalité substantive à la rationalité procédurale. *Pistes*, n°3, Octobre 1992.

SUTTER, J., 1987. Cattle and inequality: herd size differences and pastoral production among the Fulani of Northeastern Senegal. *Africa*, 57(2):196-217

TOURE I., A.T. DIOP, A. DIOUF, 2003. Dynamic analysis of landscapes and landcovers for the knowledge and evolution of the pastoral ecosystems in the Ferlo-Senegal, in *Proceeding of the VII International Rangelands Congress*, Editions N. Allsopp ISBN number 0-958-45348-9, p. 134-136

UNESCO, 1977. *Carte de la répartition mondiale des régions arides*. Note technique du MAB 7, UNESCO, Paris, 55 p.

WANE A., A.D. CAMARA, V. ANCEY, S.N. KA, 2008a. Choix individuel et sécurisation collective – Le salariat dans les exploitations pastorales du Ferlo (Sahel sénégalais), Soumis à ***Socio Economie du Travail***, Série ***Economies et Sociétés***, 19 p.

WANE A., V. ANCEY, I. TOURÉ, 2008b. Assets of the Market, Assets of the Rural World – Some evidences from Pastoral Populations of Senegalese Sahel (Ferlo), under revisions at ***Food Policy***, 15 p.

WANE A., I. TOURE, B. TOUTAIN, V. ANCEY, A.T. DIOP, A. ICKOWICZ, 2007. How to obtain a representative sample of economic studies in the areas with strong mobility? Case of the Senegalese Sahel (Ferlo). On: Farming Systems Design 2007, Int. Symposium on *Methodologies on Integrated Analysis on Farm Production Systems*, M. Donatelli, J. Hatfield, A. Rizzoli Eds., Catania (Italy), 10-12 September 2007, book 2 – Field-farm scale design and improvement, 13-14