QUEEN — Facilitator Toolkit

QualitativE Evaluator of farm productioN

Practical step-by-step guide, monitoring sheets, and questionnaires

Prepared from Assogba et al. (2025)

Figure 1: A group of farmers playing QUEEN in semi-arid Burkina Faso

Contents

1 Introduction and Relevance

Why this game matters

The QUEEN game is a participatory learning tool to explore crop–livestock integration, agroecological practices, and social cooperation in smallholder mixed systems under **high rainfall variability**. In many semi-arid zones, **rainfall is the main driver of production** while **nutrient applications remain low** and **biomass is scarce**. This combination creates unstable yields, feed deficits, and pressure on soils.

QUEEN lets players test strategies already studied at field level and see how they play out at **farm and village scale**, under **good** and **bad** seasons. Participants manage crops, residues, livestock, labour and cash; compete/cooperate over common resources; and confront trade-offs among *food security*, *income*, and *resilience*. The game encourages discussion of:

- Soil fertility as a foundation for stable yields and residue (feed) production;
- Livestock management for manure and reproduction;
- Social organisation to reduce unproductive competition over shared grazing;
- Financial planning to manage scarce cash and market exposure.

2 Agroecological Options in QUEEN

QUEEN allows players to explore various agroecological practices in order to increase the sustainability of their farms.

Options Players Can Explore

Intercropping (incl. cereal–legume): stabilises yields, improves N cycling; outcomes depend on the pair chosen.
Rotation: breaks pest cycles, manages nutrients, spreads risk across seasons.
Organic + mineral fertilisation: manure, mulch and fertiliser can be combined for yield and residue gains.
Market choices: crop selection affects cash flow and food security.

Game crops and their roles:

- **Sorghum** — staple; sets baseline food production and residue supply.
- **Cowpea** — main legume; food + cash + add nitrogen in soil and grains.
- **Sesame** — cash crop; drives income but not a staple food.
- **Mungbean** — new legume, excellent as cover/green manure; poor fodder preference.

Player objective: maximise crop and livestock production and **income**, while **remaining food secure**. The game is *open* to local social rules, provided they respect the basic game rules.

3 Preparation for the Game Session

Before You Start

Players: 4 per board is ideal. 4 facilitators: 1 for crop and livestock production, 1 for the market and exchanges, and 1 to report key moments in a game session. In classes, run multiple boards.
Time: 5 rounds ≈ 2–2.5 hours; short mode: 3 rounds.
Room: Arrange tables so groups can discuss without disturbing each other.

Materials Checklist

- A1 QUEEN board (schematic/legend in Section 6)
- Tokens: livestock, manure, fertiliser, residues, grains, cash, family markers, bonus pawns
- Player resource sheets and monitoring sheets (crops, livestock, market, exchange)
- Season cards (Good/Bad) or dice
- Pre- and Post-game questionnaires
- Flipchart + markers, pens/pencils

4 Game Structure & Rules

Round and Step Overview

Step mapping

Step 1 — Sowing: Rules #1–11, 15, 18
Step 2 — Harvesting: Rules #12–14, 16–17, 19–20
Step 3 — Trading: Rules #21–24

Rules of the Game (1–24)

1. In a good season, each plot produces 2 units of grains and 2 units of crop residues.
2. A maximum of 2 units of manure/mulch and a maximum of 2 units of fertiliser can be applied on one plot.
3. In a good season, in strip intercropping, a plot produces 1 unit of grain and 1 unit of residue of each crop.

4. In a good season, in traditional sorghum–cowpea intercropping, a plot produces 2 units of grains and 2 units of crop residues of sorghum. Grain advantage of intercropping appears after two consecutive rounds of intercropping on the same plot (see #7–#8).
5. In a bad season, grain and crop residues production per plot is divided by half.
6. Plot production drops by half after two years of monoculture.
7. There is one additional unit of grain after two consecutive rounds of intercropping or manure application.
8. Attribution of additional grain/crop residues and production in bad year in intercropped plots: sorghum > cowpea > mungbean > sesame.
9. Manure provides one additional unit of grain and crop residues.
10. One unit of crop residues used as mulch provides one additional unit of grains.
11. Fertiliser provides one additional unit of grains and crop residues in good years and only one additional unit of crop residues in bad years.
12. All grains are harvested.
13. The number of units of crop residues a farm can harvest depends on household size and number of cattle and donkeys. Two people harvest one unit of residue; one cattle/donkey can harvest 4 units of residues.
14. Cattle, donkey and sheep respectively require 4, 3 and 2 units of residues after harvest. Unfed animals die the next round.
15. Livestock feed on unlimited grass in grazing land at the sowing step.
16. Livestock of all farms can feed on crop residues not harvested by participants.
17. A maximum of two animals can compete for crop residues on a field after harvest. If competition occurs, throw a die to decide which animal benefits.
18. Two cattle, 4 donkeys or 8 small ruminants produce 1 unit of manure at the first step of each round.
19. Livestock reproduce in the third round. Two animals give birth to one; all animal types are concerned.
20. Each household member eats 2 units of grains per year (all grains except sesame).
21. Prices: cattle = 10 cash, donkey = 5, sheep = 3; sorghum = 1, cowpea = 2, sesame = 2; mungbean unsellable. Prices fixed through sessions.
22. One unit of manure and one unit of fertiliser each cost 1 cash. Two crop residues are worth 1 cash.
23. Manure and fertiliser cannot be stored for more than one round.
24. All resources can be exchanged among participants, except household members. Participants may define their own exchange rules.

5 Step-by-Step Gameplay

5.1 Step 1 — Sowing (Rules 1–11, 15, 18)

What happens:

1. **Announce the season** (Good/Bad) for the round (cards/dice).
2. **Allocate plots to crops**: sorghum, cowpea, sesame, mungbean.
3. **Choose configuration**: monocrop vs. intercropping; plan rotations.
4. **Apply inputs**: manure, fertiliser, mulch/cover; record per plot.
5. **Residue plan**: leave for grazing vs. harvest later.
6. Optional **bonus pawns**: local interventions (labour, micro-irrigation) if used.
7. Facilitator writes major choices on flipchart and monitors sheets.

5.2 Step 2 — Harvesting (Rules 12–14, 16–17, 19–20)

What happens:

1. **Calculate yields** per plot from season + inputs (use simple look-up modifiers).
2. Convert to **grains** and **crop residues**.
3. **Harvest capacity** depends on household members & draft animals.
4. **Feed household** (2 grain units/person; sesame excluded).
5. **Feed livestock**: residues from field/village stocks; unfed animals die next round.
6. Update **resource sheets** and **monitoring forms**.

5.3 Step 3 — Trading (Rules 21–24)

What happens:

1. **Buy/sell/exchange** grains, residues, livestock, manure, fertiliser.
2. Record transactions on **market** and **exchange** sheets (note gifts/aid).
3. Update **cash** and **resource balances**; proceed to next round.
4. Track **food insecurity** (FU) if households fell short.
5. Produce **manure** from livestock stocks at start of next round (Rule 18).

6 Schematic Board

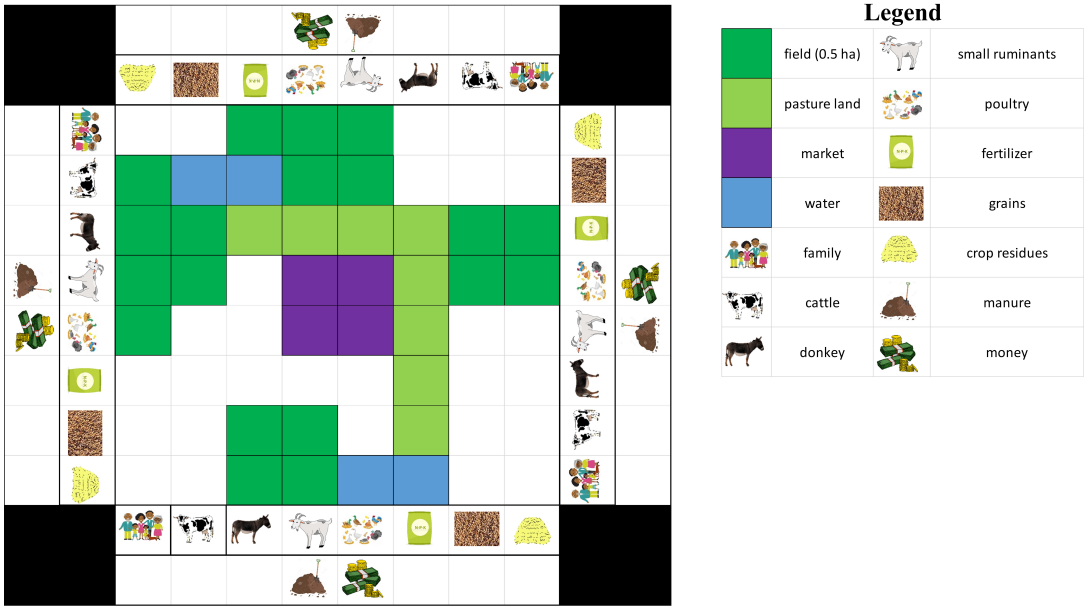

Figure 2: QUEEN — board layout and legend (replace with final art when ready).

7 Starting Resources & Farm Types

Use the four farm types (SOC, SOL, MOD, LCL) and their starting bundles. Adapt numbers to local context if needed.

Farm type	Family	Cattle	Donkeys	Sheep	Poultry	Fertiliser	Grains	Residues	Manure	Money
SOC (subsistence crop)	5	0	0	2	0	0	0	0	0	1
SOL (subsistence livestock)	4	0	0	4	0	0	0	0	0	1
MOD (market-oriented/diversified)	6	2	1	2	0	0	0	0	0	2
LCL (land-constrained livestock)	4	5	0	2	0	0	0	0	2	2

8 Monitoring Sheets (print-ready)

Below are the monitoring tables exactly as in the original materials. Print them as A4 forms.

8.1 Crops monitoring (fields + grains stock)

	Fields (crops + resources: fertiliser + mulch + manure + bonus pawn)						| Grains stock
Round 1	Field1	Field2	Field3	Field4	Field5	Field6	Grains stock
P1							
P2							
P3							
P4							
Round 2	Field1	Field2	Field3	Field4	Field5	Field6	Grains stock
P1							
P2							
P3							
P4							
Round 3	Field1	Field2	Field3	Field4	Field5	Field6	Grains stock
P1							
P2							
P3							
P4							
Round 4	Field1	Field2	Field3	Field4	Field5	Field6	Grains stock
P1							
P2							
P3							
P4							
Round 5	Field1	Field2	Field3	Field4	Field5	Field6	Grains stock
P1							
P2							
P3							
P4							

8.2 Livestock monitoring (stocks, residues, food insecurity)

	Cattle |	Small ruminants |	Donkeys |	Residues harvested |	Residues on soil |	Grains harvested |	Manure+Fertiliser |	Money |	FU (n)
Round 1									
P1									
P2									
P3									
P4									
Round 2									
P1									
P2									
P3									
P4									
Round 3									
P1									
P2									
P3									
P4									
Round 4									
P1									

P2	
P3	
P4	
Round 5	
P1	
P2	
P3	
P4	

Note: FU = Number of household members that are food insecure.

8.3 Market monitoring (buy/sell) — per round

Market: (Items Bought / Sold) — cattle, small ruminants, donkeys, poultry, residues, grains, manure, fertiliser								
Round 1	Cattle B/S	SR B/S	Donkey B/S	Poultry B/S	Residues B/S	Grains B/S	Manure B/S	Fertiliser B/S
P1								
P2								
P3								
P4								
Rounds 2–5	(repeat as above)							

Note: B/S = Buy/Sell.

8.4 Exchange monitoring (detailed trade/gifts)

Round&Step	Player	Object	Player (recipient)	Quantity	Comment (exchange conditions, gift, aid)

9 Pre-game Questionnaire

Purpose

The pre-game questionnaire helps facilitators identify **existing social ties** and potential **power dynamics**, and record **baseline perceptions** of climate risk, constraints, and intended strategies. This context improves interpretation of in-game behaviour and post-game learning.

A. Social Network and Roles

A1. Relationships among players: For each other player, indicate: Friend / Family / Neighbour / Colleague / Community leader / Other (specify).

A2. Who do you usually discuss farming with? List up to three people and why.

A3. Who influences your decisions most in real life? (rank top 3) and explain why (e.g., success, authority, expertise).

B. Farming Context and Constraints

B1. Land and labour: Approx. plots farmed, household size, typical labour peaks.
B2. Livestock: Types and numbers; main functions (manure, traction, savings, status).
B3. Biomass scarcity: In a typical year, which is the bigger constraint: residues or cash for inputs? Why?
B4. Soil fertility: How do you maintain/restore soil fertility now? (e.g., rotations, manure, mulches, fertiliser).

C. Climate Risk Perception

C1. Rainfall variability: In the past 5 years, how often were rains *earlier/later* than expected?
C2. Bad seasons: What do you change first in bad rainfall years (crop choice, inputs, herd, expenses)?
C3. Drought memory: Describe one drought year and what worked/did not work for you.

D. Baseline Strategy (Before Playing)

D1. Starting plan: Which crops and how many plots? Intercropping or monocrop? Any rotation plan?
D2. Inputs: Will you apply manure, fertiliser, mulch? Where and why?
D3. Livestock: Will you buy/sell animals? Why (feed availability, cash needs, risk)?
D4. Markets: What will you prioritise to sell vs. keep for food?

E. Ethics and Inclusion (for facilitator)

E1. Participation: Ensure everyone speaks at least once before the first harvest step.
E2. Accessibility: Use icons and recap rules aloud for low-literacy participants.
E3. Safety: Remind that sensitive personal info is voluntary and confidential.

10 Post-game Questionnaire

Purpose

The post-game questionnaire documents **how strategies evolved**, perceived **realism and feasibility**, and what players **learned** about cooperation, markets, and climate adaptation. It also probes how decisions might change in the next real season.

F. Goals and Outcomes

F1. What did you try to achieve? (food security, income, herd growth, soil fertility).
F2. Did you achieve it? If yes, which resources/decisions helped most? If not, what limited you?

G. Strategy Changes During Play

G1. Crop choices: What changed your crop plan (season, prices, residues, livestock feed)?
G2. Agroecology: Did you use rotations/intercrops/manure/fertiliser differently by Round 3–5? Why?
G3. Livestock: Any purchases/sales? Did residue availability or reproduction affect this?

H. Trade-offs and Social Interactions

H1. Biggest trade-off faced: (sell grain for cash vs. keep for food; harvest residues vs. leave for soil; sell animal vs. keep for manure/insurance).
H2. Exchanges: What did you trade/gift? Why choose peer exchange vs. market?
H3. Influence: Which player(s) influenced your decisions most, and how?

I. Climate Risk and Realism

I1. Realism of seasons: Did Good/Bad seasons feel realistic? What was missing?
I2. Next drought: If next year is bad, which **three** actions would you take first, and why?
I3. Adoption: Which practice from the game would you consider trying (intercrop, rotation, manure focus, saving for fertiliser, herd adjustment)?

J. Debrief and Reflection

J1. One surprise or new insight you got from the game.
J2. One change you might make in your real farm or advice to a neighbour.
J3. What part of the game rules felt least realistic and how would you change it?

11 Facilitator Tips & Adaptations

- **For schools / low literacy:** reduce token types, use icon-based sheets, limit to 3 rounds.
- **Timing:** aim for 20–25 minutes/round; longer for Round 1 explanation.
- **Season decks:** use pre-sequenced seasons to illustrate drought clusters, or shuffle for randomness.
- **Inclusion:** invite quiet participants to explain a decision each round.
- **Low-access kit:** laminated A1 board + dry-erase markers + 4 player sheets + facilitator cheat-sheet.

12 Data & Outputs

- Digitise monitoring sheets into round-by-round CSVs for quantitative analysis.
- Synthesize post-game responses for themes (realism, exchange drivers, likely adoption).
- Prepare 2–3 contrasting case studies (e.g., crop-heavy vs. livestock-heavy strategies) for teaching.