

The Use of a Beehive Deboner

in

Surimi Processing

ABSTRACT: The conventional surimi process includes two stages which have a potential for improvement in production efficiency. The first stage is pollock filleting. Even with the most efficient filleting machinery considerable flesh remains on the skeletal frames. The Beehive deboner was set up to recover usable meat from these frames. Results indicated 60% recovery, but the deboner was unable to remove kidney material which degraded the proteins. The second stage under investigation was the refining stage. Traditional refining machinery is difficult to clean, incapable of producing a clear separation, and incorporates air into the product. The Beehive machine was tested under a wide range of refining conditions to evaluate its applicability in the processing of surimi. Results indicate the Beehive deboner is easier to clean and separates red and white flesh up to 25% more effectively than the traditional refiner. However, the Beehive was not able to remove "black specks" and had a low capacity.

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The Use of a Beehive in Surimi Processing

I. Introduction

This series of tests was conducted during the months of February and March of 1986. The principle reason the tests were conducted was to determine if the Beehive machine was capable of recovering usable meat from pollock frames and of replacing the Fukoku refiner (FKC) in the manufacture of surimi.

At the present time pollock frames are sent to the reduction plant with a small amount of flesh remaining between and on the surface of the bones. This presented an opportunity to investigate the potential to recover this meat and add it into the surimi process.

The reason it was felt necessary to see if the FKC could be replaced was that the FKC has several perceived weaknesses. These are:

1. The machine is difficult to clear
2. The machine is incapable of making a clear separation. Therefore, a two-stage approach is normally used to produce a #2 grade
3. The FKC whips air into the product. This incorporation of air is both high and highly variable, making the pressing operation difficult to control.

II. The Beehive

A Beehive experimental deboner, model RSTC AUX 2" rotary meat machine, was utilized for this research effort. The Beehive machine works on an entirely different principle than the FKC. In the Beehive the material to be separated enters a hopper that measures approximately 2' X 18" X 1". In the bottom of this hopper are two interlocking screw conveyors that carry the material into the feed zone of a third screw conveyor that runs parallel to and below the conveyors in the hopper. This conveyor carries the material into the separation head.

The separation head consists of a truncated cone through which the material passes. The flites of the conveyor are milled down to conform to the reduction in diameter. The pitch of the screw is constant. The reduction in volume that occurs as the screw carries the material through the head is what effects the separation. Small, or mechanically weak material is forced out through the holes in the cone. Large, or mechanically strong material passes through the system as reject.

There are three main control variables that can be used to change the performance of the machine. These are speed, hole size in the screen, and choke setting. The first two variables are self explanatory. The choke restricts the flow of reject from the machine.

III. Test Description

Frame Mince

Frames from the Baader 182 pollock filleter were fed into the Beehive deboner. The deboner accepted the frames and minced the recoverable meat which was then analyzed.

Refiner

Because of the fact that the tests were run in an operating plant, it was not possible to get a direct comparison between the FKC and the Beehive; therefore, the Beehive was run in all its possible configurations.

Because of the fact that it is impossible to determine at this time all the uses for this data, all of the compiled data is attached. Each data sheet is divided into four sections: Test, Feed, Reject and Cake. Under the test sections the first line shows the origin of the feed. 418 signifies the Alfa Laval 418 decanter, BH signifies the Beehive machine, and the number immediately after the "BH" signifies the hole size used with the Beehive. "Choke" and "speed" signify the Beehive settings, "nominal recovery" shows the actual

recovery achieved in the test, and "solids" recovery is recovery adjusted for water content. "Temp in," "temp out" and "temp gain" are different capacity shows in lbs/hr, the rate at which the machine actually processed material during the test. "Hole size" shows the hole size used in the machine.

The "Feed" section shows a detailed description of the feed. "Solids content" is the dry solids in the feed stock. "Color" is presented in the Hunter system. "Contamination" is the average contamination in particles/10g. "Small" designates particles under 2mm. Large designates particles over 2mm. This allows for easy conversion to the Japanese contamination score.

The section labelled "Reject" describes the rejected product. In most cases it was not possible to measure contamination of the product. The section labelled "cake" describes the good product that passed through the screens, the "whiteness spread" shows the difference in whiteness between the cake and the reject. "Whiteness increase" shows the gain from the cake.

IV. Results and Discussion

Frame Mince

The Beehive deboner achieved 60% recovery from the frames, increasing overall recovery from round fish by 5%. The recovered meat had kidney material in it which stained the surimi it was made into and degraded the proteins. However, it is possible that, if the kidney material could be removed by some process, the recovered meat could be used in low-quality surimi. It may also be usable for animal feeds.

Refiner

The Beehive machine is far easier to clean than the FKC. The Beehive is also far better at making the separation between red and white meat than the FKC. The Beehive achieved a 95% recovery rate in replacing the FKC. The highest recovery rate achieved by the FKC in surimi production is 75%. However, the Beehive is not effective at removing contamination. Even when the 4mm head was used, it was ineffective in removing the black specks of peritoneal lining.

Another problem with the Beehive is capacity. Only when the machine ran solid material such as fillets did capacity exceed 2,000 lbs/hr. It is thought that this is due to the fact that the feed hopper and screws are designed to handle solids such as chicken wings, and the clearance between the screws and the hopper is too great for material such as mince, unless the mince is pressed before running, in which case the machine is used as a strainer.

If these two problems can be solved, the Beehive could be used to replace the FKC. This could result in substantial improvements in recovery.

The most promising avenue of investigation on the capacity problem is using a positive displacement pump for feeding the machine, rather than hoppers and the screw arrangement now used. Beehive has built such a machine for apples, and it works quite well.

The best solution to the "black speck" problem is to ensure that they don't enter the system in the first place. The Baader-182 that produced the fillets used in these tests was badly out of adjustment at the time. A properly tuned machine will produce mince that contains almost no black specks. If these two problems can be solved, the Beehive would prove to be a superior machine for producing surimi.

TEST DATA TABLES

Units of Measure

Feed:	descriptive
Choke:	machine setting
Speed:	machine setting
Recovery:	rate
Temperature:	°C
Capacity:	lbs/hour
Hole size:	mm
Solids content:	rate
Color:	Hunter System
Contamination:	#/10g.

TEST#

1

FEED	FILLETS
CHOKER	NA
SPEED	NA
NOMINAL RECOVERY	0.957
SOLIDS RECOVERY	0.954649
TEMP IN	2.5
TEMP OUT	4.1
TEMP GAIN	1.6
CAPACITY	3000
HOLE SIZE	5

FEED

SOLIDS CONTENT	NA
COLOR(L)	NA
(a)	NA
(b)	NA
NOMINAL CONTAMINATION (SMALL)	NA
(LARGE)	NA
ACTUAL CONTAMINATION (SMALL)	ERR
(LARGE)	ERR
CONTAMINATION SCORE	ERR

REJECT

SOLIDS CONTENT	0.1699
COLOR(L)	46.3
(a)	3.3
(b)	7
NOMINAL CONTAMINATION (SMALL)	NA
(LARGE)	NA
ACTUAL CONTAMINATION (SMALL)	0
(LARGE)	0
CONTAMINATION SCORE	0

CAKE

SOLIDS CONTENT	0.1607	
	RAW	COOKED
COLOR(L)	49.4	
(a)	0.3	
(b)	9.1	
NOMINAL CONTAMINATION (SMALL)	NA	
(LARGE)	NA	
ACTUAL CONTAMINATION (SMALL)	0	
(LARGE)	0	
CONTAMINATION SCORE	0	
CONTAMINATION REDUCTION % (SMALL)	ERR	
% (LARGE)	ERR	
WHITENESS INCREASE	NA	
WHITENESS SPREAD	3.1	

TEST#	2	FILLETS
FEED		8.19
CHOKER		10
SPEED		0.947
NOMINAL RECOVERY		0.939178
SOLIDS RECOVERY		3.4
TEMP IN		7.3
TEMP OUT		3.9
TEMP GAIN		1614
CAPACITY		0.15
HOLE SIZE		

FEED	SOLIDS CONTENT	NA
	COLOR(L)	NA
	(a)	NA
	(b)	
	NOMINAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	ACTUAL CONTAMINATION (SMALL)	ERR
	(LARGE)	ERR
	CONTAMINATION SCORE	ERR

REJECT	SOLIDS CONTENT	0.1819
	COLOR(L)	44.7
	(a)	4.2
	(b)	8.9
	NOMINAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	ACTUAL CONTAMINATION (SMALL)	0
	(LARGE)	0
	CONTAMINATION SCORE	0

CAKE	SOLIDS CONTENT	0.1572	
	COLOR(L)	RAW	COOKED
	(a)	51.1	
	(b)	2.5	
		10.1	
	NOMINAL CONTAMINATION (SMALL)	NA	
	(LARGE)	NA	
	ACTUAL CONTAMINATION (SMALL)	NA	
	(LARGE)	NA	
	CONTAMINATION SCORE	NA	
	CONTAMINATION REDUCTION % (SMALL)	ERR	
	% (LARGE)	ERR	
	WHITENESS INCREASE	NA	
	WHITENESS SPREAD	6.4	

TEST#	3	
FEED		695 MINCE
CHOKER		7.81
SPEED		10
NOMINAL RECOVERY		0.976
SOLIDS RECOVERY		0.969274
TEMP IN		4.5
TEMP OUT		5.5
TEMP GAIN		1
CAPACITY		1375
HOLE SIZE		0.15

FEED		
SOLIDS CONTENT		0.1426
COLOR(L)		49.4
(a)		3.4
(b)		9.2
NOMINAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
ACTUAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
CONTAMINATION SCORE		NA

REJECT		
SOLIDS CONTENT		0.1846
COLOR(L)		42.7
(a)		4
(b)		8.9
NOMINAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
ACTUAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
CONTAMINATION SCORE		NA

CAKE			
SOLIDS CONTENT		0.1432	
		RAW	COOKED
COLOR(L)		52.1	
(a)		3.3	
(b)		10.8	
NOMINAL CONTAMINATION (SMALL)		3.6	
(LARGE)		1	
ACTUAL CONTAMINATION (SMALL)		4.148044	
(LARGE)		1.152234	
CONTAMINATION SCORE		2.534916	
CONTAMINATION REDUCTION % (SMALL)		ERR	
% (LARGE)		ERR	
WHITENESS INCREASE		2.7	
WHITENESS SPREAD		9.4	

TEST#	4	SCREEN MINCE
FEED		7.23
CHOKER		10
SPEED		0.8966
NOMINAL RECOVERY		0.904817
SOLIDS RECOVERY		6.2
TEMP IN		7.2
TEMP OUT		1
TEMP GAIN		1548
CAPACITY		0.15
HOLE SIZE		

FEED		0.133
SOLIDS CONTENT		56.8
COLOR (L)		3.2
(a)		10.4
(b)		
NOMINAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
ACTUAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
CONTAMINATION SCORE		NA

REJECT		0.1402
SOLIDS CONTENT		50.3
COLOR (L)		3
(a)		9.6
(b)		
NOMINAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
ACTUAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
CONTAMINATION SCORE		NA

CAKE		0.1537	
SOLIDS CONTENT		RAW	COOKED
COLOR (L)		59.8	
(a)		2.7	
(b)		11.2	
NOMINAL CONTAMINATION (SMALL)		5.9	
(LARGE)		1.33	
ACTUAL CONTAMINATION (SMALL)		6.333767	
(LARGE)		1.427781	
CONTAMINATION SCORE		3.539037	
CONTAMINATION REDUCTION % (SMALL)		ERR	
% (LARGE)		ERR	
WHITENESS INCREASE		3	
WHITENESS SPREAD		9.5	

TEST#	5	HX-200 PRESS
FEED		7.62
CHOKE		10
SPEED		0.9489
NOMINAL RECOVERY		0.947272
SOLIDS RECOVERY		10.8
TEMP IN		11.7
TEMP OUT		0.9
TEMP GAIN		3288
CAPACITY		0.15
HOLE SIZE		

FEED		0.1935
SOLIDS CONTENT		49.7
COLOR(L)		0.6
(a)		9.6
(b)		15.6
NOMINAL CONTAMINATION (SMALL)		1.33
(LARGE)		13.30232
ACTUAL CONTAMINATION (SMALL)		1.134108
(LARGE)		5.568217
CONTAMINATION SCORE		

REJECT		0.1998
SOLIDS CONTENT		51.5
COLOR(L)		0.7
(a)		10.1
(b)		46
NOMINAL CONTAMINATION (SMALL)		3.33
(LARGE)		37.98798
ACTUAL CONTAMINATION (SMALL)		2.75
(LARGE)		15.41266
CONTAMINATION SCORE		

CAKE		0.1933	
SOLIDS CONTENT		RAW	COOKED
COLOR(L)		52.3	
(a)		-0.1	
(b)		10.5	
NOMINAL CONTAMINATION (SMALL)		9.6	
(LARGE)		2	
ACTUAL CONTAMINATION (SMALL)		8.194516	
(LARGE)		1.707190	
CONTAMINATION SCORE		4.438696	
CONTAMINATION REDUCTION % (SMALL)		38.39786	
(LARGE)		-50.5315	
WHITENESS INCREASE		2.6	
WHITENESS SPREAD		0.8	

TEST#

6

FEED	SCREEN MINCE
CHOKER	7.92
SPEED	10
NOMINAL RECOVERY	0.9518
SOLIDS RECOVERY	0.950495
TEMP IN	3.8
TEMP OUT	4.6
TEMP GAIN	0.8
CAPACITY	1494
HOLE SIZE	0.15

FEED

SOLIDS CONTENT	0.1172
COLOR(L)	57.4
(a)	1.3
(b)	9.7
NOMINAL CONTAMINATION (SMALL)	NA
(LARGE)	NA
ACTUAL CONTAMINATION (SMALL)	NA
(LARGE)	NA
CONTAMINATION SCORE	NA

REJECT

SOLIDS CONTENT	0.1192
COLOR(L)	48
(a)	3.2
(b)	8.8
NOMINAL CONTAMINATION (SMALL)	NA
(LARGE)	NA
ACTUAL CONTAMINATION (SMALL)	NA
(LARGE)	NA
CONTAMINATION SCORE	NA

CAKE

SOLIDS CONTENT	0.1159
	RAW
COLOR(L)	58.9
(a)	0.1
(b)	7
NOMINAL CONTAMINATION (SMALL)	19.6
(LARGE)	1
ACTUAL CONTAMINATION (SMALL)	27.90336
(LARGE)	1.423641
CONTAMINATION SCORE	10.72476
CONTAMINATION REDUCTION % (SMALL)	ERR
% (LARGE)	ERR
WHITENESS INCREASE	1.5
WHITENESS SPREAD	10.9

COOKED

TEST#	7	TEST 6 CAKE
FEED		8.15
CHOKER		10
SPEED		0.7596
NOMINAL RECOVERY		0.729950
SOLIDS RECOVERY		3.4
TEMP IN		6
TEMP OUT		2.6
TEMP GAIN		1060
CAPACITY		0.8
HOLE SIZE		

FEED	SOLIDS CONTENT	0.1159
	COLOR(L)	58.9
	(a)	0.1
	(b)	7
	NOMINAL CONTAMINATION (SMALL)	19.6
	(LARGE)	1
	ACTUAL CONTAMINATION (SMALL)	27.90336
	(LARGE)	1.423641
	CONTAMINATION SCORE	10.72476

REJECT	SOLIDS CONTENT	0.1273
	COLOR(L)	56.9
	(a)	0.3
	(b)	10.4
	NOMINAL CONTAMINATION (SMALL)	19
	(LARGE)	1.33
	ACTUAL CONTAMINATION (SMALL)	24.62686
	(LARGE)	1.723880
	CONTAMINATION SCORE	9.932835

CAKE	SOLIDS CONTENT	0.1089	
		RAW	COOKED
	COLOR(L)	59	
	(a)	0.4	
	(b)	10.5	
	NOMINAL CONTAMINATION (SMALL)	16.6	
	(LARGE)	0.33	
	ACTUAL CONTAMINATION (SMALL)	25.15151	
	(LARGE)	0.5	
	CONTAMINATION SCORE	8.883838	
	CONTAMINATION REDUCTION % (SMALL)	9.862071	
	(LARGE)	64.87878	
	WHITENESS INCREASE	0.1	
	WHITENESS SPREAD	2.1	

TEST#	7.1	TEST 7 CAKE
FEED		8.92
CHOKER		10
SPEED		0.9358
NOMINAL RECOVERY		0.928128
SOLIDS RECOVERY		6.5
TEMP IN		6.7
TEMP OUT		0.2
TEMP GAIN		1123
CAPACITY		0.8
HOLE SIZE		

FEED		0.1089
SOLIDS CONTENT		59
COLOR(L)		1.4
(a)		10.5
(b)		16.6
NOMINAL CONTAMINATION (SMALL)		0.33
(LARGE)		25.15151
ACTUAL CONTAMINATION (SMALL)		0.5
(LARGE)		8.883838
CONTAMINATION SCORE		

REJECT		0.1166
SOLIDS CONTENT		57.8
COLOR(L)		0.5
(a)		10.3
(b)		11.66
NOMINAL CONTAMINATION (SMALL)		1.33
(LARGE)		16.5
ACTUAL CONTAMINATION (SMALL)		1.882075
(LARGE)		7.382075
CONTAMINATION SCORE		

CAKE		0.1033	
SOLIDS CONTENT		RAW	COOKED
COLOR(L)		59.1	
(a)		0.9	
(b)		10.4	
NOMINAL CONTAMINATION (SMALL)		21.6	
(LARGE)		0	
ACTUAL CONTAMINATION (SMALL)		34.50145	
(LARGE)		0	
CONTAMINATION SCORE		11.50048	
CONTAMINATION REDUCTION % (SMALL)		-37.1744	
% (LARGE)		100	
WHITENESS INCREASE		0.1	
WHITENESS SPREAD		1.3	

TEST#	8	SCREEN MINCE
FEED		8.96
CHOKER		10
SPEED		0.897
NOMINAL RECOVERY		0.874870
SOLIDS RECOVERY		3.6
TEMP IN		5.1
TEMP OUT		1.5
TEMP GAIN		936
CAPACITY		0.8
HOLE SIZE		

FEED		0.1188
SOLIDS CONTENT		57.1
COLOR(L)		1.6
(a)		9.6
(b)		
NOMINAL CONTAMINATION (SMALL)	NA	
(LARGE)	NA	
ACTUAL CONTAMINATION (SMALL)	NA	
(LARGE)	NA	
CONTAMINATION SCORE	NA	

REJECT		0.141
SOLIDS CONTENT		50.1
COLOR(L)		3.1
(a)		9.6
(b)		7
NOMINAL CONTAMINATION (SMALL)		0.66
(LARGE)		8.191489
ACTUAL CONTAMINATION (SMALL)		0.772340
(LARGE)		3.502836
CONTAMINATION SCORE		

CAKE		0.1132	
SOLIDS CONTENT		RAW	COOKED
COLOR(L)		60.5	69.9
(a)		0	-2.4
(b)		10.6	10.4
NOMINAL CONTAMINATION (SMALL)		10.66	
(LARGE)		0	
ACTUAL CONTAMINATION (SMALL)		15.53798	
(LARGE)		0	
CONTAMINATION SCORE		5.179328	
CONTAMINATION REDUCTION % (SMALL)		ERR	
% (LARGE)		ERR	
WHITENESS INCREASE		3.4	
WHITENESS SPREAD		10.4	

TEST#	9	695 MINCE
FEED		
CHOKER		8.96
SPEED		10
NOMINAL RECOVERY		0.8826
SOLIDS RECOVERY		0.885046
TEMP IN		3.6
TEMP OUT		5.1
TEMP GAIN		1.5
CAPACITY		1023
HOLE SIZE		0.8

FEED		
SOLIDS CONTENT		0.1429
COLOR(L)		54.2
(a)		2.1
(b)		9.3
NOMINAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
ACTUAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
CONTAMINATION SCORE		NA

REJECT		
SOLIDS CONTENT		0.141
COLOR(L)		49
(a)		3.2
(b)		9.3
NOMINAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
ACTUAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
CONTAMINATION SCORE		NA

CAKE			
SOLIDS CONTENT		0.1444	
		RAW	COOKED
COLOR(L)		55.9	
(a)		1.8	
(b)		10.8	
NOMINAL CONTAMINATION (SMALL)		11.66	
(LARGE)		0	
ACTUAL CONTAMINATION (SMALL)		13.32340	
(LARGE)		0	
CONTAMINATION SCORE		4.441135	
CONTAMINATION REDUCTION % (SMALL)		ERR	
% (LARGE)		ERR	
WHITENESS INCREASE		1.7	
WHITENESS SPREAD		6.9	

TEST#	10	FILLETS
FEED		8.96
CHOKER		5
SPEED		0.909
NOMINAL RECOVERY		0.878700
SOLIDS RECOVERY		2.4
TEMP IN		4
TEMP OUT		1.6
TEMP GAIN		924
CAPACITY		0.8
HOLE SIZE		

FEED	SOLIDS CONTENT	NA
	COLOR(L)	NA
	(a)	NA
	(b)	NA
	NOMINAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	ACTUAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	CONTAMINATION SCORE	NA

REJECT	SOLIDS CONTENT	0.1583
	COLOR(L)	47.5
	(a)	2.8
	(b)	7.7
	NOMINAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	ACTUAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	CONTAMINATION SCORE	NA

CAKE	SOLIDS CONTENT	0.1148	
	COLOR(L)	54.4	
	(a)	1.2	
	(b)	9.6	
	NOMINAL CONTAMINATION (SMALL)	15.33	
	(LARGE)	0	
	ACTUAL CONTAMINATION (SMALL)	22.03353	
	(LARGE)	0	
	CONTAMINATION SCORE	7.344512	
	CONTAMINATION REDUCTION % (SMALL)	ERR	
	% (LARGE)	ERR	
	WHITENESS INCREASE	NA	
	WHITENESS SPREAD	6.9	

COOKED

TEST#	11	HX-200 PRESS	
	FEED		
	CHOKER	8.96	
	SPEED	10	
	NOMINAL RECOVERY	0.6123	
	SOLIDS RECOVERY	0.605050	
	TEMP IN	9.8	
	TEMP OUT	10.4	
	TEMP GAIN	0.6	
	CAPACITY	1251	
	HOLE SIZE	0.8	
FEED			
	SOLIDS CONTENT	0.2063	
	COLOR(L)	50.1	
	(a)	1.9	
	(b)	10.4	
	NOMINAL CONTAMINATION (SMALL)	9.3	
	(LARGE)	2	
	ACTUAL CONTAMINATION (SMALL)	7.438196	
	(LARGE)	1.599612	
	CONTAMINATION SCORE	4.079011	
REJECT			
	SOLIDS CONTENT	0.1968	
	COLOR(L)	54.7	
	(a)	1	
	(b)	11.1	
	NOMINAL CONTAMINATION (SMALL)	12.66	
	(LARGE)	2	
	ACTUAL CONTAMINATION (SMALL)	10.61432	
	(LARGE)	1.676829	
	CONTAMINATION SCORE	5.214939	
CAKE			
	SOLIDS CONTENT	0.1909	
		RAW	COOKED
	COLOR(L)	53	
	(a)	1.2	
	(b)	1.1	
	NOMINAL CONTAMINATION (SMALL)	14.66	
	(LARGE)	0	
	ACTUAL CONTAMINATION (SMALL)	12.67103	
	(LARGE)	0	
	CONTAMINATION SCORE	4.223677	
	CONTAMINATION REDUCTION % (SMALL)	-70.3508	
	(LARGE)	100	
	WHITENESS INCREASE	2.9	
	WHITENESS SPREAD	-1.7	

TEST#	12	FILLETS
FEED		7.55
CHOKER		10
SPEED		0.9833
NOMINAL RECOVERY		0.983240
SOLIDS RECOVERY		3.8
TEMP IN		5
TEMP OUT		1.2
TEMP GAIN		2888
CAPACITY		0.15
HOLE SIZE		

FEED	SOLIDS CONTENT	NA
	COLOR(L)	NA
	(a)	NA
	(b)	NA
	NOMINAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	ACTUAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	CONTAMINATION SCORE	NA

REJECT	SOLIDS CONTENT	0.1653
	COLOR(L)	43.4
	(a)	4.2
	(b)	8.1
	NOMINAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	ACTUAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	CONTAMINATION SCORE	NA

CAKE	SOLIDS CONTENT	0.1647	
	COLOR(L)	RAW	COOKED
	(a)	49.9	
	(b)	2	
		9	
	NOMINAL CONTAMINATION (SMALL)	11	
	(LARGE)	1.33	
	ACTUAL CONTAMINATION (SMALL)	11.02003	
	(LARGE)	1.332422	
	CONTAMINATION SCORE	5.005768	
	CONTAMINATION REDUCTION % (SMALL)	ERR	
	% (LARGE)	ERR	
	WHITENESS INCREASE	NA	
	WHITENESS SPREAD	6.5	

TEST#	13	418 MINCE	
FEED		8.96	
CHOKER		10	
SPEED		0.8998	
NOMINAL RECOVERY		0.882611	
SOLIDS RECOVERY		5.4	
TEMP IN		6.2	
TEMP OUT		0.8	
TEMP GAIN		983	
CAPACITY		0.8	
HOLE SIZE			

FEED	SOLIDS CONTENT	0.1303	
	COLOR(L)	54	
	(a)	2.8	
	(b)	11.1	
	NOMINAL CONTAMINATION (SMALL)	NA	
	(LARGE)	NA	
	ACTUAL CONTAMINATION (SMALL)	NA	
	(LARGE)	NA	
	CONTAMINATION SCORE	NA	

REJECT	SOLIDS CONTENT	0.1481	
	COLOR(L)	47.4	
	(a)	2.8	
	(b)	9.2	
	NOMINAL CONTAMINATION (SMALL)	NA	
	(LARGE)	NA	
	ACTUAL CONTAMINATION (SMALL)	NA	
	(LARGE)	NA	
	CONTAMINATION SCORE	NA	

CAKE	SOLIDS CONTENT	0.124	
		RAW	COOKED
	COLOR(L)	55.8	64.9
	(a)	1.7	-2
	(b)	11.5	9.2
	NOMINAL CONTAMINATION (SMALL)	17	
	(LARGE)	0	
	ACTUAL CONTAMINATION (SMALL)	22.62096	
	(LARGE)	0	
	CONTAMINATION SCORE	7.540322	
	CONTAMINATION REDUCTION % (SMALL)	ERR	
	(LARGE)	ERR	
	WHITENESS INCREASE	1.8	
	WHITENESS SPREAD	8.4	

TEST#	14	695 MINCE
FEED		
CHOKER		8.96
SPEED		10
NOMINAL RECOVERY		0.9025
SOLIDS RECOVERY		0.896188
TEMP IN		2.9
TEMP OUT		3.2
TEMP GAIN		0.3
CAPACITY		1077
HOLE SIZE		0.8

FEED		
SOLIDS CONTENT		0.143
COLOR(L)		50.2
(a)		20.7
(b)		9.2
NOMINAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
ACTUAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
CONTAMINATION SCORE		NA

REJECT		
SOLIDS CONTENT		NA
COLOR(L)		NA
(a)		NA
(b)		NA
NOMINAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
ACTUAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
CONTAMINATION SCORE		NA

CAKE			
SOLIDS CONTENT		0.142	
COLOR(L)		RAW	COOKED
(a)		50.3	
(b)		3.7	
NOMINAL CONTAMINATION (SMALL)		9	
(LARGE)		16.3	
ACTUAL CONTAMINATION (SMALL)		0	
(LARGE)		18.94014	
CONTAMINATION SCORE		0	
CONTAMINATION REDUCTION % (SMALL)		6.313380	
% (LARGE)		ERR	
WHITENESS INCREASE		ERR	
WHITENESS SPREAD		0.1	
		NA	

TEST#	14.1	418-BH.8-695
FEED		8.85
CHOKER		10
SPEED		0.9892
NOMINAL RECOVERY		0.917579
SOLIDS RECOVERY		6.1
TEMP IN		7.1
TEMP OUT		1
TEMP GAIN		1174
CAPACITY		0.8
HOLE SIZE		

FEED	SOLIDS CONTENT	0.1174
	COLOR(L)	56.3
	(a)	1.3
	(b)	10.7
	NOMINAL CONTAMINATION (SMALL)	16.3
	(LARGE)	0
	ACTUAL CONTAMINATION (SMALL)	22.90885
	(LARGE)	0
	CONTAMINATION SCORE	7.636286

REJECT	SOLIDS CONTENT	NA
	COLOR(L)	NA
	(a)	NA
	(b)	NA
	NOMINAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	ACTUAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	CONTAMINATION SCORE	NA

CAKE	SOLIDS CONTENT	0.1089	
		RAW	COOKED
	COLOR(L)	57	67.2
	(a)	1.2	-2.7
	(b)	10.4	9.2
	NOMINAL CONTAMINATION (SMALL)	30.66	
	(LARGE)	0	
	ACTUAL CONTAMINATION (SMALL)	46.45454	
	(LARGE)	0	
	CONTAMINATION SCORE	15.48484	
	CONTAMINATION REDUCTION % (SMALL)	-102.779	
	(LARGE)	ERR	
	WHITENESS INCREASE	0.7	
	WHITENESS SPREAD	NA	

TEST#	15	FILLETS
FEED		8.03
CHOKE		4
SPEED		0.9533
NOMINAL RECOVERY		ERR
SOLIDS RECOVERY		2.5
TEMP IN		3.1
TEMP OUT		0.6
TEMP GAIN		2247
CAPACITY		0.15
HOLE SIZE		

FEED	SOLIDS CONTENT	NA
	COLOR(L)	NA
	(a)	NA
	(b)	NA
	NOMINAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	ACTUAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	CONTAMINATION SCORE	NA

REJECT	SOLIDS CONTENT	0.1736
	COLOR(L)	42.9
	(a)	3
	(b)	6.5
	NOMINAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	ACTUAL CONTAMINATION (SMALL)	NA
	(LARGE)	NA
	CONTAMINATION SCORE	NA

CAKE	SOLIDS CONTENT	0.1576	
		RAW	COOKED
	COLOR(L)	48.4	
	(a)	2.6	
	(b)	8.7	
	NOMINAL CONTAMINATION (SMALL)	24.33	
	(LARGE)	2.66	
	ACTUAL CONTAMINATION (SMALL)	25.47239	
	(LARGE)	2.784898	
	CONTAMINATION SCORE	11.27569	
	CONTAMINATION REDUCTION % (SMALL)	ERR	
	% (LARGE)	ERR	
	WHITENESS INCREASE	NA	
	WHITENESS SPREAD	NA	

COMMENT :ACTUAL RECOVERY WAS MUCH HIGHER THAN INDICATED

TEST#	15.1	418-BH1.5
FEED		8.88
CHOKER		4
SPEED		0.983
NOMINAL RECOVERY		0.985692
SOLIDS RECOVERY		4.9
TEMP IN		6
TEMP OUT		1.1
TEMP GAIN		847
CAPACITY		0.8
HOLE SIZE		

FEED		0.1308
SOLIDS CONTENT		54.3
COLOR(L)		2.2
(a)		9.7
(b)		23
NOMINAL CONTAMINATION (SMALL)		1.66
(LARGE)		29.01376
ACTUAL CONTAMINATION (SMALL)		2.094036
(LARGE)		11.76529
CONTAMINATION SCORE		

REJECT		0.128
SOLIDS CONTENT		53.5
COLOR(L)		0.6
(a)		9
(b)		
NOMINAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
ACTUAL CONTAMINATION (SMALL)		NA
(LARGE)		NA
CONTAMINATION SCORE		NA

CAKE		0.1525	
SOLIDS CONTENT		RAW	COOKED
COLOR(L)		54.3	
(a)		2.8	
(b)		10.9	
NOMINAL CONTAMINATION (SMALL)		11.33	
(LARGE)		0.33	
ACTUAL CONTAMINATION (SMALL)		12.25868	
(LARGE)		0.357049	
CONTAMINATION SCORE		4.443278	
CONTAMINATION REDUCTION % (SMALL)		57.74870	
(LARGE)		82.94923	
WHITENESS INCREASE		0	
WHITENESS SPREAD		0.8	