

7

Recipes for extruded and deposited doughs

7.1 Introduction

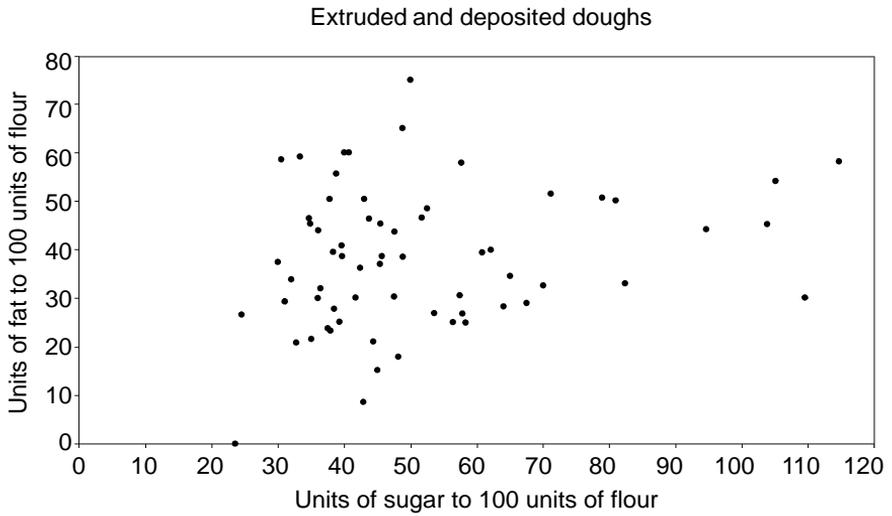
These are all short doughs so have the same basic characters and mixing requirements as those described in [section 6.1](#). They are generally softer, sometimes much softer, and often include particles such as chocolate chips, nut pieces and fruit pieces.

Wire-cut dough pieces give rise to somewhat irregular shaped cookies which seem ‘homemade’ and therefore attractive to consumers. They are usually formed from only one dough but, as can be seen in [section 7.4.3](#), two doughs of different colour can be used with the appropriate machine.

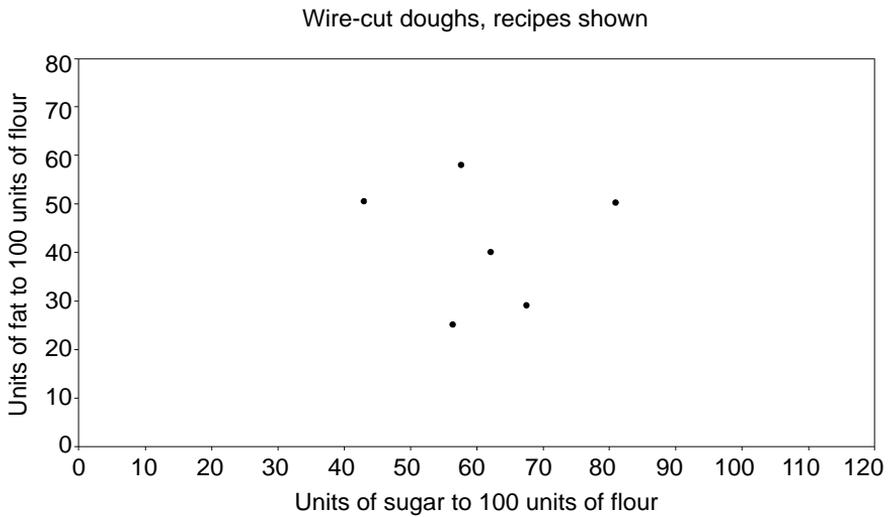
Coextrusion offers other opportunities for variety. If a tube of dough contains a fruit paste this extrusion may be cut either before or after baking. If the tube of dough contains a cream or another much softer dough the outer dough must be sealed into discrete dough pieces before baking.

Depositing involves relatively soft doughs that can be poured to a greater or lesser extent. These fatty doughs may be deposited in discrete quantities, either singly or in groups, on the oven band or as a continuous ribbon which is arranged in a zig zag pattern (see Spritz biscuits in [section 7.5.1](#)). As the recipes for deposited doughs are expensive and the production speeds are limited by the dough piece forming machines, biscuits in this group are luxury products which are often packed as assortments, for example, as components of Danish Butter Cookies.

The enrichment of extruded and deposited recipes is shown in [Fig. 7.1](#).



7.1 Enrichment of extruded and deposited recipes.



7.2 Enrichment of wire-cut recipes shown.

7.2 Wire-cut doughs

Recipe no.	88	89	90	91	92	93
Type product	choc chip cookie	cookie	cookie	oatmeal soft cookie	butter cookie	choc chip cookie
flour, weak	59.00	50.00	100.00	78.97	100.00	60.00
oatmeal/flakes	41.00	50.00		21.03		40.00
granulated sugar	67.50	25.00	50.00	29.48		50.00
powdered sugar					43.00	
Demerara sugar		50.00				
cane syrup 80%						8.00
invert syrup 70%				10.53		
glucose syrup 80%				31.59		
honey 80%		7.50	9.60			
dough fat	28.32	29.00		39.88		25.00
butter		25.00	68.90		60.00	
lecithin	0.58					
SMP					7.00	
dried egg				2.08		
fresh egg			20.00			
amm. bic.		0.68		1.05	1.50	
soda	1.73	1.06		1.05	0.20	1.50
salt	1.66	0.53	0.61	2.08	1.10	1.00
mould inhibitor				0.69		
vanilla/in*			0.10	0.10	0.10	
spice*				1.18		
liquid flavour*	0.10				0.10	
currants		21.00		7.37		
raisin paste	4.80					
des. coconut					8.00	
biscuit recycle	4.50	12.00	11.00		10.00	
nuts	4.82					
choc chips	30					30
added water	24	15	5	27	4	10

* These ingredients are not represented by accurate quantities.

Critical ingredients The use of ingredients such as fruit, nuts and chocolate adds much eating interest. It is important that the size of these inclusions is appropriate to the cookie and to the wire-cutting system.

Mixing The doughs are always mixed in at least two stages as for other short doughs. Chocolate melts readily so it is necessary to arrange the mixing and the dough temperature so that as little chocolate as possible is melted

before the dough piece reaches the oven. Cold dough water and deep frozen chocolate help. The chocolate is added as a final ingredient half-way through the mixing after the flour has been added.

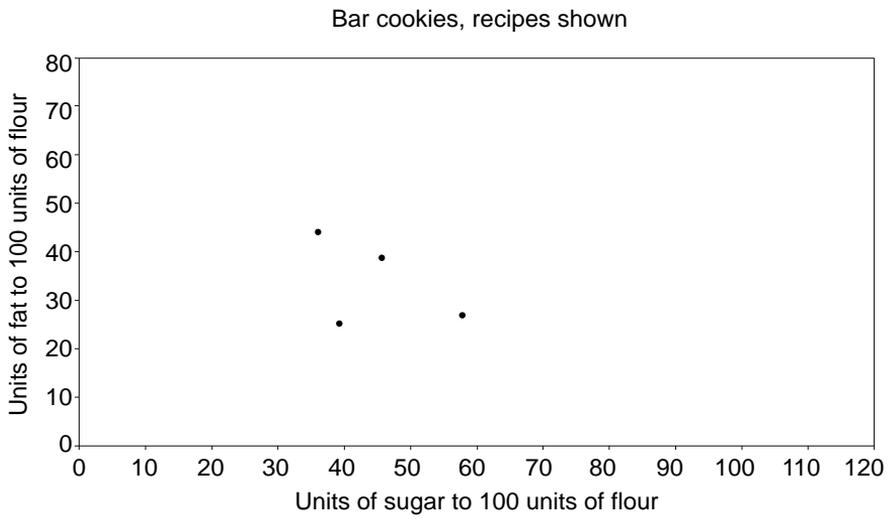
Dough handling Doughs should be held for about 30 minutes to allow the consistency to stabilise and become less sticky. However, if there is a temperature problem, such as with chocolate chips dough, the dough may have to be used with little or no standing time.

Dough piece forming Wire-cutting machines are notoriously difficult to control in terms of dough piece weights. The average weights vary as a result of dough consistency and height of the dough in the hopper. Between nozzle weight variations reflect problems in the general design of the machine. Great improvements in design have been available in recent years.

Baking The baking requirements and conditions are broadly similar to those described in [section 6.2.3](#). When baking chocolate chip cookies it is important to have the oven temperatures high enough to caramelize the surface of exposed chips slightly. This reduces the chance of these chips being sticky and messy after cooling.

Most of these products show considerable amounts of spread during baking so attention to the conditions affecting this is necessary to maintain consistent biscuit sizes. All products in the group are baked on steel oven bands.

The enrichment of wire-cut recipes shown is given in [Fig. 7.2](#).



7.3 Enrichment of bar cookie recipes shown.

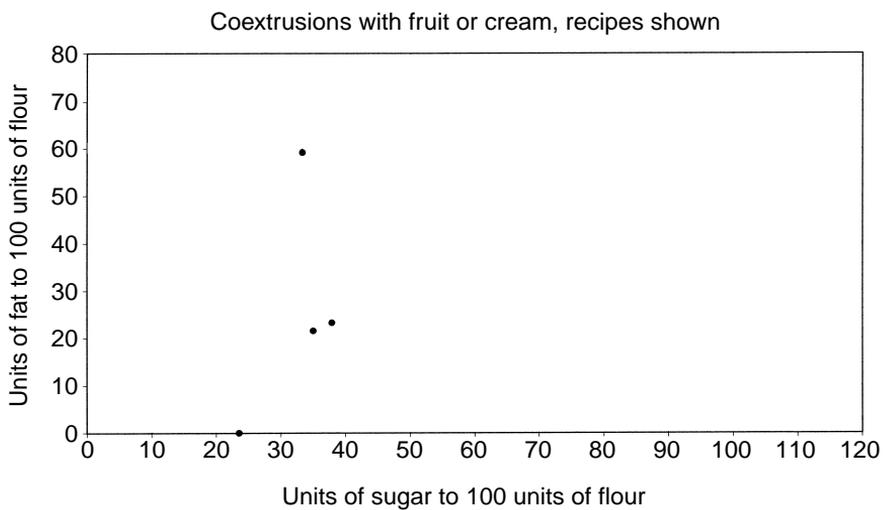
7.3 Bars/rout press doughs

There is no distinction between the doughs used for wire-cut products and those used for bar products except that the latter do not have large pieces of ingredients. The same machine can be used for bar products but the wire cutter is removed. The bars are thus continuous extrusions, usually from dies that have a flattened profile. The ribbons of dough are cut into lengths either before or after baking. Cutting before baking may give problems as the dough is soft and sticky.

The enrichment of bar cookie recipes shown is given in [Fig. 7.3](#).

Recipe no. Type product	94 coconut rout bar	95 rout bar	96 rout bar	97 soft fruit bar
flour, weak	100.00	100.00	100.00	100.00
granulated sugar				35.50
powdered sugar	45.70	36.07	37.50	
invert syrup 70%			2.50	6.33
glucose syrup 80%				6.38
honey 80%				16.00
dough fat	37.83	43.93	25.00	26.75
lecithin	0.77		0.07	
SMP		3.39		1.33
whey powder			1.10	
dried egg				1.63
fresh egg			1.10	
amm. bic.	0.13		0.50	
soda		0.40	0.37	2.00
ACP/tartar			0.13	
salt		0.89	0.37	0.88
mould inhibitor				0.88
vanilla/in*		0.10	0.10	0.10
liquid flavour*			0.10	
currants/sultanas				60.00
des. coconut	22.90			
colour*	0.10	0.10		
biscuit recycle			12.00	
added water	21	8	27	36

* These ingredients are not represented by accurate quantities.



7.4 Enrichment of coextruded recipes (fruit or cream) shown.

7.4 Coextruded products

7.4.1 Doughs enclosing a paste or cream

Recipe no. Type product	98 fig roll	99 fatless fig roll	100 date roll	101 cream filled cookie
flour, weak	100.00	100.00	100.00	100.00
granulated sugar		15.56		33.33
powdered sugar	31.25	2.22	34.00	
invert syrup 70%			5.60	
glucose syrup 80%	4.69	7.22		
dough fat	13.75		23.00	29.17
oil	7.81			30.00
lecithin			0.25	
SMP	7.19	2.11	1.60	
dried egg		2.00		
fresh egg				17.78
amm. bic.	0.19	0.33	0.30	0.39
soda		0.33	0.23	0.28
salt		0.73	0.75	0.83
citric acid		0.10		
SMS			0.050	
vanilla/in*		0.10	0.10	
liquid flavour*	0.10			
cocoa				4.44
colour*		0.10		
added water	19	26	15	2

* These ingredients are not represented by accurate quantities.

The enrichment of the coextruded recipes shown is given in [Fig. 7.4](#).

7.4.2 Pastes and creams for the above recipes

Recipe no. Type product	102* fig filling	103* fig filling	104* fig filling	105* date filling	106* coextruded cream	107* coextruded cream
granulated sugar		21				
icing sugar	4				47	43
cane syrup 80%	46		47			
glucose syrup 80%		8		23.27		
special fat					22	25
lecithin					0.05	0.05
SMP					8	7
salt		0.15				
citric acid		0.06		0.22		
glycerine	4					
vanilla/in [†]					0.1	0.1
fig paste	39	52	42			
date paste				69.8		
cocoa					8	
cocoa mass					6	
caramel colour		0.26				
biscuit recycle	5		6			
fig roll recycle			5			
crushed corn flakes			6.50			
nut paste					8	25
added water	1	18	0	(5)	0	0

* These recipes are shown on a percentage basis.

[†] This ingredient is not represented by an accurate quantity.

Critical ingredients The composition of the fruit filling and cream requires careful attention to reduce the chance of ‘blowing’ during baking. This happens when a gap forms above the filling within the dough case. If the filling is aerated (incorporation of air during mixing) or the moisture content is too high ‘blowing’ is more likely to occur.

The filling is prepared by mixing other ingredients, as shown above, with the fig (or date) paste in order both to obtain a suitable consistency for extruding and to reduce the cost.

The choice of fat for the cream is probably critical for inclusion in a baked product. The cream needs to be soft in the cooled and equilibrated product: it should not be firm or hard as it is for cream sandwich biscuits. Therefore a fat with a melting curve more like a dough fat is used.

Mixing The dough must be plastic enough to be extruded as a continuous and unbroken tube. The moisture content should be as low as possible as this aids good baking. It is often the case that a long final mixing stage is needed to develop the plasticity required.

Dough handling The dough is normally used immediately after mixing without a standing period.

Dough piece forming Coextruders for the fruit bars are available from several suppliers. The two components are fed into separate hoppers. By feeding the dough (the outer component) alone, checks can be made on the extrusion speeds both in terms of the ratio of inner and outer material, and as nozzle to nozzle across the machine. Adjustments for giving desired weights can be made and uniformity across the band can be established. When the extrusion of the internal material is started the weights can be repeated to check that the ratios of inner and outer materials are correct and even across the band.

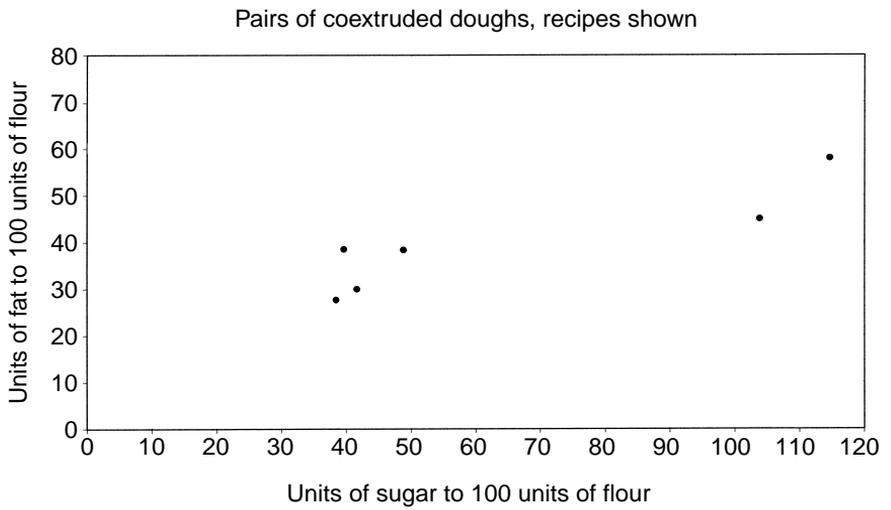
The bars are then cut into short lengths with a reciprocating guillotine either before or after baking. If they are cut before they are put in the oven there is a greater chance of the fruit filling escaping a little during baking.

For cream-filled cookies it is essential that the cream is sealed within the dough before baking. This is a critical operation probably made with a Rheon encrusting machine or a similar type of machine from another manufacturer.

Baking Baking must be at moderate temperatures so that the chance of 'blowing' is minimised. There is a fine balance required between supplying enough heat for baking the dough to a suitable texture and moisture and a small development of surface colouration and not supplying so much heat that it will cause 'blowing'. Thus a long bake time (about 13 minutes) combined with a large heat gradient between top and bottom (higher at the top) is required. A typical profile could be:

Zone 1	Zone 2	Zone 3	Zone 4
250	250	210	180
180	200	200	175

These biscuits are always baked on a steel band.



7.5 Enrichment of coextruded recipes (doughs) shown.

7.4.3 Products composed of coextruded doughs

Recipe no.	108	109	110	111	112	113
Type product	round		square		US Crisp and Chewy	
	white	brown	brown	white	outer	inner
flour, weak	97.17	100.00	100.00	100.00	100.00	92.13
cornflour	2.83					7.87
granulated sugar					85.25	35.58
powdered sugar	39.68	40.83	41.67	38.46		
cane syrup 80%		10.00				
molasses 80%					4.10	
high fructose syrup 80%					19.13	98.88
dough fat	38.46	38.33	25.00	23.08	45.08	58.05
butter oil			4.17	3.85		
lecithin	0.12	0.12	0.92	0.85		
whey powder						2.81
fresh egg			16.67	15.38		
amm. bic.	0.14	0.14				
soda	0.14	0.14	0.42	0.38	1.37	1.50
salt	0.85	0.87	0.42	0.38	1.37	1.50
vanilla/in*			0.10	0.10		
liquid flavour*					0.10	0.10
cocoa		18.37	4.17			
colour*				0.10		
choc chips						76
added water	18	19	17	15	20	0

* These ingredients are not represented by accurate quantities.

General requirements There are two distinct types of product represented in these recipes. In each case a pair of recipes is used to make one product. Recipes 108 and 109 are two fairly similar doughs differing only in colour. They are extruded in a way that gives a swirl arrangement and short lengths are cut with a wire. Recipes 110 and 111 are used to make a similar type of product but here the extrusion is in a chequer configuration.

Recipes 112 and 113 are used to form a very different type of product. These are taken from a Procter and Gamble patent¹ for a Crisp and Chewy cookie. The idea is based on the fact that all freshly cooked cookies are crisp around the edges and the outer surfaces and softer within. Later, these cookies equilibrate into one texture. By combining two distinctly different doughs and allowing a significant amount of equilibration after baking the sugar crystal structure results in stable cookies that are crisper on the edges and outside than the centre. The centres are somewhat chewy giving a very acceptable, albeit a very sweet, product.

Critical ingredients The chocolate chips should be deep frozen to reduce the melting in the dough prior to extrusion.

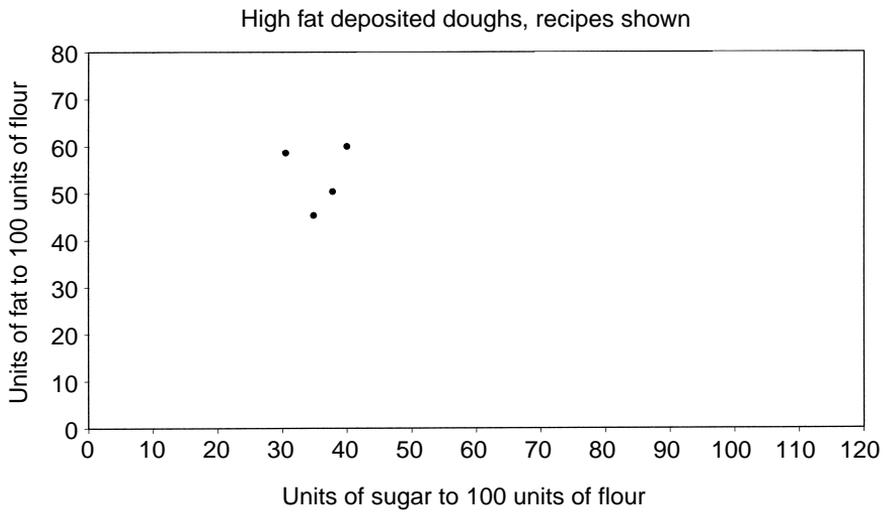
Mixing Generally these doughs are mixed by the two-stage method typical for short doughs. They have a soft consistency to allow for extrusion through complex nozzles.

Dough handling The doughs are normally used without delay after mixing.

Dough piece forming The complex patterns of the swirl and chequer cookies require special nozzles typical of Rheon extruders; other designs are possible with other makes of machine. The Crisp and Chewy cookies require that the coextrusions are cut and sealed before baking. This can be achieved either with a Rheon encrusting machine or a good coextruder like Bepex Hutt with a special cutting and sealing unit for each extrusion rope. The same machine can be used that is suitable for the cream filled cookie given in [section 7.4.1](#).

Baking This is not a critical operation and oven temperatures of around 200°C at about 6–8 minutes bake are used. Baking is always on a steel band as the dough becomes soft and often spreads.

The enrichment of coextruded recipes shown is given in [Fig. 7.5](#).



7.6 Enrichment of high fat recipes shown.

7.5 Deposited doughs

7.5.1 Fat rich recipes

Recipe no. Type product	114 Spritz	115 Swedish cookie	116 butter cookie	117 butter cookie
flour, weak	100.00	100.00	100.00	100.00
granulated sugar			34.85	
powdered sugar	40.00	30.50		35.00
invert syrup 70%				4.00
dough fat	60.00	58.60		
butter			53.94	60.00
SMP				5.00
fresh egg			11.06	3.00
soda	1.00		0.20	0.20
SAPP	1.00			
salt	1.50		0.76	1.00
vanilla/in*		0.10		0.10
liquid flavour*				0.10
biscuit recycle			19.70	10.00
added water	13	0	0	7

* These ingredients are not represented by accurate quantities.

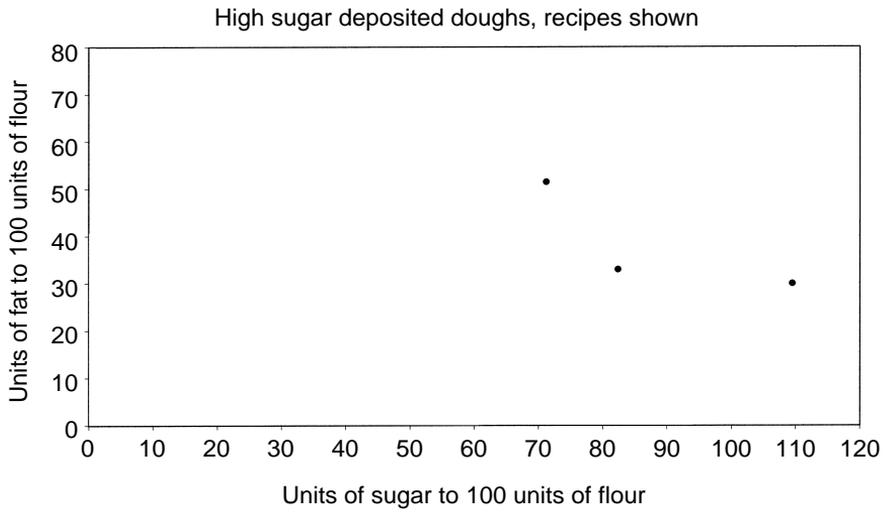
Critical ingredients As the fat content is high the quality of this ingredient is important. Very often the fat is butter because of its superior flavour. The temperature and consistency of the fat, especially if it is butter, determine the quality of the dough. The fat should be well plasticised and preferably at a temperature of around 20–25 °C. Biscuit crumb (biscuit recycle) is often used to control the consistency of the dough. The sugar particle size strongly affects the amount of spread during baking.

Mixing A two-stage mixing typical of other short doughs is recommended.

The final consistency is such that the dough can be poured to some extent.

Dough handling With low water levels, and high fat levels, standing time is not normally necessary for these doughs unless the consistency can be seen to be changing with time and thus affecting the extrusion rate.

Dough piece forming The extrusion may be either continuous (Spritz) or intermittent (butter cookies, etc.). In the case of the continuous extrusion it is common to oscillate the nozzle to produce a zig zag broad ribbon of dough that runs together to give a patterned bar during baking. The butter cookies are made as discrete deposits in the shape of either small strips, mounds or swirls. The surface patterns are formed because the edges of the nozzles are serrated and the swirls are formed when the nozzle is rotated as each deposit is made. In order to cause the dough piece to break away at each deposit the oven band is raised and lowered for each deposit and



7.7 Enrichment of high sugar recipes shown.

the short nature of the dough causes the break to occur at the nozzle exit. Some trial and error with corresponding adjustments are needed to find how high the band should be raised to ensure that the dough piece sticks to the band and does not fly off at the end of the deposit cycle. Some depositors have a reverse drive of the feed rollers to reduce the pressure of the dough at the nozzle at the moment that the extrusion must break off.

Baking Baking times are about 9 minutes. Temperatures around 200°C throughout with more top heat than bottom. Baking is always on a steel band.

The enrichment of high fat recipes shown is given in [Fig. 7.6](#).

7.5.2 Sugar rich recipes

Recipe no. Type product	118 Barmouth	119 US coconut vanilla wafer	120 Italian luxury cookie
flour, weak	100.00	100.00	100.00
powdered sugar		74.91	71.20
caster sugar	102.57		
cane syrup 80%	8.66	9.36	
dough fat	29.92	31.84	50.00
lecithin			0.60
FCMP		4.18	3.30
whey powder	5.01		
egg white			4.00
amm. bic.	0.27		
soda	0.31	0.85	
ACP/tartar		0.85	
salt	0.71		0.70
vanilla/in*	0.10	0.10	
liquid flavour*	0.10		0.10
des. coconut		9.36	
added water	56	56	39

* These ingredients are not represented by accurate quantities.

Mixing These doughs are usually very soft and more like batters. The mixing is in two stages with the flour added last. The type of mixer is determined more by the method for handling the dough than on the action of the beaters. It is best to use a detachable bowl mixer so that the dough can be taken to the hopper of the depositor where it can be tipped or poured.

Dough piece forming An extruder of similar form to that described in [section 7.5.1](#) is required.

Baking The biscuits always spread significantly during baking so a steel oven band is essential. The edges of the dough pieces become thin due to the spread so the baking must be such that these edges do not burn before the centres are baked.

Typical baking conditions are a bake time of 12 minutes at temperatures of 170, 190, 180 °C.

There should be a long run-out after baking in the oven to allow the products to set before removal from the band.

The enrichment of high sugar recipes shown is given in [Fig. 7.7](#).

7.6 Chemicals present in the recipes of this group

Only 58% of these recipes contain ammonium bicarbonate. Where it occurs, the average level is 0.48 units and the range 0.1 to 1.05 units.

Sodium bicarbonate is used in about 84% of the recipes and where used the average level is 0.79 units and the range is 0.14 to 2.00 units. An acid salt such as SAPP or ACP occurs in 20% of the recipes but the level of soda usage does not seem to be greater to compensate for the reaction which takes place with soda in the dough.

All the recipes use salt either as a separate ingredient or contained in salted butter. The average level of added salt is 0.89 units and the range found is 0.10 to 2.08 units.

Reference

[1] European Patent 0031 718 (1980) *Crisp and chewy cookie*, Procter and Gamble.