Katholieke Universiteit Leuven
Faculty of Agricultural and Applied Biological Sciences

Working Paper
2002 / 72

ESTIMATION OF PRODUCTION OF CASSAVA IN BANDUNDU (1987-1988) AND BAS CONGO (1988-1989) REGIONS, AS COMPARED TO OFFICIAL R.D. CONGO STATISTICS

Eric TOLLENS

December 2002

Department of Agricultural and Environmental Economics
K.U.Leuven
Willem de Croylaan 42, B-3001 Leuven – Belgium
Tel. +32-16-321614, Fax +32-16-321996

Tollens, E. "Estimation of Production of Cassava in Bandundu (1987-1988) and Bas Congo (1988-1989) Regions, as Compared to Official R.D. Congo statistics." Working Paper, n° 72, Department of Agricultural and Environmental Economics, Katholieke Universiteit Leuven, 2002.

This paper has been written in the framework of an Expert Consultation on Root Crop Statistics for the FAO Statistics Division (ESS), Regional Office for Africa.

Prof. Eric Tollens,
Katholieke Universiteit Leuven, Leuven, Belgium
de Croylaan 42, B-3001 Leuven (Heverlee), Belgium
Tel.: +32 16 32 16 16, Fax: +32 16 32 19 96,
Email: eric.tollens@agr.kuleuven.ac.be

Summary

Over the period 1987-1989, K.U.Leuven, in collaboration with the Ministry of Agriculture, Rural Extension and Community Development in R.D. Congo, conducted large, in-depth surveys on agricultural production and marketing in Bandundu and Bas Congo provinces, as part of a larger study on food marketing for Kinshasa markets. The production surveys covered 3 products in Bandundu (cassava, maize, and groundnuts) and 7 in Bas Congo (the previous three plus cassava leaves, beans, plantains and rice). They were held over a full year, with weekly recordings of production in physical units (basins) on specially designed survey forms, on a large sample (1305 households in Bandundu, 1040 in Bas Congo). All physical units were converted to weights and the results were aggregated to cover the whole population.

The results thus obtained were compared with official production data. For Bandundu, the measured production of cassava was 37.6% higher than official data; in Bas Congo, it was 72.2% higher. Production was also much higher for all other crops, except plantains. For various reasons, particularly civil unrest in the 1990's, the official statistics, and in particular the methodology used, were not changed or adapted to take account of our findings.

Another aspect concerns a rapid and reliable methodology for estimation of agricultural production, which was tried out for several months. The method is based on once monthly recordings, by the field enumerator, of the number of basins harvested by a farmer. The results obtained compare very favourably with the results obtained by weekly recording by the village enumerators. This method holds a lot of

potential for improving cassava production statistics and is cheap and reliable. It is based on the farmer's recall of the number of units (basins) harvested over a month.

Finally, the variances for all variables recorded in the surveys were calculated. Under certain assumptions, and for a given K (confidence level) and D (maximum difference between measured value and real value), this allows a precise calculation of the required sample size. At 95% confidence level and 10% maximum error, the sample size for bitter cassava production in Bandundu is 103 households, and 240 in Bas Congo. For cassava, maize and groundnuts, the three main staple crops, and the income from the sale of the main cash crop, cassava, the required sample size for Bandundu is between 200 and 300.

It is concluded that actual food production in R.D. Congo is thus likely to be higher than official statistics indicate. The food situation would then appear better than official statistics indicate, although clearly still far from acceptable. Household budget food consumption data over the 1975-2000 period nevertheless also show a very poor nutritional situation, one of the worst in the world. But maybe also the household budget survey data are underestimated. In any case, the situation is alarming and better production statistics are an imperative for agricultural and food policy, for aid programs and for an improvement in the food insecurity situation.

Résumé

Durant la période 1987-1989, K.U Leuven, en collaboration avec le Ministère de l'Agriculture, de l'Animation Rurale and du Developpément Communautaire de la République Démocratique du Congo, ont conduit des grandes enquêtes approfondies sur la production et commercialisation agricole dans les provinces de Bandundu et Bas Congo , comme partie d'une grande etude sur la commercilaisation des produits alimentaires sur les marches de Kinshasa. Les enquêtes de production ont concerné trois produits à Bandundu (manioc, maïs et arachide) et sept au Bas Congo (dont les trois précédent, plus les feuilles de manioc, le haricot, le plantain et le riz). Elles ont été conduite pendant une année, avec des observations hebdomadaires de production en unité physique (basines) sur un large échantillon (1305 ménages à Bandundu, 1040 en Bas Congo). Les unités de mesure physique ont été converties en poids et les résultats aggrégés pour la population.

Les résultats ainsi obtenus ont été comparé aux données officielles de la production. Pour Bandundu, la production estimée de manioc était 37,6% superieure aux données officielles ; au Bas congo, elle était de 72.2% superieure. La production était également beaucoup plus pour toutes les autres cultures, à l'exception de plantains. Pour diverses raisons, en particulier les troubles civiles de 1990, les statistiques officiellles et surtout la méthodologie utiliséee n'ont pas été modifiées ou adaptées pour inclure nos résultats.

Un autre aspect est qu'une méthodologie rapide et fiable pour l'estimation de la production agricole, a été testée sur plusieurs mois. La méthode consiste à des relévés mensuels du nombre de basines récoltées par le producteur, effectué par l'enquêteur

du village. Les résultats obtenus sont favorablement comparables avec ceux des rélévés hebdomadaires effectués par les enquêteurs des villages. Cette méthode présente beaucoup d'avantages pour l'amélioration des statistiques de production de manioc. Elle est fiable et moins coûteux. Elle est basée sur la déclaration des producteurs du nombre de basines récoltées pendant un mois.

Enfin, la variance de toutes les variables collectées pendant les enquêtes ont été calculées. Sous certaines hypothèses, et étant donné K (niveau de confiance) et D (difference maximale entre la valeur mésurée et réelle), on peut calculer avec precision la taille requise pour un échantillon. A 95% de niveau de confiance et 10% d'erreur maximale, la taille d'échantillon pour la production de manioc amer à Bandundu est de 103 ménages, et de 240 au Bas-Congo. Pour le manioc, maïs et arachides, les trois principales cultures virvières, et le revenu de vente de la principale culture de rente qui est le manioc, la taille requise pour l'échantillon est comprise entre 200 et 300 ménages pour le Bandundu.

On peut conclure que la production alimentaire réelle en République Démocratique du Congo est vraissemblement superieure à ce qu'indique les statistiques officielles. La situation alimentaire semble donc meilleure à celle indiquée dans les statistiques officielles, bien que loin de la situation acceptable. Cependant, des données sur les budgets de consommation des ménages de 1975-2000 indiquent une très pauvre situation nutritionelle, une des plus faibles du monde. Mais, il se peut que les données d'enquête sur les budgets des ménages soient aussi sous-estimées. Dans tous les cas, la situation est alarmante et de meilleurs statistiques de production sont impératives

pour la politique agricole et alimentaire, les programmes d'aide et l'amélioration de la situation d'insecurité alimentaire.

1. Introduction

As part of a large study on the marketing of food products for Kinshasa markets, extensive production and marketing surveys were conducted in Bandundu region in 1987-1988 and in Bas Congo region in 1988-1989, R.D. Congo. The study was financed by the Belgian Agency for Development Cooperation (AGCD), with co-financing for the surveys by USAID-Kinshasa. They were conducted by the Catholic University of Leuven (K.U.Leuven) under the direction of Prof. E. Tollens, with Frans Goossens and Bart Minten as researchers, and local support and collaboration of D.M.P.C.C. (the Direction of Markets, Prices and Campaign Credit) of the Ministry of Agriculture and SPCSA (Permanent System for the Collection of Agricultural Statistics) of the same Ministry. Surveys were also conducted in Kinshasa markets. The results were published in 29 (blue) working papers and 19 (yellow) statistical papers, and summarised in the book: "Nourrir Kinshasa: L'Approvisionnement local d'une métropole africaine", F. Goossens, B. Minten and E. Tollens, l'Harmattan, Paris, 1994, 397 P. More specifically for cassava, E. Tollens (1992) presented the results of the study at a workshop in Feldafing, Germany and Dr. F. Goossens published a book based on his doctoral thesis with title: "Cassava Production and Marketing in Zaire" Frans Goossens, Leuven University Press, 1996, 178 p.. A standard publication and reference on cassava production in R.D. Congo (Bandundu province in particular) remains Dr. L. Fresco's book, based on her doctoral thesis. Since the general belief was that official production figures, particularly for cassava, were notoriously

unreliable[1], an effort was made to record production, sales and purchases over a full year at the household level by statistically reliable methods. In this way, a comparison could be made with the official data, but such a comparison was never published in order not to embarrass the authorities. The comparison follows hereafter.

First of all, the survey methodology is presented, followed by a comparison of the production results with the official data. This is followed by a discussion on the methodology used to collect production and marketing data, including a quick and light method which was tried out. Finally, results are presented on the variances of principal farm characteristics in Bandundu region with implications for sample sizes and survey methods.

2. Cassava survey methodology

It should be noted that our survey methodology is based on that of the 1984 "Enquête Nationale Agricole" of Rwanda. Several studies (Sukhatme, 1954; Casley, Kumar, 1982; Poate, Casley, 1985; Verma, Marchant, Scott, 1988) have shown that our method was better than the physical recording of yields and production by crop cuts in a square in a field. Crop cuts usually overestimate production by 15 to 40% and show a large variance because of sampling and measurement errors. The same studies also indicated that farmers can be relied on to estimate their own economic production.

---

[1] According to Davies and Lipton who in 1986 did an in depth study in Zaire in preparation for a national food strategy, financed by the European Commission, …"the FAO Food Balance Sheet for Zaire is useless because it is based on official output data" (Davis and Lipton, 1986).

The surveys started in October, at the beginning of the rainy season in Bandundu and Bas Congo. To measure production, sales, purchases, prices and market conditions of the main food staples, a survey on a sample of 1305 households in Bandundu and 1040 households in Bas-Congo was organised. Five households per village were visited on a weekly basis by a field enumerator who lived in the village. In total, in Bandundu, 261 field enumerators were employed, 60 enumerators, 18 supervisors and 5 head-supervisors. For Bas Congo, there were 208 field enumerators, 38 enumerators, 11 supervisors and 3 head-supervisors. The enumerators had a bicycle, the supervisors and head-supervisors a motorbike. In Bandundu, the survey included cassava, maize and groundnuts. In Bas-Zaire, also bananas, cassava leaves, beans and rice were included. Production, sales and purchases were measured in local harvest units. For cassava, and most other crops, the main unit used was the basin. Basins are ubiquitous in all households, and are in particular used to transport cassava roots from the field to the dwelling on the head of women. To entice participation in the survey and in order to standardise the measuring unit, a new dark blue colour basin was given to all participating households. A particular survey form was designed (see Annex 1) for the easy recording of the harvest and of all transactions. Instead of recording numbers, the field enumerators only had to indicate (mark with shade) the number of units or half-units harvested. Sometimes, the production survey form remained with the farmers. For the transaction form, the field enumerator had to visit each farmer once a week to make a record of all transactions. Visits were always on the same day in the week in the evening, to make sure that the farmer's wife was present as she usually harvests most of the crops. For each transaction, receipts and major parameters such as participants, sales unit, product form, transport, place and distance were registered. Results were extrapolated towards the total farm population

of the region. Also purchases of these products, which are generally neglected, were registered. The survey was combined with a one-visit survey on general farm characteristics, such as hectarage, land use, storage behaviour, etc.. In Bas-Congo, an additional survey on household characteristics was organized. The survey villages were regularly visited by a supervisor and by the project team. All forms were checked carefully. All enumerators participated in a week long training session. They were all relatively well paid, on a monthly basis, with money rewards for good performance. Rather generous payments were made possible by a USAID-Kinshasa grant in local currency, using project counterpart funds.

The survey sampling plan was that of the Permanent System for the Collection of Agricultural Statistics (SPCSA) elaborated by an FAO-expert, Mr. SIMAIKA (SIMAIKA, 1986). Our data was regularly checked and controlled. A team of 9 persons in the head office assured data control and data entry. We conducted a special survey in each province to standardize the weight of a basin ("enquête calibrage"). The results are summarized in table 1. The coefficient of variation varies between 13% end 34% for Bandundu and Bas Congo, which is relatively small but it proves the necessity of standardisation. In addition, we used the following conversion factors, based on our own surveys and research by L. Fresco. One kg of fresh cassava roots results in:

0.759 kg fermented cassava

0.494 kg cassava paste ("kimpuka")

0.559 kg chikwangue

0.390 kg cossettes (source: L. Fresco)

0.270 kg flour (source: L. Fresco)

Surveys on the distribution sector covered 1000 food retailers in markets and 300 semi-wholesale stores. For the survey on river transporters, 208 survey forms were completed; for the survey on road transporters, 500 transporters were interviewed in one-third of the 55 parking places in the city where the trucks arrive; 1405 questionnaires were completed for the par-colis traders, of which 1000 in truck parking places and 405 in ports.

Three sources of price statistics are available in Zaire: Institut de Recherches Economiques et Sociales of the Université de Kinshasa (IRES), which publishes monthly retail prices since 1960, the Institut National de la Statistique (INS) and the DMPCC (Ministry of Agriculture) which collected and published prices since 1984. The DMPCC collected prices at the retail and semi-wholesale level (arrival in Kinshasa), which makes it possible to study retail margins. DMPCC price collection was organized by the K.U.Leuven research team. Farm gate prices were collected by the K.U.Leuven team during one year in the Bandundu and Bas-Zaire regions.

Data on consumption come from secondary sources. Main sources on consumption are the data collected under the direction of J. Houyoux: a one year's study in 1969 on 1471 households (1/100 of households), the second on 1367 households (1/200 of households in 1975), the third in 1986 on 205 households (1/2000 of households). Subsequent surveys took place in 1990, 1995 and 2000.

Official population statistics were provided by the Institut National de la Statistique (INS). These statistics are extrapolations based on the provisional data of the 1984 census. The value of the census statistics is not known.

Table 1: Standardisation of measuring unit for cassava (basin) for Bas Congo

	number of observations	weight (kg)	standard deviation	coefficient of variation
cassava:				
fermented	608	19.56	2.71	13.88
fresh roots	100	18.79	3.84	20.48

Source: Marketing surveys

N.B.: The basin used in Bas Congo was not exactly the same as the one used in Bandundu because the manufacturer could not supply exactly the same unit.

3. Comparison of the survey data with official statistics

As the focus is on cassava, we will only present the results for cassava. The source of official statistics is the "Annuaire des Statistiques Agricoles 1986-1989, Kinshasa, 1990.

Table 2: Production of cassava (fresh root equivalent) in Bandundu (Oct. 1987 - Sept. 1988) and Bas Congo (Oct. 1988 - Sept. 1989), marketing project and official statistics, in ton

	marketing project	official data	% difference
Bandundu	3.975.634	2.890.000	+ 37.6
Bas Congo	1.498.300	870.000	+ 72.2

Source: Marketing surveys

The surveys always recorded a higher production than the official statistics. This also holds for maize and groundnuts in Bandundu and Bas Congo and also for rice and beans in Bas Congo (see Annex 2). Only for plantains, where the recording unit was bunches, surpassed the official statistics our production data with 59.5%.

We cannot really explain why generally the survey data always indicates higher production than the official statistics. We basically used the same sampling plan, but we had a weekly recording of production in local units while official data are based on a one-yearly recording of the harvest for all crops together. <u>We submit that once yearly recording in metric weights grossly underestimates real, effective production</u>.

This seems to be true for roots and tubes, but also for cereals, beans and groundnuts (see tables in Annex 2). At the time of our surveys, the SPCSA was trying to improve its collection methodology, with support of FAO and USAID, but in a vast country like R.D. Congo, and with so many different crops and animal production, it is a daunting task. Undoubtedly our results would have led to improvements in the collection methodology, but the civil unrest in 1991, with widespread looting, made most official donor organisations leave the country. Widespread looting was repeated in January 1993, and it is only in 1997, when J.D. Kabilo became president, that most donors resumed their aid programs.

It is to be noted that R.D. Congo is one of the worst countries of the world in terms of the state of food insecurity. According to FAO's (2001) State of Food Insecurity in the World, the largest increases in the proportion of undernourished 1990-92 to 1997-99 is the R.D. Congo with + 29%, i.e. with 17 million more undernourished people, 22% of the total increases in the world. R.D. Congo has thus contributed the most to the rise in food insecurity in the world over the 1990-92 to 1997-99 period. According to the 2002 FAO report on Food Insecurity in the World, R.D. Congo is the worst country in the world in the 1998-2000 period in terms of undernourished people: about 75%. But it is also the country with the highest per capita cassava consumption in the world, according to our data. But we would submit, based on the foregoing, that food production statistics in Congo are underestimated, and that in reality the food security situation is probably better, although still grossly inadequate.

4. Proposal for a rapid and reliable cassava production survey based on farmer's recall

As a side-exercise to the production surveys, at the near end of the year-long survey in Bandundu, we asked for several months that farmers make a record of the number of basins that they have harvested. When the field enumerator then visits the farmer monthly, he/she just asks how many basins are harvested since his/her last visit. This is a quick method to assess production in a wide area. We assessed that the statistical reliability of such a system is quite good, but unfortunately we did not fully prepare the data for publication. But is was clear that this was a relatively cheap and reliable method of recording cassava production. Many farmers noted the number of basins harvested on the wall of their house or on a piece of wood.

For the system to work, the farmer's confidence needs to be gained, he/she needs some minimal training in the collection system (purpose, importance, need for reliability), and an incentive. The first incentive can be the giving of a standard basin, but other small incentives need to be provided later on a regular basis. We even found that some farmers (women farmers) got quite skilled in the exercise, were proud to announce their production and were probably totally reliable. Because we could not manage our Bandundu and Bas Congo surveys at the same time, and since our main focus was agricultural marketing for the Kinshasa market, we eventually discontinued the exercise, but were convinced that it was the route to follow in the future.

5. Variances of principal farm characteristics in the Bandundu region and implications for sample sizes and survey methods[2]

This part of our work was performed on the suggestion of, and with the support of Dr. Suha Satana, USAID-technical advisor to the Studies and Planning Service (SEP) of the Ministry of Agriculture.

Our sampling plan included 1305 households in Bandundu and 1040 in Bas Congo. When the total population is large compared to the number of persons in the sampling plan, the variance and the statistical reliability of the survey results is a function only of the absolute number of households in the sample and not the sampling fraction. The sample size depends on the variance of the measured variables and the required precision or reliability of the results.

The required precision or reliability requires two factors, D and K. D represents the largest acceptable difference between the estimated value and the true value. K is the confidence level which allows to make statistical statements about the probability that the true value falls between the specified range (± D). The general formula is:

$$n = \frac{K^2 V^2}{D^2}$$

This formula can only be applied if the sampling procedure consists of one step only. The sampling design used in our survey had 4 stages and in principle, this formula

---

[2] The full report is available in publication 18 in the blue series of working papers, project "Commercialisation des produits agricoles", AGCD-K.U.Leuven and USAID-Chemonics, Kinshasa, June 1990.

thus cannot be applied. But for reasons of simplicity, it is applied nevertheless. Thus, the real variance will be at least equal or greater than the calculated ones (table 3). As the households in the population are all fairly similar, the error made cannot be too large.

Table 3 presents the sampling size for combinations of K and D. For K, a normal distribution of the variables is assumed and 95% corresponds to K=1,96; 90% corresponds to K=1,645. The error margin D is fixed at 10%. With K and D fixed, the sample size is only a function of the variance of the variables considered. The variances were calculated from the survey data.

It is to be noted that for bitter cassava, by far the largest cassava type in Bandundu and Bas Congo, the minimum sample size for production is 103 households, quite small (we used 1305). For Bas Congo, the figure is 240 (we used 1040). It is to be remarked that K and D are fixed arbitrarily, but at a reasonable level, and in line with common practice of statisticians.

If we consider that for the Bandundu survey production data for 4 crops (bitter cassava, sweet cassava, maize, groundnuts) and farm income data for 3 crops (cassava, maize, groundnuts) need to be statistically reliable at K=1,96 and D=0,10, and if we accept a geometric estimation, and assuming that all variables are equally important, the overall sample size is 821. This figure is the result of the 7th root of the product of the 7 sample sizes needed for each of the 7 variables. In Bas Congo with 14 variables, we arrived at 1389 sample size.

However, if for Bandundu we consider only statistical reliability at 95% and a maximum error margin of 10% for the production of the three main food crops cassava, maize and groundnuts, and for the income from sales of the main cash crop, cassava, the required sample size is between 200 and 300. This is because the variance of the indicated variables is small. It is to be noted that Bandundu has about the size of France!

One of the advantages of the intensive, in-depth survey work is thus that it has produced variances for all the variables considered, and that these are indispensable to calculate the statistically required sample sizes. In their absence, an arbitrary a-priori probability distribution of the variables needs to be assumed.

Tabel 3: The calculation of minimum sample sizes needed for given K (95%) and D (error margin: 10%) values for Bandundu and Bas Congo for production and farm income (from sales) data for the three main crops grown (cassava, maize, groundnuts)

	coefficient of variation		required sample size K=1,96	
	Bandundu	Bas Congo	Bandundu	Bas Congo
Production				
- bitter cassava	0.517	0.790	103	240
- sweet cassava	2.132	1.061	1747	433
- maize	1.199	1.360	553	711
- groundnuts	1.188	1.192	542	501
Income				
- cassava	1.255	1.171	605	526
- maize	2.654	2.797	2707	3006
- groundnuts	2.730	2.871	2862	3167

Source: "Nourrir Kinshasa", F. Goossens, B. Minten and E. Tollens, L'Harmattan, Paris, 1994, p. 81

6. Conclusions

Our survey in the R.D. Congo carried out from 1987 to 1991 in the framework of the food marketing study for Kinshasa yielded important knowledge, not only on the marketing side but also in terms of agricultural production in the two major supply provinces of Kinshasa, Bandundu and Bas Congo. Cassava is by far the most important food staple. We submit that agricultural production statistics in Congo are seriously underestimated. This is also plausible because the FAO food balance sheet for Congo shows a continuing deterioration, to the extent that Congo contributes for 22% of the increase in under nutrition in the world between 1990-92 and 1997-99. Particularly the production data for cassava, a root crop with continuous harvest during the year, are probably well below actual production levels. However, the surveys also showed a serious underestimation of the production in the official statistics for all crops, except plantains.

Nevertheless, other sources of data on cassava, particularly per capita consumption data for Kinshasa based on household surveys conducted in 1975, 1986, 1990, 1995 and 2000 also show a continuous decline in cassava consumption, from 176,7 kg in 1975 to 145,3 kg in 2000 (Annex 3). Even in 2000, cassava consumption amounted to 49% in weight of all products consumed, including beer and soft drinks, and 31,7% of calories and 9,1% of protein (Guy-Bernard Nkwembe Unsital, 2002) in the diet. But is it possible to live and function with only 1.368 calories/person/day and 39,5 g protein/person/day? We personally doubt it and we would not be surprised if, again, cassava consumption is grossly underestimated in household surveys.

It is regrettable that the findings have not been used to improve the statistical situation, but the culprit is the civil disorders in 1991, the departure of most bilateral donors in 1991 until their return in 1997, and the unstable political situation in the 1990s.

I am grateful to FAO for the opportunity given to present our findings and to be able to contribute to the immense task of producing better root crop statistics in Africa. I am convinced that with more reliable statistics on root crops, the food situation and food outlook will not appear as bleak as it appears from official publications, although it will no doubt remain far from adequate.

References

CASLEY, J.D. and K. KUMAR, The Collection, Analysis and Use of Monitoring and Evaluation Data, The Johns Hopkins University Press, Baltimore, 1982, 20 p..

DAVIES, S and M. LIPTON, "A New Start: Preconditions for a Food Strategy in Zaire", Report of Food Strategy Team's Mission to Zaire, (January 18th to March 18th, 1985), 1985, 198 p..

Division des Statistiques Agricoles, République du Zaïre, Annuaire de Statistiques Agricoles, 1986-1989, Ministère de l'Agriculture, Animation Rurale et Développement Communautaire, Service d'Etudes et Planification, Projet PNUD/FAO-ZAI/88/004 et Projet USAID-0119, Kinshasa, juin 1990.

FAO, The State of Food Insecurity in the World, 2001 and 2002, Rome.

FRESCO, L., Cassava in Shifting Cultivation, A Systems Approach to Agricultural Technology Development in Africa, Royal Tropical Institute, Amsterdam, 1986, 240 p..

GOOSSENS, F., B. MINTEN and E. TOLLENS, Nourrir Kinshasa: L'approvisionnement local d'une métropole africaine, L'Harmattan, Paris, 1994, 397 p..

GOOSSENS, Frans, Cassava Production and Marketing in Zaire, Leuven University Press, Leuven, 1996, 178 p..

KANKONDE, Mukadi and Eric Tollens, ed., Sécurité alimentaire au Congo-Kinshasa, Production, Consommation et Survie, L'Harmattan, Paris, 2001, 478 p..

NKWEMBE Unistal Guy-Bernard, Evolution de la consommation alimentaire au Congo-Kinshasa pendant la période de transition: Essai d'une analyse pour

une sécurité alimentaire durable, Mémoire du Diplôme d'études spécialisées en Economie Rurale, Louvain-la-Neuve, septembre 2002, 79 p..

POATE, C.D. and J.D. CASLEY, Estimating crop Production in Development Projects, Methods and their Limitations, The World Bank, Washington, D.C., June 1985, 34 p..

SHAPIRO, David and Eric TOLLENS, The Agricultural Development of Zaire, Avebury, Aldershot, 1992, 201 p..

SIMAIKA, J.B., Rapport de mission sur les enquêtes statistiques du projet ZAI/88/008-Système Permanent de Collecte des Statistiques Agricoles, Kinshasa, mai 1986.

SOLAGRAL - Réseau Stratégies Alimentaires, Economie des Racines et Tubercules, Analyse dans les pays d'Afrique de l'Ouest et du Centre (CMA/AOC), Ministère de la Coopération, Paris, octobre 1995.

SUKHATME, P.V., Sampling Theory of Surveys with Applications, Iowa State College Press, 1954.

TOLLENS, E., Cassava Marketing in Zaire, An Analysis of its Structure, Conduct and Performance, in Traditional marketing systems: proceedings of an international workshop, ed. Georg Bokeloh, Norma Lange, Stefan Schad, Feldafing, July 6th to 8th, 1992, pp. 113-127.

VERMA, V., T. MARCHANT, and C. SCOTT, Evaluation of crop-cut methods and farmer report for estimating crop production, Longacre Agricultural Development Centre, Limited, London, January 1988, 73 p..

ANNEXES

Annex 1: Survey forms for Bandundu and Bas Congo

ANNEXE 1: LA FICHE "PRODUCTION"

FICHE PRODUCTION POUR MANIOC, MAIS, ARACHIDES, RIZ, HARICOTS, BANANES PLANTAINS ET FEUILLES DE MANIOC :MOIS 1
FISI YA MBUTU MADIOKO, MASANGO, NGUBA, LOSO, MADEZO, MANKONDO NA SAKA-SAKA :NSONDA 1

2

	MANIOC - MADIOKO		MAIS - MASANGU		ARACHIDES NGUBA	RIZ - LOSO	HARICOTS MADEZO	BANANES PLANTAINS MANKONDO	FEUILLES DE MANIOC SAKA-SAKA
	MANIOC ROUI MADIOKO YA KUYINIKUY NA MAZA	TUBERCULES FRAIS MADIOKO YA NKUNZU	EPIS SECS DISANGU YA KUYUMA	EPIS FRAIS DISANGU	GOUSSES YA MATITI	PADDY YA MATITI	GOUSSES YA MATITI	REGIMES NKANGA	BOTTES KIKUNKU
MNOGIOSNDIA 1									
TOTAL MOIS 1									

ANNEXE 1: QUESTIONNAIRE "PRODUCTION"

FICHE PRODUCTION MANIOC – MAIS – ARACHIDE
FICHE MBUTU MANIOKO – MASANGU – NGUBA

MNOGIOSNDA	MANIOC – MANIOKO		MAIS – MASANGU		ARACHIDE – NGUBA
	MANIOC ROUI 1 MANIOKO YA KUPOLA NA MASA	TUB. FRAIS MANIOKO YA MUBISU	EPIS SECS DISANGU YA KUKAUKA	EPIS FRAIS DISANG. MOBISU	
1					
TOTAL MOIS 1	21	4 1/2	5	0	0
2					
TOTAL MOIS 2	28	2	5	0	0
3					
TOTAL MOIS 3	24	1 1/2	8	0	0

ANNEXE 2: QUESTIONNAIRE "VENTE"

FICHE VENTE MANIOC MOIS 1
FICHE YA KUTEKISA MANIOKO NGONDA 1

SEMAINE SABALA	TRANSACTION KINKITA	FORME MUTINDU	UNITE DE MESURE KITESO YA NTALU	NOMBRE D'UNITES NTALU YA BITESO	PAYEMENT VENTE LUFUTU YA KUTEKISA				LIEU DE VENTE KISIKA YA KUTEKA	DUREE DU TRAJET NTANGU YA KUTAMBULA	MODE DE TRANSPORT MPILA YA KUNATA	VENDU A QUI NA NANI BOMETEKA	VENDEUR PRINCIPAL MUTEKI
					ZAIRE TOTAL ZAIRE YA KUFUTA	ECHANGE KU SOBA							
						PRODUIT BIMA	UNITE KITESO	NOMBRE NTALU					
1	1	3	6	10	100	0	0	0	1	0	0	3	2
2	1	3	6	30	300	0	0	0	3	120	1	3	1
3	1	3	6	20	200	0	0	0	3	120	1	3	2
4	1	3	6	30	300	0	0	0	3	420	1	3	2
									/				

SEMAINE 1 2 3 4
MPOSO

FORME
MUTINDU

1	tubercules frais	manioko ya mubisu
2	cossette	manioko ya mbuma
3	chikwange	kuanga
4	farine	fufu ya konika
5	pâte	
6	épis frais	disangu ya mubisu
7	épis secs	disangu ya kukauka
8	graines	bambuma
9	coques	nguba ya bapusu
10	autre	ya nkaka

UNITE DE MESURE
KITESO YA NTALU

1	sac	saki
2	bassin	dilonga
3	seau	kantini
4	gobelet	kopo
5	assiette	dilonga ya fioti
6	pièce	na mosi
7	autre	ya nkaka

PAYEMENT-ECHANGE-PRODUIT
LUFUTU- KU SOBA-BIMA

0	aucun	ata mosi
1	manioc	manioko
2	mais	masangu
3	arachide	nguba
4	haricots	madeso
5	riz	loso
6	autre	ya nkaka

PAYEMENT-ECHANGE-UNITE
LUFUTU- KU SOBA-KITESO

0	aucun	ata mosi
1	sac	saki
2	bassin	dilonga
3	seau	kantini
4	gobelet	kopo
5	assiette	dilonga ya fioti
6	pièce	na mosi
7	autre	ya nkaka

LIEU DE VENTE
KISIKA YA KUTEKA

1	village	buala
2	marché	zandu
3	en dehors du village	na nima ya buala
4	au bord de la route	na kati ya nzila

DUREE DU TRAJET — aller en minutes
NTANGU YA KUTAMBULA — wapi na miluta

MODE DE TRANSPORT
MPILA YA KUNATA

0	aucun	ata mosi
1	tête et/ou dos	ntu to mapeka
2	vélo	vélo
3	autre	ya nkaka

VENDU A QUI
NA NANI BOMETEKA

1	personne au village	muntu ya buala
2	commerçant	munkiti
3	autre personne de l'extérieur du village	muntu ya nzenza

VENDEUR
MUTEKI

1	homme	muntu ya bakala
2	femme	muntu ya nkento
3	enfant	muana

FICHE ESTIMATION PRODUCTION MANIOC - MAIS - ARACHIDE
FISI YA KUYIBUKA MPILA YA KUKUNA MANIOKO - MASANGU - NGUBA

MOIS NGONDA	PRODUIT BIMA	FORME MUTINDU	NOMBRE DE BASSINS RECOLTES NTALU YA MALONGA YA BAU ME BASISA
MOIS 1 NGONDA 1	MANIOC MANIOKO	MANIOC ROUI MANIOKO NA KUPOLO NA MASA	
		TUBERCULES FRAIS MANIOKO YA MUBISU	
	MAIS MASANGU	EPIS SECS DISANGU YA KUKAUKA	
		EPIS FRAIS DISANGU YA MUBISU	
	ARACHIDES NGUBA	COQUES BAPUSU	
MOIS 2 NGONDA 2	MANIOC MANIOKO	MANIOC ROUI MANIOKO NA KUPOLO NA MASA	
		TUBERCULES FRAIS MANIOKO YA MUBISU	
	MAIS MASANGU	EPIS SECS DISANGU YA KUKAUKA	
		EPIS FRAIS DISANGU YA MUBISU	
	ARACHIDES NGUBA	COQUES BAPUSU	
MOIS 3 NGONDA 3	MANIOC MANIOKO	MANIOC ROUI MANIOKO NA KUPOLO NA MASA	
		TUBERCULES FRAIS MANIOKO YA MUBISU	
	MAIS	EPIS SECS DISANGU YA KUKAUKA	
		EPIS FRAIS DISANGU YA MUBISU	
	ARACHIDES NGUBA	COQUES BAPUSU	

INSTRUCTIONS POUR L'ENQUETEUR-VILLAGE

Vous visiterez le premier jour de chaque mois les 5 ménages de votre village qui font l'objet de l'enquête. Vous aurez donc 3 visites à effectuer par trimestre pour la fiche estimation de la production. Vous demanderez au chef de ménage et son (ses) épouse(s) le nombre de bassins qu'ont été récolté durant tout le mois passé. Vous posez cette question pour chaque forme (roui, tubercules frais, épis secs, épis frais, coques) des trois produits agricoles de notre enquête.

Assurez-vous que la récolte provienne des champs des membres du ménage.

Exemple: Vous passez le 1 décembre chez un ménage et vous demandez combien de bassins de manioc roui il a récolté durant tout le mois de novembre (du premier au 30 novembre). Ensuite vous posez la même pour tubercules frais, ainsi de suite.

NSIKU SAMBU NA MUNTU YA KISALU NA BUALA

Beno ata kutala kulumbu ya ntete ya ngonda, bakanda tanu ya buala yina imene ponaka.

Beno ata kuvanda na kutala mbala tatu (3) na nima ya ngonda 3 sambu na fisi ya kuyibuka ya bima ya bilanga.
Beno ata yula na mfumu ya nzo to ve na nkento na yandi, to bakuento na yandi, ntalu ya malonga ya bau mene fasisa na ngonda mosi mene kuluta.

Beno ata yuvula, na konso mutindu (ya kupala maniok ya mobisu, masangu ya kuyermuka, masangu ya mobisu to ya mpusu) na bima tatu yai ya bilanga na kutala na beto.

Beno zaba mbote, to kukatula ya bima ya bilanga, na bantu ya bika nda.

Mbandu: Beno luta lumbu ya ntele ya ngonda kumi na zole na kikanda masi, ye beno kuyula malonga kua ya manioko ya kupola namasa, yandi mene katula na ngonda ya mvimba ya kumi na mosi. (Yantika kilumbu ya ntete ya ngonda kumi na mosi li na nsuka ya ngonda.) Na nima beno yuvula ngiuvula mosi yina sambuna manioko ya mobisu ti ya nkaka.

FICHE ESTIMATION
FISI YA KUZABA PENEPENE YA NTALU

PRODUIT MBUTU	MANIOC - MADIOKO		MAIS - MASANGU		ARACHIDES NGUBA	RIZ LOSO	HARICOTS MADEZO	BANANES PLANTAINS MANKONDO	FEUILLES DE MANIOC SAKA-SAKA
FORME MUTINDU	MANIOC ROUI MADIOKO YA KUYINIKUA	TUBERCULES MADIOKO YA NKUNZU	EPIS FRAIS DISANGU YA MAZA	EPIS SECS DISANGU YA KUYUMA	GOUSSES YA MATITI	PADDY YA MATITI	GOUSSES YA MATITI	REGIMES NKANGA	BOTTES BIKUNKU
UNITE DE MESURE KITEZO	NOMBRE DE BASSINS NTALU YA MALONGA	NOMBRE DE BASSINS NTALU YA MALONGA	NOMBRE DE BASSINS NTALU YA MALONGA	NOMBRE DE BASSINS NTALU YA MALONGA	NOMBRE DE BASSINS NTALU YA MALONGA	NOMBRE DE BASSINS NTALU YA MALONGA	NOMBRE DE BASSINS NTALU YA MALONGA	NOMBRE DE REGIMES NTALU YA NKANGA	NOMBRE DE BOTTES NTALU YA BIKUNKU
MOIS 1 NGONDA 1									
MOIS 2 NGONDA 2									
MOIS 3 NGONDA 3									

INSTRUCTIONS POUR L'ENQUETEUR-VILLAGE

Le dernier jour de chaque mois, vous visiterez les 5 ménages de votre village qui sont dans l'enquête. Pour la fiche "Estimation de la Production", vous aurez donc 3 visites à faire par trimestre et par ménage.

Vous demandez au chef de ménage et son (ses) épouse(s) le nombre de bassins qui ont été récoltés le mois avant. Vous posez cette question pour chaque produit et chaque forme de ce produit, c'est-à-dire pour le manioc roui, le manioc tubercules frais, le maïs épis secs, maïs épis frais, arachides gousses, haricots gousses, le riz paddy Pour les bananes plantains, vous demandez le nombre de régimes récoltés et pour les feuilles de manioc, le nombre de bottes.

Assurez-vous que la récolte provienne des champs des membres du ménage.

Exemple: Vous passez le 1 décembre chez un ménage et vous demandez combien de bassins de manioc roui il a récolté durant tout le mois de novembre (du premier au 30 novembre). Ensuite vous posez la même question pour les tubercules frais et ainsi de suite.

NSADILU YA KISADI YA BUALA

Kilamba ya ntete ya konso ngonda, kuenda tala mabuta nionso tanu ya buala kesalimina bisalu na beto. Nge ketala bau mbala tatu konso ngonda tatu samu na kufulusa fisi "ya kuzaba penepene ya ntalu ya bambutu".

Yuvusa na mfumu ya dibuta na nkento nandi to bakento nandi ntalu ya malonga babakaka na ngonda me luta. Yuvusa nguivu yayi samu na konsa mutindu ya mbutu: madioko ya kuyinikua, madioko ya nkunzu, masangu ya kuyuma, masangu ya nkunzu, nguba matiti, madezo ya matiti, loso ya matiti. Samu na mankondo, yuvusa ntalu ya ba nkanga bakukaka. Samu na saka-saka, yuvusa ntalu ya bikunku.

Sonika kaka bima yina me katuka na bilanga ya dibuta.

Kifuanisu: ngeme luta kilumbu ya ntete ya ngonda kumi na zole na dibuta mpe ngeme yuvusa bau ntalu ya malonga madioko ya kuyinikua ba bakaka na ngonda nionso ya kumi na mosi (banda kilumbu ya ntete ti na nsuka ngonda). Na manima yuvusa nguivu yina kaka samu na madioko ya nkunzu na bima nkaka.

Annex 2: Production of maize and groundnut in Bandundu and Bas Congo and rice, beans and plantains in Bas Congo

Table 1: Production of Maize (grain) and Groundnuts (husk) in Bandundu (Oct. 1987-Sept. 1988) and Bas Congo (Oct. 1988-Sept. 1989), marketing project and official statistics in ton

	Maize			Groundnuts		
	marketing project	official data	% Δ	marketing project	official data	% Δ
Bandundu	229.600	122.400	+87.6	134.200	96.600	+38.91
Bas Congo	38.180	25.300	+50.4	65.257	17.000	+284.0

Source: Marketing surveys and Division des Statistiques Agricoles, 1990

Table 2: Production of Rice, Beans and Plantains, October 1988-September 1989, Bas Congo, marketing project and official statistics, in ton

	marketing project	official data	% Δ
Rice	8.622	6.820	+26.4
Beans	17.316	8.490	+104.0
Plantains	149.284	251.010	-59.5

Source: Marketing surveys and Division des Statistiques Agricoles, 1990

Annex 3 Results of household budget surveys in Kinshasa, 1975 to 2000

Tableau 1: Consommations alimentaires annuelles per capita, ville de Kinshasa, kg

N°	Produits	Années				
		1975	1986	1990	1995	2000
1	Manioc (tubercules)	176,71	165,39	161,84	156,52	145,31
2	Blé (farine)	37,92	32,08	30,37	28,36	26,48
3	Légumes (feuilles fraîches)	24,73	25,03	25,12	24,24	24,35
4	Riz	8,41	12,81	15,41	19,43	21,51
	- Riiz local (grains)	4,91	7,62	9,26	11,82	13,09
	- Riz importé (grains)	3,50	5,18	6,15	7,61	8,42
5	Boissons alcoolisées	31,90	18,42	15,76	12,98	10,69
6	Poissons frais et conserves	11,40	10,97	10,81	10,62	10,43
7	Plantains	3,85	5,39	6,22	7,43	8,89
8	Huiles et autres matières grasses	14,78	10,18	9,08	7,88	6,83
9	Maïs grains	2,84	4,02	4,64	5,57	6,68
10	Laits	1,72	2,83	3,56	4,74	6,32
11	Condiments (sels, piments)	3,46	4,06	4,33	4,70	5,09
12	Poulets	1,90	4,51	7,23	6,03	4,48
13	Sucres	6,59	5,12	4,72	4,27	3,86
14	Viande bovine	6,53	4,67	4,21	3,70	3,26
15	Haricots	5,02	3,97	3,68	3,34	3,03
16	Tomates en boîtes	1,39	1,57	1,69	1,74	1,85
17	Citrons divers	1,12	1,25	1,30	1,38	1,45
18	Oignons	2,29	1,64	1,48	1,30	1,14
19	Bananes douces	1,91	1,48	1,37	1,24	1,12
20	Arachides (coques)	2,79	1,52	1,87	1,05	0,85
21	Poissons fumés, salés, séchés	6,13	1,72	1,32	0,94	0,67
	Autres produits	14,41	3,50	2,75	2,10	1,62
Total		367,80	322,13	318,76	309,54	295,91

Sources: Houyoux,(1986), PNUD - SOCOMEG (2000) et Guy-Bernard Nkwembe Unsital (2002).

Tableau 2: Consommations alimentaires annuelles per capita, ville de Kinshasa, kg, calories et g de proteïnes

N°	Produits	Années 2000		
		kg	calories	proteïnes
1	Manioc (tubercules)	145,31	433,9	3,6
2	Blé (farine)	26,48	268,2	12,9
3	Légumes (feuilles fraîches)	24,35	33,3	3,2
4	Riz	21,51	212,0	4,4
	- Riiz local (grains)	13,09	-	-
	- Riz importé (grains)	8,42	-	-
5	Boissons alcoolisées	10,69	9,6	0,2
6	Poissons frais et conserves	10,43	21,7	4,4
7	Plantains	8,89	20,7	0,4
8	Huiles et autres matières grasses	6,83	132,6	-
9	Maïs grains	6,68	65,0	1,7
10	Laits	6,32	14,7	0,7
11	Condiments (sels, piments)	5,09	13,9	0,4
12	Poulets	4,48	24,9	2,5
13	Sucres	3,86	36,1	-
14	Viande bovine	3,26	21,1	1,6
15	Haricots	3,03	27,9	1,6
16	Tomates en boîtes	1,85	2,7	0,2
17	Citrons divers	1,45	1,1	0,0
18	Oignons	1,14	1,1	0,0
19	Bananes douces	1,12	2,6	0,0
20	Arachides (coques)	0,85	6,9	0,4
21	Poissons fumés, salés, séchés	0,67	7,6	1,3
	Autres produits	1,62	10,0	-
Total		295,91	1.367,6	39,5

Sources: Houyoux,(1986), PNUD - SOCOMEG (2000) et Guy-Bernard Nkwembe Unsital (2002) et nos calculs.

Tableau 3: Consommations alimentaires annuelles per capita, ville de Kinshasa, 1975-2000, calories et g de proteïnes

	calories	proteïnes
1975	1.797	59,8
1986	1.506	46,8
1990	1.471	46,3
1995	1.438	44,0
2000	1.368	38,5

Sources: Houyoux (1986), PNUD - SOCOMEG (2000) et Guy-Bernard Nkwembe Unsital (2002) et nos calculs.

List of Available Working Papers

nr. 1 BEERLANDT, H. en L. DRIESEN, *Criteria ter evaluatie van 'duurzame landbouw'*, Afdeling Landbouweconomie, K.U.Leuven, januari 1994, 35 p.

nr. 2 BEERLANDT, H. en L. DRIESEN, *Evaluatie van herbicide-resistente planten aan criteria voor duurzame landbouw,* Afdeling Landbouweconomie, K.U.Leuven, januari 1994, 39 p.

nr. 3 BEERLANDT, H. en L. DRIESEN, *Evaluatie van bovine somatotropine aan criteria voor duurzame landbouw*, Afdeling Landbouweconomie, K.U.Leuven, januari 1994, 63 p.

nr. 4 BEERLANDT, H. en L. DRIESEN, *Evaluatie van gemanipuleerde planten met biopesticide eigenschappen afkomstig van Bacillus thuringiensis aan criteria voor duurzame landbouw,* Afdeling Landbouweconomie, K.U.Leuven, januari 1994, 32 p.

nr. 5 BEERLANDT, H. en L. DRIESEN, *Evaluatie van haploide planten aan criteria voor duurzame landbouw,* Afdeling Landbouweconomie, K.U.Leuven, januari 1994, 17 p.

nr. 6 BEERLANDT, H. en L. DRIESEN, *Evaluatie van genetische technieken voor diagnosebepaling, immunologische technieken ter verbetering van de landbouwproduktie en transgene dieren en planten als bioreactor aan criteria voor duurzame landbouw,* Afdeling Landbouweconomie, K.U.Leuven, januari 1994, 28 p.

nr. 7 BEERLANDT, H. en L. DRIESEN, *Evaluatie van verbetering van de stikstoffixatie bij planten aan criteria voor duurzame landbouw,* Afdeling Landbouweconomie, K.U.Leuven, januari 1994, 17 p.

nr. 8 BEERLANDT, H. en L. DRIESEN, *Evaluatie van porcine somatotropine aan criteria voor duurzamelandbouw,* Afdeling Landbouweconomie, K.U.Leuven, januari 1994, 29 p.

nr. 9 BEERLANDT, H. en L. DRIESEN, *Evaluatie van tomaten met een langere houdbaarheid aan criteria voor duurzame landbouw,* Afdeling Landbouweconomie, K.U.Leuven, februari 1994, 30 p.

nr. 10 CHRISTIAENSEN, L., *Voedselzekerheid: van concept tot actie: een status questionis,* Afdeling Landbouweconomie, K.U.Leuven, april 1994, 106 p.

nr. 11 CHRISTIAENSEN, L. and J. SWINNEN, *Economic, Institutional and Political Determinants of Agricultural Production Structures in Western Europe,* Afdeling Landbouweconomie, K.U.Leuven, May 1994, 40 p.

nr. 12 GOOSSENS, F., *Efficiency and Performance of an Informal Food Marketing System, The case of Kinshasa, Zaire,* Afdeling Landbouweconomie, K.U.Leuven, July 1995, 41 p.

nr. 13 GOOSSENS, F., *Failing Innovation in the Zairian Cassava Production System, A comparative historical analysis,* Afdeling Landbouweconomie, K.U.Leuven, July 1995, 18 p.

nr. 14 TOLLENS, E., *Cadre conceptuel concernant l'analyse de la performance économique des marchés,* Projet-FAO "Approvisionnement et Distribution Alimentaires des Villes de l'Afrique Francophone", Afdeling Landbouweconomie, K.U.Leuven, août 1995, 35 p.
(Deuxieme version, avril 1996)

nr. 15 TOLLENS, E., *Les marchés de gros dans les grandes villes Africaines, diagnostic, avantages et éléments d'étude et de développement,* Projet-FAO "ApprovisioMement et Distribution Alimentaires des Villes de l'Afrique Francophone", Afdeling Landbouweconomie, K.U.Leuven, août 1995, 23 p.
(Deuxieme version, septembre 1996, 32 p.)

nr. 16 ENGELEN, G., *Inleiding tot de landbouwvoorlichting* (heruitgave), Afdeling Landbouweconomie, K.U.Leuven, augustus 1995, 17 p.

nr. 17 TOLLENS, E., *Agricultural Research and Development towards Sustainable Production Systems: I. Information Sources, Surveys; II. Conceptualisation of the Change Process,* NATURA-NECTAR course: "Agricultural Economics and Rural Development", module 1, Afdeling Landbouweconomie, K.U.Leuven, August 1995

nr. 18 TOLLENS, E., *Planning and Appraising Agricultural Development programmes and Projects: I. Farm Planning; II. Aggregation, Sensitivity Analyses and Farm Investment Analysis; III. Guidelines on Informal Surveys and Data Collection,* NATURA-NECTAR course: "Agricultural Economics and Rural Development", module 2, Afdeling Landbouweconomie, K.U.Leuven, September 1995

nr. 19 TOLLENS, E., *Structural Adjustment and Agricultural Policies: I. Market Theory: the State and the Private Sector; II. Output Markets and Marketing Institutions; III. Input Markets; IV. Case Study: Cameroon,* NATURA-NECTAR course: "Agricultural Economics and Policy Reforms", module 1, Afdeling Landbouweconomie, K.U.Leuven, September 1995

nr. 20 TOLLENS, E., *Theory and Macro-Economic Measures of Structural Adjustment – Methods of Evaluation and Linkages to the Agricultural Sector: I. Development Models and the Role of Agriculture,* NATURA-NECTAR course: "Agricultural Economics and Policy Reforms", module 2, Afdeling Landbouweconomie, K.U.Leuven, September 1995

nr. 21 TOLLENS, E., *Theory and Macro-Economic Measures of Structural Adjustment – Methods of Evaluation and Linkages to the Agricultural Sector: II. Implementation of Policy Reforms: Case Study of Market Liberalisation in Cameroon for Cocoa and Coffee,* NATURA-NECTAR course: "Agricultural Economics and Policy Reforms", module 2, Afdeling Landbouweconomie, K.U.Leuven, September 1995

nr. 22 TOLLENS, E., *Supply Response within the Farming Systems Context: I. Input Supply and Product Markets; II. Agricultural Supply Response Assessment,* NATURA-NECTAR course: "Agricultural Economics and Policy Reforms", module 3, Afdeling Landbouweconomie, K.U.Leuven, September 1995

nr. 23 GOOSSENS, F., *Agricultural Marketing and Marketing Analysis: I. Agricultural Marketing Research Frameworks. II. Agricultural Market Performance Criteria and The Role of Government Intervention,* NATURA-NECTAR course: "Agricultural Economics and Rural Development", module 3, Afdeling Landbouweconomie, K.U.Leuven, September 1995

nr. 24 GOOSSENS, F., *Agricultural Marketing and Marketing Analysis: Demand Analysis,* NATURA-NECTAR course: "Agricultural Economics and Rural Development", module 3, Afdeling Landbouweconomie, K.U.Leuven, September 1995

nr. 25 CHRISTIAENSEN, L. en H. BEERLANDT, *Belgische voedselhulp geanalyseerd met betrekking tot voedselzekerheid,* Afdeling Landbouweconomie, K.U.Leuven, november 1994, 15 p.

nr. 26 CHRISTIAENSEN, L. en H. BEERLANDT, *De Belgische ontwikkelingssamenwerking met Rwanda geanalyseerd met betrekking tot voedselzekerheid,* Afdeling Landbouweconomie, KU.Leuven, november 1995, 36 p.

nr. 27 BEERLANDT, H., *Identificatie van de meest kwetsbaren in Monduli distrikt, Arusha regio, Tanzania,* A.C.T.- Afdeling Landbouweconomie, K.U.Leuven, april 1995, 40 p.

nr. 28 BEERLANDT, H., TOLLENS, E. and DERCON, S., *Methodology for Addressing Food Security in Development Projects, Identification of the Food Insecure and the Causes of Food Insecurity based on Experiences from the Region of Kigoma, Tanzania,* Department of Agncultural Economics and Centre for Economic Research, K.U.Leuven, Leuven, December 1995, 19 p.

nr. 29 BEERLANDT, H., *Koppelen van noodhulp en strukturele ontwikkelingssamenwerking: opties voor een Belgisch beleid,* Afdeling Landbouweconomie, K.U.Leuven, december 1995, 23 p.

nr.30 TOLLENS, E., *La crise agraire au Zaïre: pour quelle politique de développement dans la phase de transition?,* Une contribution au colloque "Le Zaïre en Chantier: Quels Projets de Societé", Anvers, 18 février 1993, December 1995, 14 p.

nr.31 GOOSSENS, F., *Rôle des systemes d'alimentation dans la securité alimentaire de Kinshasa,* Une contribution au projet GCP/RAF/309, AGSM, FA0, mai 1996, 78 p.

nr.32 BEERLANDT, H., DERCON, S., and SERNEELS, I., (Project co-ordinator: E. TOLLENS), *Tanzania, a Food Insecure Country?,* Department of Agricultural Economics, Center for Economic Research, K.U.Leuven, September 1996, 68 p.

nr. 33 TOLLENS, E., *Food security and nutrition 2. Case study from Tanzania,* Nectar Programme, Agricultural Economics and Policy Reforms, module 4, Afdeling Landbouweconomie, K.U.Leuven, Septembre 1996, 47 p.

nr. 34 BEERLANDT, H., en SERNEELS, J., *Voedselzekerheid in de regio Kigoma, Tanzania,* Afdeling Landbouweconomie en Centrum voor Economische Studiën, K.U.Leuven, september 1996, 45 p.

nr. 35 BEERLANDT, H., *Identificatie van verifieerbare indicatoren ter toetsing van de voedselzekerheidssituatie in de regio Arusha, Tanzania,* Afdeling Landbouweconomie, K.U.Leuven, november 1996, 60 p.

nr. 36 GOOSSENS, F., *Commercialisation des vivres locaux en Afrique Subsaharienne, le secteur informel dans un perspectif dynamique,* Une contribution au projet GCP/RAF/309, AGSM, FAO, novembre 1996, 58 p.

nr. 37 GOOSSENS, F., *The Economics of Livestock Systems: I. Marketing Problems and Channels of Livestock in Subsahara Africa,* NATURA-NECTAR course: "Agricultural Economics and Rural Development", module 4, Afdeling Landbouweconomie, K.U.Leuven, November 1996.

nr. 38 GOOSSENS, F., *The Economics of Livestock Systems: II. Price Stabilization in the Livestock Sector,* NATURA-NECTAR course: "Agricultural Economics and Rural Development", module 4, Afdeling Landbouweconomie, K.U.Leuven, November 1996.

nr.39 GOOSSENS, F., *The Economics of Livestock Systems: III. Consumer Demand for Livestock Products,* NATURA-NECTAR course: "Agricultural Economics and Rural Development, module 4, Afdeling Landbouweconomie, K.U.Leuven, November 1996.

nr. 40 JASPERS, N., *I. La Seguridad Alimenticia en el departamento de Quiché: Identificación e Impacto del Programa de Créditos, II. Informe Sobre Estudio Seguridad Alimenticia,* ACT - Afdeling LandbwAuweconomie, K.U.Leuven, November 1996, 39 p.

nr. 41 TOLLENS, E., *Social indicators with an illustration from Thailand,* NATURA-NECTAR course: "Agricultural Economics and Policy Reforms", module 4, Afdeling Landbouweconomie, K.U.Leuven, January 1997, 38 p.

nr. 42 BEERLANDT, H., en SERNEELS, J., *Handleiding voor een voedselzekerheidsdiagnose,* Afdeling Landbouweconomie en Centrum voor Economische Studiën, K.U.Leuven, februari 1997, 131 p.

nr. 43 BEERLANDT, H., and SERNEELS, J., *Manual for a Food Security Diagnosis,* Department of Agricultural Economics and Center for Economic Research, K.U.Leuven, March 1997, 125 p.

nr. 44 GOOSSENS, F., *Aangepaste vormen van samenwerking als hefboom voor de sociaal-economische promotie van boeren in het zuiden - algemene conclusies,* Seminarie georganizeerd door Ieder Voor Allen, Brussel, 17-18 maart 1997, 8 p.

nr. 45 GOOSSENS, F., *Commercialisation des vivres locaux en Afrique Subsaharienne - neuf études de cas,* Afdeling Landbouweconomie, K.U.Leuven, Mai 1997, 50 p.

nr. 46 BEERLANDT, H., en SERNEELS, J., *Food Security in the Kigoma Region of Tanzania,* Department of Agricultural Economics and Center for Economic Research, K.U.Leuven, May 1997, 42 p.

nr. 47 BEERLANDT, H., and SERNEELS, J., *Manuel Pour un Diagnostic de Securité Alimentaire,* Département d'Economie Agricole et le Centre d'Etudes Economiques, K.U.Leuven, Juillet 1997, 134 p.

nr. 48 GOOSSENS, F., *Rural Services and Infrastructure - Marketing Institutions,* NATURA-NECTAR course: "Agricultural Economics and Policy Reforms", module 4, Afdeling Landbouweconomie, K.U.Leuven, June 1997, 20 p.

nr. 49 TOLLENS, E., *International Trade and Trade Policy in Livestock and Livestock Products,* NATURA-NECTAR COURSE: "Agricultural Economics and Rural Development", module 4, Afdeling Landbouweconomie, K.U.Leuven, October 1997,43 p.

nr. 50 DESMET, A., *Working towards autonomous development of local farmer organisations: which role for development agencies?,* Department of Agricultural Economics and Center for Economic Research, March 1998, 49 p.

nr. 51 TOLLENS, E., *Catalogue de titres dans la bibliotheque ALEO sur le Zaïre - Congo,* Département d'Economie Agricole, Mars 1998, 96 p.

nr. 52 DEMONT, M., JOUVE, P., STESSENS, J., et TOLLENS, E., *Evolution des systèmes agraires dans le Nord de la Côte d'Ivoire: les débats « Boserup versus Malthus » et « compétition versus complémentarité » révisités*, Département d'Economie Agricole et de l'Environnement, K.U.Leuven, Avril 1999, 43 p.

nr. 53 DEMONT, M., and TOLLENS, E., *The Economics of Agricultural Biotechnology: Historical and Analytical Framework*, Department of Agricultural and Environmental Economics, K.U.Leuven, October 1999, 47 p.

nr. 54 DEMONT, M., en TOLLENS, E., *Biologische, biotechnologische en gangbare landbouw : een vergelijkende economische studie*, Afdeling Landbouw- en Milieueconomie, K.U.Leuven, Maart 2000, 53 p.

nr. 55 DEMONT, M., JOUVE, P., STESSENS, J., and TOLLENS, E., *The Evolution of Farming Systems in Northern Côte d'Ivoire: Boserup versus Malthus and Competition versus Complementarity*, Department of Agricultural and Environmental Economics, K.U.Leuven, August 2000, 25 p.

nr. 56 DEMONT, M., and TOLLENS, E., *Economic Impact of Agricultural Biotechnology in the EU: The EUWAB-project*, Department of Agricultural and Environmental Economics, K.U.Leuven, January 2001, 16 p.

nr. 57 DEMONT, M., and TOLLENS, E., *Reshaping the Conventional Welfare Economics Framework for Estimating the Economic Impact of Agricultural Biotechnology in the European Union*, Department of Agricultural and Environmental Economics, K.U.Leuven, March 2001, 32 p.

nr. 58 DEMONT, M., and TOLLENS, E., *Uncertainties of Estimating the Welfare Effects of Agricultural Biotechnology in the European Union*, Department of Agricultural and Environmental Economics, K.U.Leuven, April 2001, 81 p.

nr. 59 DEMONT, M., and TOLLENS, E., *Welfare Effects of Transgenic Sugarbeets in the European Union: A Theoretical Ex-Ante Framework*, Department of Agricultural and Environmental Economics, K.U.Leuven, May 2001, 39 p.

nr. 60 DE VENTER, K., DEMONT, M., and TOLLENS, E., *Bedrijfseconomische impact van biotechnologie in de Belgische suikerbietenteelt*, Afdeling Landbouw- en Milieueconomie, K.U.Leuven, Juni 2002, 66 p.

nr. 61 DEMONT, M., and TOLLENS, E., *Impact of Agricultural Biotechnology in the European Union's Sugar Industry*, Department of Agricultural and Environmental Economics, K.U.Leuven, June 2002, 55 p.

nr. 62 DEMONT, M., and TOLLENS, E., *The EUWAB-Project: Discussion*, Department of Agricultural and Environmental Economics, K.U.Leuven, August 2002, 20 p.

nr. 63 DEMONT, M., DELOOF, F. en TOLLENS, E., *Impact van biotechnologie in Europa: de eerste vier jaar Bt maïs adoptie in Spanje*, Afdeling Landbouw- en Milieueconomie, K.U.Leuven, Augustus 2002, 41 p.

nr. 64 TOLLENS, E., *Food Security: Incidence and Causes of Food Insecurity among Vulnerable Groups and Coping Strategies*, Department of Agricultural and Environmental Economics, K.U.Leuven, September 2002, 30 p.

nr. 65 TOLLENS, E., *La sécurité alimentaire: Incidence et causes de l'insécurité alimentaire parmi les groupes vulnérables et les strategies de lutte*, Département d'Economie Agricole et de l'Environnement, K.U.Leuven, Septembre 2002, 33 p.

nr. 66 TOLLENS, E., *Food Security in Kinshasa, Coping with Adversity*, Department of Agricultural and Environmental Economics, K.U.Leuven, September 2002, 35 p.

nr. 67 TOLLENS, E., *The Challenges of Poverty Reduction with Particular Reference to Rural Poverty and Agriculture in sub-Saharan Africa*, Department of Agricultural and Environmental Economics, K.U.Leuven, September 2002, 31 p.

nr. 68 TOLLENS, E., *Het voedselvraagstuk*, Afdeling Landbouw- en Milieueconomie, K.U.Leuven, September 2002, 71 p.

nr. 69 DEMONT, M., WESSELER, J., and TOLLENS, E., *Biodiversity versus Transgenic Sugar Beet: The One Euro Question*, Department of Agricultural and Environmental Economics, K.U.Leuven, November 2002, 33 p.

nr. 70 TOLLENS, E., and DEMONT, M., *Biotech in Developing Countries: From a Gene Revolution to a Doubly Green Revolution?*, Department of Agricultural and Environmental Economics, K.U.Leuven, November 2002, 8 p.

nr. 71 TOLLENS, E., *Market Information Systems in Liberalized African Export Markets: The Case of Cocoa in Côte d'Ivoire, Nigeria and Cameroon*, Department of Agricultural and Environmental Economics, K.U.Leuven, November 2002, 19 p.

nr. 72 TOLLENS, E., *Estimation of Production of Cassava in Bandundu (1987-1988) and Bas Congo (1988-1989) Regions, as Compared to Official R.D. Congo statistics*, Department of Agricultural and Environmental Economics, K.U.Leuven, December 2002, 29 p.

nr. 73 TOLLENS, E., *Biotechnology in the South: Absolute Necessity or Illusion?*, Department of Agricultural and Environmental Economics, K.U.Leuven, December 2002, 29 p.

nr. 74 DEMONT, M., BONNY, S., and TOLLENS, E., *Prospects for GMO's in Europe*, Department of Agricultural and Environmental Economics, K.U.Leuven, January 2003.