

> INFORMATION SHEET

The major use of pastry in New Zealand is for the manufacture of pies. The standard method for pie pastry production is the Scotch method, also known as the Blitz method. In this short process method, small lumps of fat are mixed into the dough to produce a paste, which is then sheeted to build up a layered structure.

PASTRY PIE RECIPE

Typically a pie top has a fat to flour ratio of 1:2, described as 'half paste' and the pie bottom has a 1:3 ratio called a 'third paste'.

INGREDIENT	PIE TOP RECIPE AMOUNTS (KG)	PIE BOTTOM RECIPE AMOUNTS (KG)
Flour	10.0	10.0
Fat	5.0	3.0
Salt (optional)	0.05	0.125
Water (variable)	5.0	3.5

1. PUFF PASTRY

Pastry dough and fat are laminated together to produce many thin layers of pastry. During baking, water is driven off from gluten in the paste as steam and trapped in the fat layers, blowing the paste layers apart. These inflated layers are set by heat of oven to create a light, puffy, flaky and tender pastry.

INGREDIENTS

INGREDIENT	FUNCTION & SPECIFICATIONS
Flour	10–12% protein content with low water absorption. Medium strength; weaker than bread flour but stronger than cake or biscuit flour. Flour needs to be strong enough to form thin layers of pastry, but extensible so that it can be rolled out. Flour must contain enough gluten to hold the crust together to avoid breakage and leaking of the contents.
Water	Amount added is dependent on the water absorption of the flour. Adjusting the amount of water added is the primary method of controlling dough consistency so that the same amount of force is required to roll out the dough as for the fat. Water is chilled to assist with final pastry temperatures.
Fat	Ideally pastry fat is pliable at processing temperatures (20–23°C) but melts in the mouth (37°C) when the final product is consumed, so it requires a slip melting point at 44°C. Fat can be pre-tempered to the same conditions as the pastry dough before machining to assist with mixing.
Salt	Adds flavour and strengthens gluten. Most pastry margarines contain salt so extra salt addition not usually required.
Gluten strengthening	If the flour is so weak that the dough tears, then weak acids such as ascorbic or citric acid can be added to strengthen the dough, although these decrease the dough extensibility. Or extra gluten can be added, which should be mixed in with the flour to ensure it is evenly dispersed.
Gluten weakening	If dough is not elastic or short resting times are needed then reducing agents such as L-cysteine and sodium metabisulfite can be added to make the dough more extensible. This makes it weaker, which needs to be monitored as if it becomes too weak it tears easily and damages the layers.

PROCESSING

PROCESS	DETAILS
Mixing	Pie tops: A flaky pastry with partially developed gluten and mixed in large pieces of fat. In single staged mixing all the ingredients are added to a bowl and mixed until the dough comes together but the fat is still in large pieces. Mixing time is critical. The dough should be mixed enough to partially develop the gluten in the dough so the dough levels stay together but not to the extent that dough is tough. Minimal water is used as gluten develops as fat is mixed in. In multistage mixing, 6–7% fat is added to the dough, and the dough is partially developed before the fat nuggets are added. This allows for greater development without breaking up fat.

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Sheeting	Pie bottoms: Traditionally a semi-flaky pastry was used but now replaced with short pastry base with no lamination. A homogenous paste using pie fat shortenings that inhibit gluten development is mixed and paste is sheeted to required dimensions. These pie bottoms are very stable, short and more suitable for holding pie shape through prolonged warming.
Rest time	Pie tops: The aim is to build up layers of fat and dough which on baking produce a layered structure of puff pastry. The pastry dough, with paste and fat of the same consistency, is sheeted to gradually reduce the thickness and increase the length of the pastry by a series of gradual reductions. It is then folded using the book fold and reduced again. This is usually done three times, with a rest in between each fold. A book fold is when the pastry is folded to give four layers of pastry, achieved by folding each end of the pastry into the middle of the sheet and then folding the dough in half again.
Forming	Pie bottoms: Pastry is simply reduced to correct dimensions for forming.
Filling	Is required to minimise pastry shrinkage and give the pastry time to hold its new shape. The stronger the flour the longer the rest time, although this can be decreased with the use of reducing agents although these can affect the end quality of the dough. The pastry is stored covered overnight in a retarder or chiller. In the morning the pastry must be left to warm up to processing temperature before a final sheeting and production of pies begins.
Baking	The bottom pastry sheet is pressed into tray of tins, the scrap is removed and the filling added before the docked pie top sheet is pressed over, cut and additional scrap removed. The pastry should not be stretched as this causes shrinkage and streaking on the surface. Any spillage of filling may prevent the top and bottom pastries sealing. The top pastry is docked to prevent excessive lift. Ideally the filling should be cold to avoid the fat melting out of the pastry, and the right volume to avoid the top pastry sinking too far. The water activity should be similar to that of the pastry to avoid moisture transfer. Temperatures are 215–220°C, although baking times are partly dependent on the moisture content of the dough. Use a hot oven to achieve rapid generation of steam to produce a good lift and avoid overheating the filling. The heat balance of the oven should be set in favour of bottom heat as the filling conducts some of the heat away from the pastry. Browning of the pie can be encouraged by reducing agents in the dough or by applying a glaze over the pastry.

2. SHORT PASTRY

Pastry dough and fat are laminated together to produce many thin layers of pastry. During baking, water is driven off from gluten in the paste as steam and trapped in the fat layers, blowing the paste layers apart. These inflated layers are set by heat of oven to create a light, puffy, flaky and tender pastry.

INGREDIENTS

INGREDIENT	FUNCTION & SPECIFICATIONS (*Based on flour content.)
Flour	Low protein soft flour makes the most tender pastry. As the amount and strength of protein present in the flour increases so too does the toughness. Soft flour has less starch damage, so it absorbs less water which is an advantage when water has to be baked off.
Fat	Needs to be soft to mix with and coat the flour particles at processing temperatures. It should not be oily and a bland taste is preferred. Margarine is frequently used with allowances made for its water content.
Sugar	Helps to shorten the pastry. It also adds colour and extends the shelf life. Castor sugar is preferred due to its ability to readily dissolve in the small amounts of liquids used in pastry manufacture. High sugar pastry will have a firmer, crisper texture with dark surface, but too much sugar produces a sticky and difficult to machine pastry. Glucose or lactose can be used; they are both sweeter than sucrose and offer more browning.
Salt	Added at 1.5–2%*, although addition levels are adjusted based on the salt content of margarine.
Baking powder	To increase shortness or tenderness of lower fat pastry. The leavening effect of baking powder produces a more open structure pastry.

PROCESSING

PROCESS	DETAILS
Mixing	Incorporate all the ingredients with minimal development of gluten. The fat is mixed into the flour to form a fine crumble. The sugar and liquids are then added and mixed until distributed and a paste is formed. The fat acts as a protective layer, preventing water from coming into contact with flour protein and forming gluten which would ultimately toughen the dough. The rate of mixing and mixing speed should be low so as not to disrupt the fat layer from the flour.
Sheeting	Reduction steps to produce a dough sheet of the correct thickness. The paste needs to be carefully handled to avoid tearing and dusting flour should be kept to a minimum to avoid it hydrating and developing.
Filling	Short pastry is commonly used with sweet fillings, such as fruit. The filling needs to be of the correct consistency to avoid boiling out during baking and excessive moisture migration in the finished product.
Baking	Short pastry with a high proportion of sugar will brown at a lower temperature than pastry with lower proportion of sugar. Actual baking temperature is dependent on the size of pie but pastry needs to brown before the filling boils out.

REFERENCE

Abels Bakery Advisory Service. A guide to pastry making in New Zealand.

Murray B. An Introduction to puff pastry. William Angliss Baking Department Workshop.

Wilson AJ, Ross M, Waters IR 2005. Pie pastry faults manual. The New Zealand Institute for Crop & Food Research Limited.