Assessing relationship between agricultural and food diversity within African rural households: a case study in Southwestern Burkina Faso

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INTRODUCTION

Diversifying diets to achieve food and nutrition security in rural households of sub-Saharan Africa raises challenging issues. In these farming systems, a substantial share of the farm production is allocated to self consumption but the link between production and food diversity within the farm remains fuzzy. Most of published studies use large data samples and statistical analyses to characterize these linkages. But their results are not always conclusive or even contradictory (Jone, 2017; Sibhatu and Qaim, 2018).

Based on a comprehensive survey of 42 farms in Burkina Faso, this study investigates whether and how farmers integrate a food diversity objective in their production choices, either through self consumption or by marketing their products and purchasing food.

MATERIAL & METHODS

A holistic approach was implemented to document the relationship between crop/livestock and food choices in Southwestern Burkina Faso farming systems.

Three villages were selected to embrace environmental diversity (access to main roads, local market, natural forest) :

- Gombélédougou: quite isolated, close to a natural forest
- Makognadougou: on a main road axis connecting the two main cities
- Wakuy: the most isolated as compared to the two other villages
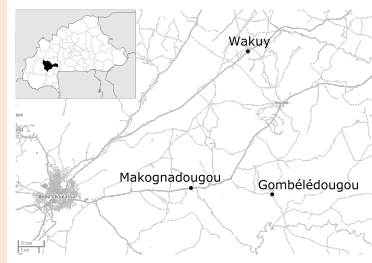
▲ **Study sites**
Location of the 3 villages in the Tuy province (OpenStreetMap, 2020)

In each village, 14 farms were selected to embrace sociocultural diversity (ethnic group, religion, household structure). Each farm was monitored over one year on a 10-days time step (38 data replicates) regarding (i) crop and livestock management, (ii) crop and food stocks inventory, and (iii) dietary intakes.

This quantitative monitoring was completed by qualitative interviews conducted with each household head and the women in charge of cooking in order to understand both their crop and food choices.

Household organization	Field management	Bwaba	Mossi	Peuhl	Dafing	Dagara	Total
One household Monogamous	CF*	1	1				2
	CF + IF				1	1	2
Multi-household and/or Polygamous	CF	8	1	6	1		16
	CF + IF	9	8	2	2	1	22
Total		**18**	**10**	**8**	**4**	**2**	**42**

CF = common field; IF = individual field

▲ **Sample description**
Distribution of the 42 farms according to their household structure and the existence of common and/or individual fields

Based on the hypothesis that farm structure, crop choices and food choices would be intertwined, we focused our analysis on the different strategies adopted by farmers and the way they are connected.

RESULTS

Maize is the main crop and staple food in the region. The top first objective of the farm head is to provide maize for the family consumption throughout the year. Maize is grown in rotation with cotton in farms with sufficient land, workforce and cash flow. Otherwise traditional cereal crop can be grown then sold and exchanged or maize can be bought with income generated from other activities : livestock breeding, market gardening, off-farm activities.

Farm structure	n	Land assets (ha per capita) Mean	CV	Livestock assets (TLU per capita) Mean	CV
S1	13	0.34	50%	0.25	64%
S1L	3	0.39	31%	0.82	24%
S1P	8	0.14	36%	1.59	48%
S2	11	0.96	17%	0.33	33%
S2L	4	1.02	16%	0.68	35%
S3L	3	2.17	23%	0.64	17%

◀ **Farm structure typology**
According to data dispersion, thresholds for land and livestock assets were set respectively at 0.6 ha per capita and 0.5 TLU per capita. Six types of farm structure were then identified. (TLU = tropical livestock unit)

Crop choices	n	Cereal crops Mean	CV	Legume crops Mean	CV	Market oriented crops Mean	CV
C	3	100%	0%				
CL	10	72%	31%	28%	79%		
CLM	22	47%	28%	7%	57%	46%	33%
CLMV	1	45%		7%		48%	
CM	4	58%	19%			42%	26%
CMV	1	70%				30%	
LV	1			100%			

▶ **Crop choices typology**
Cropping patterns may combine C = cereal (maize, sorghum, rice), L = legumes (groundnut, cowpea), M = market-oriented crops (cotton, sesame), V = vegetables (onion, tomato, eggplant, cabbage) and house garden plant (gombo, Guinea sorrel). Seven combinations of C, L, M, and V were identified at farm level

Food choices	n	Vegetables	Gombo	Rice	Ground-nut	Guinea sorrel
F1	7	14.43	9.57	9.57	7.43	3.43
F2	9	6.44	17.67	5.56	6.78	4.78
F3	11	16.00	17.36	2.82	9.82	13.91
F4	10	24.00	13.90	15.20	9.40	5.60
F5	5	26.80	21.60	18.40	20.80	12.00

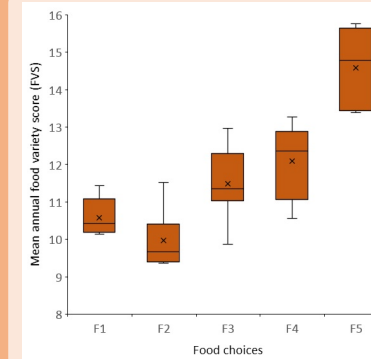Mean consumption frequency (days)

◀ **Food choices typology**
Consumption frequency of each food item likely to be grown by farmers may vary from 0 (never) to 38 (always) at farm level. Only five of them had a variable frequency within the farm sample. Five types of food choices were identified based on the combined frequencies of these five items.

Current cropping patterns are little diversified. Cereal crops (mostly maize) cover 29% to 100% of cultivated areas. Its combination with market-oriented crops (mostly cotton) exceeds 75% of cultivated areas. Legumes (mostly groundnut and cowpea) cover 13% of the cultivated areas in average.

When farm structure and crop choices typologies are crossed, it results in 15 combinations:

- S1 farms with little land and livestock per capita adopt a wide range of strategies (C, CL, CLM, CM, CMV, LV): farms with the most available land grow cotton, other farms generate income from sesame crop, market garden or off-farm activities;
- S1P farms gathers all the Peuhl farmers, traditionally breeders: The farm with the most available land grow cotton (CM), the others grow C or CL;
- Farms with better land and livestock assets per capita (S1L, S2 and S2L) grow CLM or CLMV. Most farms have a complementary off-farm activity;
- S3L farms are all located in Wakuy and are specialized in cotton/maize rotation (CLM, CM). They have the greatest cultivated areas of the sample (>25 ha).

Crossing the three typologies results in 27 combinations, showing that the link between farm structure, crop choices and food choices is not straightforward.

▲ **Overall food variety**
The food variety score is defined as the number of food items consumed by all the household members within the farm over an entire day, from a possible total of 151 items either produced, purchased, picked or given

Mean annual food variety score (FVS) never exceeds 16 food items and 90% of the total consumption is centered on 30 food items out of the 150 possible.

FVS is inherently correlated to food choices typology.Three points appear in first analysis:

- The presence of individual field, allowing women to grow legumes, does not seem to impact food variety;
- Mossi ethnic group has a particularly low FVS (most of the F2 farms);
- F5 farms are located in the same village (Gombélédougou).

CONCLUSION

- A common objective to every farmer : to grow and/or to buy maize in order to cover the family needs regarding staple food throughout the year;
- Marketing crops for covering family expenses, including food items purchase: all farms sell part of their production (cotton, maize, legumes);
- Growing legumes participates to food variety in the diets, but it is not its primary objective;
- Using income to increase or not food variety in diets is an individual choice disconnected from farmers' agricultural strategies.

References :

Jones, A.D., 2017. Critical review of the emerging research evidence on agricultural biodiversity, diet diversity, and nutritional status in low- and middle-income countries. Nutr. Rev. 75, 769–782. doi:10.1093/nutrit/nux040

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