

FERMENT & FOLD DIAGNOSTICS

Technical Support for Professional Bakeries

Croissant Technical Audit

Case 001: Strong external lift, restricted internal cell development



ASSESSMENT	PRIMARY FINDING	STATUS
Evidence-led	Under-proofing with expansion restricted by tight shaping and formula/process mismatch	Corrective result visually verified

This public demonstration report suppresses full proprietary recipe detail. Findings are separated into observed evidence, operator-supplied facts and technical interpretation.

01 / CASE RECORD

What happened

Product	Straight croissant	Formula basis	Bachour / Schoolinary, operator-adapted
Cut size	10 x 40 cm	Final thickness	3.5 mm
Lamination	Bachour single/triple-fold method	Initial proof	2.5 h at 27.5 C / 75% RH
Initial bake	170 C / 17 min	Reported concern	Tight crumb; insufficient proof development
Piece weight	95 g	Outcome comparison	Same triangle size and 3.5 mm thickness

Photographic evidence



A. Shaped dough



B. Proofed and glazed



C. Baked cross-section

Observed facts

- Shaping is consistent, but the rolls are compact and were identified by the operator as too tight.
- External lift, colour and visible layer definition are strong; the lamination was not completely lost.
- The crumb shows laminated separation but restricted central and basal expansion.
- Cell structure is tight and fragmented rather than forming a continuous open honeycomb.

02 / FORMULA REVIEW

The production formula was rebalanced

The operator retained flour, nominal total liquid and butter, while reducing sugar and yeast, increasing salt, and replacing part of the milk with water. Full batch weights are withheld from this public sample.

Component	Original	Adjusted	Technical change
Sugar	14.93%	8.91%	Reduced by 40.3%
Salt	1.60%	1.99%	Raised to standard production range
Milk	50.00%	34.89%	Partly replaced by water
Water	0%	14.95%	Nominal total liquid maintained
Butter in dough	11.65%	11.65%	Unchanged
Yeast	4.67%	2.80%	Reduced for controlled retardation

Key interpretation

The formula was not simply made drier. Nominal liquid remained essentially unchanged (50.00% versus 49.84%); the type of liquid and fermentation load were changed.

Technical implication

The original sugar level increased osmotic load and slowed fermentation response. Replacing part of the milk with water reduced milk solids without materially lowering nominal liquid. Lower yeast then became appropriate once the process moved from a short direct proof to controlled overnight fermentation. These changes should be interpreted as a coordinated formula/process adaptation rather than isolated ingredient corrections.

Because several variables changed together, the successful outcome validates the combined intervention; it does not isolate the contribution of each individual variable.

03 / DIAGNOSIS

Root-cause assessment

Finding	Evidence	Confidence
Insufficient proof development at bake	Restricted crumb expansion; compact proofed profile; operator confirmation; short initial proof cycle.	HIGH
Shaping tension restricted expansion	Rolls visibly compact; operator identified the fold/roll as too tight; central compression consistent with restraint.	HIGH
Original formula mismatched the intended production cycle	High sugar and all-milk liquid system were subsequently rebalanced for controlled overnight fermentation.	MEDIUM-HIGH
Complete lamination failure	External layers and internal laminated separation remain visible.	NOT SUPPORTED

Most likely causal chain

1	High-enrichment direct-process formula
2	Proof development lagged behind the fixed 2.5-hour schedule
3	Small, tightly rolled pieces added mechanical restraint
4	Oven set the exterior before the centre achieved the desired open structure

What the photographs do not prove

The images do not independently establish dough temperature, butter plasticity, sheeting pressure or exact proof readiness. Those variables remain process checks in a live customer audit. This report therefore avoids claiming butter fracture or temperature mismatch without supporting measurements.

04 / CORRECTIVE PROGRAM

Production system adopted

Retard and proof cycle



Everlasting retarder/proofer programme shown; humidity subsequently standardised to 75%.

Stage	Set point	Humidity	Duration
1	-6 C	-	Variable by loading time
2	6 C	-	6 h 59 min
3	17 C	75%	1 h 30 min
4	27.5 C	75%	3 h
5	22 C	75%	Hold / INF

Current bake profile

Phase	Oven	Time	Fan	Vent	Purpose
Preheat	180 C	-	-	Closed	Establish thermal reserve
1	155 C	6 min	1	Closed	Controlled initial expansion
2	170 C	10 min	2	Closed	Structure and colour development
3	170 C	7 min	2	Fully open	Moisture release and crisp finish

The revised bake extends total baking time from 17 to 23 minutes and deliberately separates initial expansion, colour/structure development and final drying. The interpretation of each phase is functional; the settings themselves are operator-supplied and proven in that production environment.

05 / OUTCOME & CONTROL

Corrective result visually verified

OUTCOME STATUS

Subsequent production shows substantially improved internal expansion, a continuous open cell network and clear external lamination.



Corrected exterior



Corrected cross-section



Layer definition

Controlled comparison

The corrected batch retained the 10 x 40 cm triangle, 3.5 mm final thickness and 95 g piece weight. Lamination was changed to one double fold plus one single fold. The formula, proof programme, shaping tension and bake profile were also changed, so the images verify the combined system correction rather than isolating the effect of the fold sequence.

Recommended production controls

- Judge final proof by physical readiness as well as elapsed time; record actual completion time against the programmed cycle.
- Roll without compressing the turns; document piece dimensions and weight so shaping tension remains repeatable.
- Record finished dough temperature, butter condition and sheeting-room temperature for future fault isolation.

FINAL ASSESSMENT

The initial batch did not fail because the lamination disappeared. It failed to achieve the desired internal expansion. The successful response was a system correction: rebalance the formula, reduce shaping restraint, extend and control fermentation, then bake through a staged profile.

Prepared as a demonstration of the Ferment & Fold Diagnostics Croissant Troubleshooting Audit. Technical approval: Matthew Smith, pastry chef and baker specialising in French patisserie.