Seafish Technology and Training SR584

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Trials to Determine the Fat Content of Fish and Chips

Summary

Fish and chips are typically perceived as being high in fat along with other takeaway foods. Currently there is little quantifiable data on the actual fat content of commercially produced fish and chips. The currently accepted benchmark for the total fat content of commercially produced fish and chips is 15.4 g/100g and 12.4 g/100g, respectively. Composite samples of fish and chips were taken from 30 takeaways for analysis; in addition controlled trials were carried out under commercial conditions to investigate the optimum cooking conditions.

The takeaway average meal portion size was found to be 507.9g, with an average total fat for the fish and chips at 9.8 g/100 g and 9.0 g/100 g, respectively. Under optimum commercial conditions the average total fat for fish and chips was 8.2 g/100g and 6.9 g/100 g respectively.

This work represents a new benchmark for the total fat content of takeaway fish and chips, on average 32% lower than the currently accepted values. For samples cooked under optimal commercial conditions the benchmark for total fat was found to be even lower; an average 45% less than the currently accepted values.

Fish and chips represent a nutritious meal which is relatively low in total fat compared to some takeaways. By removing the batter from the fish, health-conscious consumers can enjoy a very low fat meal (fish 0.7% fat).

Table of Contents:

Tables

1. Introduction

The UK is waking up to obesity issues, and there is a much greater awareness of the effect of diet and fat intake on health. Fish and chips are typically perceived as being high in fat along with other takeaway foods. Currently there is little quantifiable data on the actual fat content of commercially produced fish and chips. The current bench mark is derived from limited samples presented in McCance & Widdowsons, hence there is a need to determine actual values. Takeaway fish and chips is a highly variable product, with each shop frying in a slightly different way. There is a need to investigate how the key factors may affect the total fat and type of fat in the product. Resulting information could then be used for updating guidance material for fryers.

This report is concerned with trials carried out in November 2005. Working in collaboration with the National Federation of Fish Fryers (NFFF), sampling of commercially produced fish and chips from 30 takeaways was carried out. In addition, trials were carried out under controlled commercial conditions to investigate the effect of cooking temperature, batter thickness, oil type and antioxidant (to prevent chip browning) on the total fat and fat type, in the fish and chips produced.

2. Method

Five takeaway fish and chip shops were selected at random from each of the following 6 geographical regions; England South, Midlands, England North, Scotland, Wales and Northern Ireland. Two 'large' battered cod were purchased from each shop. After ten minutes, to simulate an approximate time from purchase to consumption, both samples were double bagged together to create a composite sample. This procedure was repeated for two portions of chips to give a total of 60 composite samples.

The controlled trials were carried out at the NFFF Fryer training centre, Leeds. A Senior professional fryer (NFFF), commercial frying range, preparation equipment and raw materials were used to replicate typical commercial conditions.

Maris piper potatoes were peeled using a Bold R1 chipper peeler, followed by manual 'eye' removal and 10 minutes soaking in water to float off the starch. The potatoes were then chipped using a 14mm grid to produce chips with a 14mm x 14mm cross sectional area. Approximately half the chips were treated using a 5g/l solution of antioxidant for 1½ minutes. All chips were left to drain for a minimum of one hour.

Both treated and untreated chips were fried in blended vegetable oil, beef dripping and palm vegetable oil at 160°C, 170°C and 180°C using a standard pan. Chip samples were also fried in a high efficiency (HE) pan (170^{o}C). In addition some chip samples were part fried for 3 minutes, allowed to cool and then cooked again at 170^{o}C for 3 minutes (HE pan). The point of cooking was determined by the fryer using colour and the traditional pinch test. Two standard scoops of chips were double bagged to create a composite sample.

Similar size, defrosted, frozen at sea cod fillets (graded 8-16oz) were rice coned and battered with either a thick or thin viscosity batter. Fish were fried

using the same three temperature conditions as the chips. Colour and 'floating' was to determine cook time. Two fish were double bagged to create a composite sample.

Samples were couriered to the Seafish laboratory and stored frozen until analysis. All samples were analysed for total fat and fat type, with selected samples receiving full nutritional analysis. The skin and the batter attached to the skin was removed from the battered fish samples before analysis to reflect the normally consumed edible portion. Analysis was carried out by a AL Control Ltd, Rotherham (NAMAS accredited).

3. Results

3.1Takeaway samples

The average meal portion size was 507.9g, with the average fish portion (skin removed) and chip portion at 256.3g and 251.6g, respectively.

The currently accepted benchmark for the total fat content of commercially produced fish and chips is 15.4 g/100g and 12.4 g/100g, respectively (McCance & Widdowson's, 6th Summary Edition). The average total fat found was 9.8 g/100 g and 9.0 g/100 g, respectively. The breakdown of the fat types is shown in Table 1.

Table 1 - Average Total Fat & Fat Type in Takeaway Fish & Chip Samples

		Average Fat Content (g/100g)					
		Saturated fat	**Mono-unsat. fat**	**Poly-unsat. fat**	**Trans fat**	**Other Fat**	**Total fat**
Fish	Overall Average	4.9	3.6	0.5	0.3	0.4	9.8
	Cooked in Vegetable oil	3.8	3.4	0.8	0.2*	0.3	8.6
	Cooked in Animal Fat	5.3	3.6	0.3	0.5	0.5	10.2
Chips	Overall Average	4.4	3.4	0.6	0.3	0.4	9.0
	Cooked in Vegetable oil	4.0	3.4	0.7	0.2*	0.4	8.6
	Cooked in Animal Fat	5.0	3.4	0.3	0.4	0.4	9.6

**Or less (reported values of >0.1 were converted to 0.1 for analysis)*

3.2 Controlled samples

The average total fat found in the controlled trial fish and chip samples was 8.2 g/100g and 6.9 g/100 g respectively. The breakdown of the average total fat and fat type for each treatment is shown in Table 2.

Table 2 – Average Total Fat and Fat Type for each Treatment

		Average Fat Content (g/100g)					
		Saturated fat	**Mono-unsat. fat**	**Poly-unsat. fat**	**Trans fat**	**Other**	**Total fat**
Chips Average	Overall Average	3.4	2.6	0.4	0.1*	0.4	6.9
	Antioxidant Treated	3.6	2.8	0.4	0.1*	0.4	7.3
	Untreated	3.2	2.5	0.3	0.1*	0.4	6.5
	Cooking temp 160^{o}C	3.4	2.7	0.5	0.1*	0.3	7.0
	Cooking temp 170^{o}C	3.2	2.5	0.4	0.2*	0.3	6.6
	Cooking temp 180^{o}C	3.7	2.7	0.2	0.1*	0.5	7.2
	Blended oil	3.8	2.9	0.5	0.1*	0.3	7.7
	Palm oil	3.3	2.8	0.4	0.04*	0.5	7.0
	Beef dripping	3.4	2.3	0.1	0.3*	0.3	6.4
	Double fried (Blend/Beef)	4.4	3.4	0.4	0.3*	0.4	9.0
	HE range (oil blend)	4.2	3.3	0.6	0.1	0.4	8.6
Fish Average	Overall Average	3.9	2.8	0.4	0.1*	0.3	8.2
	Thick batter	4.1	3.0	0.5	0.1*	0.4	8.1
	Thin batter	4.2	3.1	0.5	0.1*	0.4	8.4
	Cooking temp 160^{o}C	3.6	2.8	0.5	0.1*	0.3	7.3
	Cooking temp 170^{o}C	4.5	3.2	0.5	0.1*	0.5	8.7
	Cooking temp 180^{o}C	4.3	3.2	0.6	0.2*	0.3	8.8
	Blended oil	5.1	3.8	0.7	0.1*	0.5	10.1
	Palm oil	3.7	2.9	0.7	0.03*	0.3	7.6
	Beef dripping	3.7	2.5	0.1	0.3*	0.4	7.1
	Batter removed	0.3	0.3	0.1	0.0	0.0	0.7

**Or less (reported values of >0.1 were converted to 0.1 for analysis)*

Table 3 shows a comparison table of other takeaway foods

Table 3. Total Fat Takeaway Comparison Table

Item	Total Fat g/100g
Crispy Duck Chinese style[+]	24.2g
Doner Kebab, Pita & Salad[+]	16.2g
High street chain Burger[+]	14.8g
French Fries[+]	15.5g
Large battered Cod*	9.8g
Traditional Chips*	9.0g

[+]*McCance & Widdowson's, 6th Summary Edition*
**Fish & Chip shop 'takeaway' samples, Seafish 2005*

4. Conclusions

Commercial sampling produced a new benchmark for the total fat content of takeaway fish and chips, on average 32% lower than the currently accepted values. Fish and chips represents a nutritious meal which is relatively low in total fat and the more undesirable saturated and trans fats, compared to some takeaways. Results showed that samples cooked in vegetable fat had the lowest total fat, saturated fat and trans-fatty acid levels compared to samples cooked in animal fat.

For samples cooked under controlled commercial conditions the benchmark for total fat was found to be even lower; an average 45% less than the currently accepted values. By removing the batter from the fish, health-conscious consumers can enjoy a very low fat meal with (fish 0.7% fat). But, double frying could significantly increase the total fat content of chips. Although samples cooked in beef dripping had the lowest total fat; it is considered that the takeaway samples give a better overall picture of the effect of fat type, as these samples were cooked in a range of different vegetable oils.

The controlled samples gave lower total fat results than the takeaway samples. This difference can be explained by the optimal preparation of the raw materials, careful cooking, i.e. no over cooking, lengthening the time in contact with the fat and effective draining. The oil was at or close to the optimum temperature.

At the level of treatments used, no significant differences in total fat were observed by varying batter thickness, oil type/temperature or antioxidant treatment. However, it was observed that the cooking time was reduced for antioxidant treated chips. It can be concluded that further work would be required, broadening the treatments; i.e. widening the cooking temperature range, to determine their effects.

