

FDMS Signed Calibration Register

Version 1.0 (FINAL, countersigned) · FDMS v1.2 adopted edition, 29-trigger register · 6 August 2026

This document is the faithful publication rendering of FDMS_Calibration_Register_v1.0.xlsx, the signed record referenced by the Farm Decision Modelling Standard v1.2 and by the papers of the FDMS programme. The spreadsheet is the artefact of record; this rendering changes no word of its content. The register is change-controlled with the standard: any re-coding after signature requires a new version of the file.

Purpose

The single signed record required by the Research and Manuscript Blueprint: every conformance trigger of FDMS v1.2, coded against both calibration cases, with the recorded basis for every answer. Case A is recoded here against the post-1.2-VR register (TE14.2 rewritten as the observable screen; TE14.3 split into TE14.3, TE14.4, TE14.5); its prior count of 25 of 27 was taken under the pre-split register and is superseded by this record.

Cases

CASE A (complex): 2.0 ha Eastern Cape household; convert 0.5 ha maize to drip-irrigated, double-cropped, loan-financed, contract-marketed cabbage. Artefact: FDMS_Reference_Workbook_v1.2.1.xlsx (findings W1-W12 corrected).

CASE B (simple): 300 ha maize-specialist commercial operation; raise N top-dressing from 120 to 150 kg N/ha on own strip-trial evidence. Artefact: FDMS_Calibration_Case_B_Simple.xlsx.

Result

Case A activates 25 of 29 triggers (86%). Case B activates 4 of 29 (14%). The separation is the calibration evidence: proportionality is delivered by the machinery, not by exhortation. Both directions are correct: the complex case fires nearly everything because nearly everything is material to it; the simple case fires only what is material and answers it cheaply.

Correction to the theory paper, section 9: the estimate "about 26 of 29" becomes exactly 25 of 29. The two additional non-activations arise from the TE14.3 split (two of the three narrow triggers do not attach to Case A) and from TE4.5 moving to No under the proportionality convention Case B established (judgment call J1 in the findings section).

Coding method

Independent recode: every answer in the trigger table was coded from the artefact contents (assumption register rows, tab formulas, recorded notes), not from the prior trigger record. Where a coding convention had to be chosen, the choice is logged as a judgment call in the findings section. This recode serves as an independent coding pass on the trigger register for the Blueprint's coding-check requirement.

Sign-off

Coded by: Perplexity adversarial review pass, 6 August 2026.

Author countersign: Jackson Mambozokuni, 6 August 2026. J1 accepted as coded (TE4.5 No; Case A stands at 25 of 29). J2 accepted as coded (TE4.4 Yes). Countersigned via recorded decision, session of 6 August 2026.

Trigger Register: Case A and Case B, coded against FDMS v1.2 (29 triggers). Answers coded from artefact contents. Yes activates the element for that case.

ID	Trigger question (abbreviated)	Case A	Case A recorded basis	Case B	Case B recorded basis
TE4.1	Claim of improved productivity, efficiency, resource use, resilience or technical performance?	Yes	Higher yield and grade claimed from irrigation: mature drip yield 32 t/ha x 2 crops (A11, A12) vs 25 t/ha rainfed (A5); Grade A share lifts 0.6 to 0.7 (A6, A13). E4 activated: Productivity tab.	Yes	Higher yield (technical performance) is the proposition. E4 activated: response economics on Financials.
TE4.2	Intervention materially affects more than one limiting resource?	Yes	Land (0.5 ha converted), water (2,200 m3/ha/crop against a 2,500 m3/season allocation, A34/A39), labour (110 vs 90 days/ha/crop, A23-A24), capital (R38,000 kit plus R30,000 loan, A17-A18).	No	Only fertiliser spend changes; land, labour, water, machinery unchanged.
TE4.3	Could higher yield come from disproportionately higher input, labour, water or capital use?	Yes	Variable cost rises to R34,000/ha/crop x 2 crops (A14) vs R28,000 rainfed (A10); return per rand is a live question, answered on Productivity/Financials.	Yes	Yield via more input is the question under test. E4 activated: marginal return per rand, response efficiency.
TE4.4	Comparison across farms, scales, technologies, regions or time periods?	Yes	Cross-context evidence transfer: mature yields from supplier trials on other operations, discounted 15% for field reality (A11); grading shares from neighbours' packhouse history (A6-A7, A13). The 15% adjustment is the discipline the trigger demands, and it is recorded. See judgment call J2.	No	Single farm, single season; yields from the farm's own strip trials; no cross-case transfer.
TE4.5	Would a multifactor productivity or optimisation method materially improve a high-stakes decision?	No	High stakes for the household, but the decision structure (binary conversion plus channel choice) is served by counterfactual appraisal and the scenario library; no allocation problem at 2 ha justifies TFP or optimisation, and the data to parameterise one does not exist at this scale. Judgment call J1.	No	Decision value does not justify TFP or optimisation methods.
TE6.1	Capital expenditure, borrowing, leasing, supplier credit, grant co-finance or material upfront outlay?	Yes	Capex R38,000 and loan R30,000 (A17-A18). E6 activated: Appraisal tab with financing inside the cashflow.	No	Operating expense inside the normal input cycle; no capex, borrowing, lease, credit or grant. NOTE D1: share-of-reserves figure in the recorded basis changes when the B6 input cost is corrected.
TE6.2	Material timing gap between expenditure and revenue, or production and payment?	Yes	Establishment outlay precedes first drip revenue; packhouse payment delay 1.5 months expected, 45 to 75 days actual track record (A29, Institutional).	No	Top-dressing to harvest payment is the existing, already-financed cycle; no new timing gap.
TE6.3	Profitable but unaffordable at current income, reserves, collateral or debt capacity?	Yes	NPV positive (R87,808) while the year-1 cover ratio runs below the mature-year ratio; verdict reads carriable at maturity but year 1 needs the bridge; unsecured loan, no collateral (Appraisal affordability block).	No	No debt; reserves (B7) cover the full spend many times over. NOTE D1: the multiple falls from 18x to about 4x at corrected urea cost; the answer stands.
TE6.4	Household withdrawals, owner remuneration, tax, insurance, reserves or maintenance material to feasibility?	Yes	Cash consumption R2,400/month (A26) and January school fees R4,500 (A27) sit inside Cashflow M and drive the hunger-gap months.	No	Company farm; drawings, tax, maintenance unaffected by the operating increment.
TE6.5	Plausible downside breaches minimum cash, debt-service or solvency conditions?	Yes	Worst cumulative month -R32,664 against the -R8,000 informal line; drought scenario requires the named survival plan (Risk).	No	Worst case = full spend lost; no minimum-cash or solvency condition approached. NOTE D1: at corrected LAN cost the workbook's own SURVIVAL check flips to Material: reconsider; the trigger answer stands, the basis wording does not.
TE7.1	Resources also used by other enterprises or household activities?	Yes	Converted land competes with maize; one household labour pool serves all enterprises (Resource Calendar); the loan is serviced from whole-farm cash.	No	Maize-specialist farm; no competing enterprise.
TE7.2	Could it displace another crop, livestock, off-farm work, consumption or investment?	Yes	Displacement is the decision: 0.5 ha maize displaced; retained maize is staple food and drought hedge, retention grounds stated (Decision Register #5, A38).	No	Nothing displaced; same land, same crop, same calendar.
TE7.3	Costs, machinery, infrastructure, labour, overheads or financing shared across enterprises?	Yes	Loan and family labour shared; allocation basis disclosed (W8): debt service coverage computed on whole-farm cash because the lender's claim is on the household.	No	Single enterprise; no shared-cost allocation exists.
TE7.4	Could it affect food security, withdrawals, unpaid family labour or disposable cash?	Yes	Food security is inside the model: retained grain (A38), hunger-gap months, the family eats first (Household, Risk).	No	Commercial operation; no household economy inside the decision unit.
TE7.5	Would it change whole-farm risk, diversification, seasonality or concentration?	Yes	Cabbage concentration flagged against threshold A37; single-crop exposure named and hedged by retained maize (Household).	No	Mix, seasonality, concentration unchanged; downside bounded at the extra spend.
TE11.1	Does it require actors to change behaviour, roles or practices?	Yes	Fertigation and drip management are new practices for the household; roles change at handover (E16).	No	Same operation, different rate setting on existing equipment.
TE11.2	Is adoption uncertain, staged, voluntary, costly, skill-intensive or support-dependent?	Yes	Learning curve modelled: 70% then 85% of mature yield (A15-A16); advisor and extension dependence recorded.	No	One management instruction, complete on the day of application.
TE11.3	Would benefits change materially if adoption were partial, delayed, wrong or	Yes	Uptake lever with a partial-uptake pass test (E11); discontinuation trigger set in advance on Transition.	No	Spreader calibration is existing SOP; no staged uptake.

	discontinued?				
TE11.4	Must different actors adopt complementary practices or coordinate?	Yes	Packhouse contract (records, grading), lender schedule and municipal water allocation all require coordination for the plan to work.	No	No coordination with other actors required.
TE11.5	Smallholder, emerging farmer, group scheme or development programme context?	Yes	Smallholder household; capability constraints and the handover gate are modelled (E16 checklist, QA log).	No	Not a smallholder, group scheme or programme context.
TE13.1	Dependence on a specific channel, buyer, contract, offtake or cooperative?	Yes	Channel choice is registered Decision #3: informal vs packhouse contract, compared term by term on the Institutional tab.	No	Spot silo/SAFEX marketing; no buyer, contract or offtake dependence.
TE13.2	Certification, standard compliance, audited recordkeeping or traceability required?	Yes	SIZA-aligned compliance checklist R6,000/yr at this scale (A30); audited spray and grading records.	No	No certification or standard change; rates within registered label use.
TE13.3	History of payment delay, partial payment, rejection or renegotiation in the channel?	Yes	Documented: neighbours paid at 45 to 75 days actual against 45-day terms (A29, Institutional track record row).	No	Silo/SAFEX settlement is standardised; no delay history.
TE13.4	Obligation to generate, submit or surrender data, records or traceability information?	Yes	Spray records, harvest dates and grading data surrendered to the packhouse; what returns for the data is recorded (data-tax test, Institutional).	No	No data submission obligations change.
TE14.1	Material change in use of a regulated, allocated, licensed or rationed natural resource?	Yes	Municipal allocation 2,500 m3/season (A39); DWS abstraction tariff priced (A40); headroom check enforced in QA.	No	Rainfed; no allocated, licensed or rationed resource use changes.
TE14.2	Do the alternatives differ in carbon or residue input, rotation, tillage or nutrient balance?	Yes	Rotation composition differs: drip cabbage breaks continuous maize; the 3%/season fertility decline is modelled in both arms (W7) and carried into productivity, not noted and forgotten.	Yes	Nutrient balance differs (that is the decision); minimum analysis recorded in three lines: acidification real but multi-year, managed by the standing lime programme; no within-horizon productivity feedback, stated not silent.
TE14.3	Does modelled revenue depend on a market-access condition (deforestation-free, residue limits, phytosanitary, legality)?	No	Domestic informal and packhouse channels; MRL and market-access conditions are export matters and none attaches to modelled revenue (Environment note).	No	Spot SAFEX/silo into the domestic market; no market-access condition attaches.
TE14.4	Does a legally priced emission, effluent charge or levy attach to any input or activity?	No	Gravity-fed drip: no pump energy, no fuel combustion in the incremental plan; biological emissions carry no price under the AFOLU carve-out (statutory ground, not scale).	Yes	Carbon fuel levy on diesel: the extra spreading pass burns priced fuel; the levy sits inside the spreading cost (B6), disclosed where it already sits.
TE14.5	Contracted environmental revenue under a signed offtake?	No	No signed environmental offtake; no such revenue modelled.	No	No signed offtake for carbon or any environmental revenue; none modelled.
TOTAL	Activation count and completeness	25/29	86% · PASS: all 29 answered	4/29	14% · PASS: all 29 answered

Calibration findings, judgment calls and defect log

FINDING 1

Discrimination confirmed. 25 of 29 (86%) against 4 of 29 (14%). The register separates a maximum-complexity household transition from a single-input commercial rate decision by a factor of six in activation burden, and every activation on both sides is individually defensible. The target set on the Case B cover (fewer than half on a simple case) is met with a wide margin.

FINDING 2

Correction to the theory paper (section 9, calibration paragraph): "about 26 of 29" becomes exactly 25 of 29. Suggested wording: "activated twenty-five of the twenty-nine triggers of the adopted register". The Case B Trigger Record footer and Cover carry the same "about 26 of 29" estimate and should be updated to cite this register.

FINDING 3

Near-universal triggers watch item (carried forward): TE4.1 and the rewritten TE14.2 fire on virtually any input decision. The materiality and minimum-analysis branches are the pressure valve; Case B's three-line TE14.2 answer is the demonstration that the valve works. Keep this disclosed in the methods paper, as the Case B finding already does.

J1 (judgment call)

TE4.5 Case A: coded No under the proportionality convention Case B established (decision value does not justify TFP or optimisation methods). The prior pre-split record implicitly coded this Yes. Defensible either way; the convention is now: the trigger asks whether the method would materially improve the decision, not whether the stakes are high. If the author overrules to Yes, Case A becomes 26 of 29 and the paper's original estimate stands; the overrule must then be recorded here.

J2 (judgment call)

TE4.4 Case A: coded Yes on the cross-context evidence-transfer reading: supplier trial yields from other operations enter the model (A11) and are disciplined by the 15% field-reality discount, which is exactly the adjustment the trigger exists to compel. Case B is No under the same reading because its response evidence is the farm's own strip trials. This makes the two cases' answers consistent rather than contradictory.

D1 (RESOLVED)

Case B input B6 (extra fertiliser plus spreading, R450/ha expected, range 420 to 520) is unsupported at published mid-2026 prices. SA Grain (6 July 2026): LAN R19,125/t, urea R21,009/t, urea up about 91% year on year on the ammonia spike. 30 kg N via LAN (28% N) = 107 kg product = R2,049/ha; via urea (46% N) = 65 kg = R1,370/ha, both before spreading. Even the NAMC Q4 (Feb 2026) urea price of R11,223/t gives R732/ha, above the B6 high case. The recorded source ("LAN quote Aug 2026") is inconsistent with the market by a factor of 3 to 4.5 and must be re-verified against the actual paper or corrected. RESOLUTION (6 Aug 2026): Case B reissued as v1.0.1. B6 repriced on the urea basis: 65 kg product/ha for +30 kg N at R21,009/t (SA Grain, 6 Jul 2026) plus spreading = R1,300/1,450/1,650 per ha. LAN alternative (about R2,130/ha) recorded and rejected on cost per kg N. Source verified against the published SA Grain report. Via LAN the expected case reverses outright (about -R650/ha at the restated price basis): the nitrogen source is part of the decision, and that judgment is recorded on the Case B cover.

D1 impact

Consequences at corrected cost, holding B5 at R3,500/t: via urea, incremental margin falls to about R174/ha (R52,000 farm), marginal return per rand 1.13, break-even response 0.399 t/ha against the expected 0.45, and the bad-year loss bound becomes about R411,000 (16% of reserves). Via LAN, the expected case reverses outright: margin about -R506/ha, break-even response 0.597 t/ha, above the expected response, and the workbook's own SURVIVAL check flips to Material: reconsider. The nitrogen source becomes the decision. None of the 29 trigger answers changes (activation stays 4 of 29), so the calibration conclusion survives; the case economics do not.

D2 (RESOLVED)

Case B input B5 (net realised price, expected R3,500/t): Dec-26 white maize futures last traded around R3,314/t (JSE, late June 2026); net of a location differential the realistic expected value sits near the B5 low case (R3,100 to R3,250). At B5 = R3,100 and urea cost, break-even response is 0.451 t/ha against the expected 0.45: the expected case fails on the knife edge. Combined with D1 this reverses the case's headline conclusion. Recommend restating Case B at verified inputs before it is cited anywhere as a worked example; as a trigger-burden calibration it stands as is. RESOLUTION (6 Aug 2026): board re-verified at reissue: Dec-26 white maize last traded R3,548/t on 5 Aug 2026. Case B v1.0.1 restates B5 to R3,000/3,350/3,700 net of an approximately R200/t location differential. Resulting economics: incremental margin R27/ha (R8,205 farm), marginal return per rand 1.02, break-even response 0.442 t/ha against expected 0.45, worst case 17.4% of reserves, SURVIVAL check Absorbable. The comfortable yes is now a knife-edge yes; all 29 trigger answers unchanged.

VERIFIED

Author's pass verification results, 6 August 2026: Reference Workbook v1.2.1, 386 formulas, zero errors, all 13 automated QA checks pass, NPV R87,807.62 (a 2.14% fall from the pre-W7 R89,731, confirming the paper's "approximately two percent"). Case B, 34 formulas, zero errors, all QA checks pass, trigger answers occupy C5:C33 exactly so the all-29-answered check counts the right cells. The paper's section 9 claims about both artefacts are accurate except the "about 26 of 29" estimate corrected by this register.