Cambridgeshire Secondary School Meals Pilot Project

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1. Executive Summary

1.1 Introduction

This Cambridgeshire Secondary School Meals Pilot Project was commissioned and funded by The Food Standards Agency (FSA). Its aim was to inform the work of a panel, established by the Department of Education and Skills (DfES), considering the revision of standards for secondary school meals in England. The action research which included an analysis of the nutritional content of school meals at lunch-time, took place in two secondary schools in Cambridgeshire between January and May 2005.

1.2 Objectives / Approach

The objectives of the study were to:

- Actively involve young people in the process of determining the extent to which standards in school meals can be modified to more easily enable healthy choices.
- Analyse the nutritional content of school meals before and after modifications are made to the meals, with active participation by pupils in order to influence eating patterns.

An emphasis on partnership working both at a strategic and school level was central to the methodology of this research.

The study was informed and directed by a partnership steering group with representatives from:

- Cambridgeshire Catering Services (CCS), the schools service provider
- Cambridgeshire Personal, Social and Health Education Service (PSHE)
- East Cambridgeshire and Fenland Primary Care Trust (PCT) Community Nutrition and Dietetic department
- Public Health
- The two secondary schools at the centre of the study

A school nutrition action group (SNAG) was established in each participating secondary school to inform interventions that may promote healthy eating. The SNAGs included pupil representatives, the healthy schools co-ordinator who was also a member of the school management team, the school catering service and a community dietitian.

1.3 Key Findings

1.3.1 Pupil participation

- Pupil participation was an effective way of making pupil-led changes to encourage healthy eating choices at lunchtime.
- Pupils were able to both identify a range of healthy eating interventions in and around school that were acceptable to their peers and to tackle barriers to consuming a healthier diet at school.
- The empowerment of pupils through their active participation in the study ensured that they had ownership of the changes introduced
- A partnership approach supports the implementation of changes to promote healthy eating at both a school-based and a strategic level.
- Menu changes that were introduced on an incremental basis and as a result of full pupil participation were more successful.

1.3.2 Nutritional analysis and influencing change

- Pupils at both schools had a good knowledge of general healthy eating principles but showed poor knowledge of the Balance of Good Health model which provides guidance on balanced eating throughout the day.
- Small but positive changes were made to the nutritional Intake of pupils at lunch-time, despite the short period of the study.
- Main dietary changes observed between pre- and post-intervention data were:
  - A reduction in total and saturated fat (School B)
  - A reduction in percentage energy from fat and saturated fat (School B)
  - A reduction in NME sugars (Schools A and B)
  - An increase in calcium, vitamin A and vitamin C intakes (Schools A and B)
  - A reduction in sodium intake (Schools A and B)
  - An increase in fruit and vegetable intake (School A)
- Macronutrients appeared to be easier to effect than micronutrients. Iron remained particularly low in the post-intervention analysis.
- Pre-intervention, mean intakes of nutrients at School A met three of the Caroline Walker Trust (CWT) Guidelines, at School B, two of the guidelines were met. Post-intervention, mean nutrient intakes at both schools met four out of twelve CWT Guidelines.

1.4 Project Overview

- A multi-agency steering group was formed to determine the scope of the project.
- Two secondary schools participating in the healthy schools programme were selected to participate in the study, School A and School B.
- Both schools had cashless catering systems where data regarding pupil choices was logged daily onto central computer systems. Both schools

also had existing contracts for catering provision with CCS and were keen to work with their provider to improve pupil choices at lunchtime.

- A key contact person in each school was identified: in School A, a Business Manager and in School B an Assistant Head Teacher. Both key contacts were healthy school co-ordinators.
- Two community dietitians were recruited as project officers, taking responsibility for one school each.
- Fifty-two pupils in School A and 51 in School B were randomly selected to take part in the study.
- During the first measurement week pupils completed food diaries and had their food choices measured via the cashless card used to purchase their food.
- The pupils' intake at lunchtime was analysed using Dietplan 6 and intakes compared to the CWT Guidelines for school meals. The Megabyte system was used to source the base data from recipes and manufacturers product specifications.
- The selected pupils also completed a questionnaire during the first measurement week. This was aimed at assessing their knowledge and attitudes regarding healthy eating.
- A leaflet was given to all the pupils in both schools to gather their views about the catering service and to seek ideas about possible changes within the schools that may encourage healthy eating.
- School nutrition action groups (SNAGs) were then set up in the schools. These involved school council members, teachers, catering staff and the project officer. These meetings were held regularly and pupils' ideas to promote healthy eating were identified.
- CCS made a number of menu and recipe changes as a result of the ideas and proposals generated in each SNAG.
- A second measurement week was then carried out.
- The pupils completed the same questionnaire after the second measurement week.
- Pre- and post-intervention dietary analyses were then compared.
- Focus groups were held in each school to evaluate the processes involved in the study.

1.5 Recommendations and Implications

Overall pupil participation in the process of initiating change to promote healthy eating in the secondary schools studied was successful. To increase the impact of such changes, the following are recommended:

- Agreed, effective and fully representative mechanisms need to be in place for involving all pupils in the process of identifying, planning and implementing change to promote healthy eating.
- A recognised level of knowledge regarding key healthy eating principles and their context within a balanced diet, incorporating the application of the Balance of Good Health, may help to guide pupils towards achieving a more adequate micro- and macro-nutrient intake.

- The wider influences on food choice within the context of a school environment should be taken into consideration when developing interventions to encourage healthy eating choices.
- Longer-term success for bringing about change will require further investment into the funding of school meals and a review of the financial arrangements with schools. In addition, there must be greater investment in the infrastructure, the skilled staff time, and foodstuffs if pricing levels are not to be increased substantially and take -up of school meals is not to be effected so as to damage the viability of the Service.
- Pupil-led changes introduced over a short period of time provided small but significant improvements in the healthy eating choices of pupils. If more significant and sustainable changes in food choices are to be achieved changes must be introduced incrementally and over a long period of time, allowing time for pupil involvement and ownership of change and varied educational interventions. It was observed that menu changes such as the introduction of meal deals did not prove popular, and in order to bring about change, full pupil participation and gradual long-term introduction would be needed.
- In considering revised nutritional standards for school meals, food and drink consumed over the whole day should be taken into account and effective mechanisms for monitoring this need to be in place.
- The involvement of registered dietitians to advise on nutrition within the school environment and facilitate change in healthy eating practices should be encouraged and supported with sufficient provision of funding.

2. Glossary of Terms

Cash cafeteria system	Catering services offering a variety of hot and cold dishes and snacks. Pupils make their choice and pay for each item.
Cashless Catering System	All pupils have a card on which money can be added on to. Food is paid for using the card and no money passes hands at the point of the till.
CCS	Cambridgeshire Catering Service
COMA	Committee on Medical Aspects of Food Policy
CWT	Caroline Walker Trust
DfES	Department for Education and Skills
Extrinsic sugars	Any sugar which is not contained within cell walls. Examples are the sugar in honey, table sugar and lactose in milk and milk products.
NME sugars	Non-milk extrinsic sugars. Extrinsic sugars except lactose in milk and milk products
HEA	Health Education Authority
LEA	Local Education Authority
MAFF	Ministry of Agriculture, Fisheries and Food
NSP	Non-starch polysaccharides. A precisely measurable component of foods. The best measure of ‘dietary fibre’.
PCT	Primary Care Trust
PHSE	Personal, Health and Social Education
SNAG	School nutrition action group

3. Introduction

3.1 Background

Cambridgeshire Catering Services (CCS) is the in-house provider of the County Council and provides services to a number of secondary schools in Cambridgeshire.

In determining to submit Cambridgeshire schools for the project, partnerships were forged with a number of agencies to take the project forward. This has resulted in productive and beneficial relationships between CCS (the service provider), Cambridgeshire PSHE, East Cambridgeshire and Fenland PCT dietitians, the Public Health Department and most importantly the schools and their health promotion co-ordinators.

Selected schools were those offering successful catering services, actively working towards the healthy schools standard, and with cashless catering systems in place to assist in the collection of sales information.

Cash cafeteria services are very much customer driven, and the financial viability of the services is key to both the provider and the schools. A project aim would be to improve the understanding and selection of healthier food choices whilst still keeping catering services viable in the longer term.

3.2 Objectives

The objectives of the project were to:

- Actively involve young people in the process of determining the extent to which standards in school meals can be modified to more easily enable healthy choices
- Analyse the nutritional content of school meals before and after modifications are made to the meals, with active participation by pupils in order to influence eating patterns.

The full scope of work is in Appendix 1

3.3 Project Overview

- A multi-agency steering group was formed to determine the scope of the project.
- Two schools were selected to participate in the study, School A and School B.
- Both schools had cashless catering systems where data regarding pupil choices was logged daily on central computer systems. Both schools

also had existing contracts for catering provision with CCS and were keen to work with their provider to improve pupil choices at lunchtime.

- A key contact person in each school was identified: in School A, a Business Manager and in School B an Assistant Head Teacher. Two community dietitians were recruited as project officers, taking responsibility for one school each.
- Fifty two pupils in School A and 51 in School B were randomly selected to take part in the study.
- During the first measurement week the pupils completed food diaries, and their food choices were also measured via the cashless card used to purchase their food.
- The pupils' intake at lunchtime was analysed using Dietplan 6 and intakes compared to the Caroline Walker Trust Guidelines for school meals.
- The selected pupils also completed a questionnaire during the first measurement week. This was aimed at assessing their knowledge and attitudes regarding healthy eating.
- A leaflet was given to all the pupils in both schools to gather their views about the catering service and to seek their ideas about possible changes within the schools that may encourage healthy eating.
- School nutrition action groups (SNAGs) were then set up in the schools. These involved school council members, teachers, catering staff and the project officer. These meetings were held regularly and pupils' ideas for healthier food were discussed.
- As a result of the pupil ideas discussed during the SNAG meetings, CCS made a number of menu and recipe changes.
- A second measurement week was then carried out.
- The pupils completed the same questionnaire after the second measurement week had been carried out.
- Pre- and post-intervention dietary analyses were then compared.
- Focus groups were held in the school to evaluate the processes involved in the project.
- A detailed timetable of events can be found in Appendix B.

3.4 National Nutritional Standards For School Meals

National nutritional standards for school meals[1] were reintroduced in April 2001 following concern about the quality of pupil's diets. They set out minimum standards, in terms of food groups, that school caterers must meet.

There are separate, although similar, standards for nursery schools, primary schools and secondary schools. The standards apply to lunches whether they are free or paid for.

The regulations for secondary schools stipulate that at least two items from the food groups in Table (i) must be available every day and throughout the lunch service. These are the compulsory standards. The regulations do not make any reference to portion size or specific nutrients.

Table (i). The national nutritional compulsory standards. At least two items from each food group must be available every day.

Food group	Additional requirement
Starchy foods	At least one of the foods available in this group must not be cooked in oil/fat
Vegetables and fruit	Both a fruit and a vegetable must be available
Milk and dairy foods	
Meat, fish and alternative (non-dairy) sources of protein	Fish must be available at least two days a week Red meat must be available at least three days a week

The DfES produced guidance for school caterers on how to implement these new standards for school meals. Included in this guidance were additional recommendations.

The Secretary of State:

- Expects that drinking water should be available to all pupils every day, free of charge
- Strongly recommends that schools should offer some hot food, particularly in the winter months
- Strongly recommends that drinking milk is available as an option every day.

Further recommendations include serving oily fish once per week and making milk free to pupils entitled to free school meals.

Ensuring that the national nutritional standards are met is the responsibility of the LEA, or school governing body if the school meals budget has been delegated.

3.5 Caroline Walker Trust Guidelines for School Meals

In addition to monitoring compliance with the compulsory nutritional standards, the DfES suggests that the nutrient content of the meals is monitored, either by the use of food composition tables or via laboratory analysis of samples.

The results from the analysis may then be compared with the Caroline Walker Trust (CWT) Guidelines for School Meals[2]. The CWT Guidelines 'provide figures for the recommended nutrient content of an average school meal provided for pupils over a one-week period'.

The values are based on the recommendations contained in the COMA report Dietary Reference Values for Food Energy and Nutrients for the United Kingdom[3]. The CWT Guidelines, published in 1992, are still the only nutrient based guidelines for school meals in England. The CWT Guidelines are set out in Table (ii).

Table (ii). Summary of Caroline Walker Trust Nutritional Guidelines for school meals.

Nutrient	Guideline	Minimum/ maximum	Unit	Guideline amount for secondary school pupils
Energy	30% of the EAR*		MJ/Kcal	2.65/634
Fat	Not more than 35% of food energy**	max	g	24.7
Saturated fatty acids	Not more than 11% of food energy	max	g	7.7
Carbohydrate	Not less than 50% of food energy	min	g	84.5
Non-milk extrinsic (NME) sugars	Not more than 11% of food energy	max	g	18.0
Non-starch polysaccharides (NSP) (fibre)	Not less than 30% of the Calculated Reference Value♣	min	g	5.1
Protein	Not less than 30% of RNI♣♣	min	g	13.0
Iron	Not less than 40% of RNI	min	mg	5.9
Calcium	Not less than 35% of RNI	min	mg	350
Vitamin A (retinol equivalents)	Not less than 30% of RNI	min	µg	183
Folate	Not less than 40% of RNI	min	µg	80
Vitamin C	Not less than 35% of RNI	min	mg	13
Sodium	Should be reduced in catering practice			

* Estimated Average Requirement (EAR) is the estimated average requirement of a group of people

** Food energy is the energy obtained from food, assuming no contribution from alcohol

♣ Calculated Reference Value is a value calculated by the Working Group for pupils based on a non-starch polysaccharide (NSP) intake of 8g/1000kcal

♣♣ Reference Nutrient Intake (RNI) is an amount of the nutrient that is enough, for about 97% of people in a group.

3.6 Scottish Nutrient Standards for School Lunches

In February 2003, Hungry for Success, the report of the Expert Panel on School Meals, was published[4]. This report sets out the Panel's vision for a revitalised school meals service in Scotland. The Standards are based on the Caroline Walker Trust Guidelines for School Meals but in addition, the following standards are added:

- Fruits and vegetables should be considered as part of the nutrient standards, with around 30% being supplied by school lunch (World

Health Organization Recommendations on Diet, Nutrition and the Prevention of Chronic Disease 1990[5]).

- Sodium provision should be no more than 30% of the Dietary Reference Value (Scientific Advisory Committee on Nutrition (2003) Salt and Health[6]).

This study compares the pupils' dietary intakes with both the Caroline Walker Trust Guidelines for school meals and the two extra standards from the Scottish Nutrient Standards for School Lunches.

3.7 Steering Group

A project steering group was established in December 2004 in order to produce a scope for the project and secure funding. Monthly steering group meetings were held throughout the duration of the project in order to guide and advise progress. The establishment of a project steering group ensured multi-agency working and aided communication between those involved in the project. The steering group meetings also served as a forum in which results could be shared and interpreted as they became available.

The membership of the steering group included the Head of Service of Cambridgeshire Catering Service, a Public Health Registrar, the Manager of Education and Health Partnerships from Cambridgeshire PHSE service, the Lead Practitioner Dietitian of East Cambridgeshire and Fenland PCT, the two Community Dietitians who took on roles as project officers, the Business Manager from School A and the Assistant Head Teacher from School B.

3.8 School Profiles

Both schools are Community Colleges in rural Cambridgeshire.

School A has 1172 pupils and 184 staff and was built in 1958 to house 250 pupils. The school has rapidly expanded in recent years and now has permanent accommodation for 1200 pupils.

There are two key issues with the premises. Firstly the main hall serves as a function area, assembly hall and dining hall but was built for 250 pupils with an only small extension in 1998. Secondly, the kitchen and service area is very small for the number of meals produced with a service counter that limits the adequate display of the full range of meals and dishes available. Capacity is therefore a considerable difficulty for School A and as a result pupils are able to take food away from the dining area, and hand held food is important to fulfil the throughput.

The school achieved Science Specialist Status in 2003. It has embarked on the Cambridgeshire Health Promoting Schools Programme.

CCS employs a school caterer and 14 catering staff here.

School B has 1100 pupils and was opened in 1937 as the second Cambridgeshire Village College. School B achieved Specialist Status as a Humanities College in 2004 and is also a Health Promoting School.

The kitchen is of adequate capacity, with a recently re-furbished service area and dedicated dining room. All customers have to remain within the dining area and cannot take food outside of that area.

A school caterer and 13 catering staff are employed here.

Both schools operate a cashless catering system but use ones produced by different companies. All pupils and staff are allocated with a cashless catering card. Cards can be charged with money from cash loading machines around the school, by cheque, or by paying a member of staff at lunchtime. These cards are then used to buy all food and drink within the school, speeding up the service, and making those pupils that have free school meals anonymous.

3.9 Catering Service

3.9.1 Service Provision

Both schools' catering services offer a full cash cafeteria system at lunchtimes, with both traditional and popular fast food options as shown in Appendix C. These services reflect the range of dishes and services found typically in secondary schools. There is a high proportion of prime cooking using base ingredients, including bread freshly made daily, and made into pizzas, rolls and sweet dough items.

The majority of the fast and snack food options are bought-in products, with a range of fresh and convenience vegetables, fresh salads and fruit and a wide range of beverages.

The catering staff have been trained, mostly in-house by CCS trainers, and have craft skills at the appropriate level, food safety, and customer care training.

At School A the pupils are not allowed off site at lunchtime other than with parental permission. There is one small shop nearby.

At School B all pupils remain on the premises. There is one small shop in the Village.

Opening times are found in Appendix D. Breakfast and morning break product mix is found at Appendix E.

3.9.2 Pre-Intervention Menu Range, Tariff and Sales Mix

The menu range and tariff at the baseline are shown in Appendix C, and reflect the extensive choice that is available at lunchtime. The Sales Mix is at Appendix F.

In both schools there is a mid-morning break at quite a late time in the morning, and so this service is well used and includes a wide range of hot savoury snacks, sandwiches, bakery items and drinks. Many pupils use this break time provision as an important part of their day's food consumption.

At school B there is also a breakfast service.

3.9.3 Dining environment

School A as stated above is operating beyond the existing capacity. The main hall is used for dining, with service areas operating from the kitchen service area, and service trolleys at one end of the hall. The kitchen service includes the hot traditional main meals, salads as well as snacks, and the trolley service offers a limited range of snack foods.

At break time all the pupils stand in the hall to eat. There is no seating at this time and it is a very busy area. At lunchtime the service is staggered in 2 sittings rather than a continuous service. There is not sufficient room for everyone to be seated, especially in the first sitting. Many pupils therefore have to stand and eat. The staff eat on the stage in the hall. Water is available to all from an urn in the dining room.

School B has a dedicated dining room, recently upgraded, offering an attractive environment, although reaching overcapacity at times over the lunch period. At break time snacks can be also be purchased in the main hall.

Meal observations were carried out on the project officers' first visits to the schools. These can be found in Appendix G.

4. Methods

4.1 Sampling

The study population were pupils whose main source of food was the school meal provision. To identify these pupils, in both schools, pupils who spent more than £1 on food at lunchtime on one particular day were identified using the cashless catering system data.

From this data, a stratified random sample of 60 pupils, according to year group size, were selected to participate in the study using random number tables. Sixty pupils were selected with the hope of successfully recruiting 50 pupils for the study.

4.1.1 Ensuring a representative sample

The uptake of six popular food items by all pupils eating school lunches was measured and compared with the uptake of these foods by the study pupils to see if the study pupils were representative of the whole school. This was done by looking at the choices of all pupils who used their cashless catering card on the first day of the first measurement week.

4.2 Consent

Following the selection process at School A, a letter was sent in the post to the parents of the 60 selected pupils, explaining about the project and requesting that a consent form be sent back. This letter can be found in Appendix H.

In School B a similar letter was written but this was given directly to pupils during a meeting organised by the assistant head teacher involved in the project. During the pupil meeting, the purpose and requirements of the project were explained. In School B it was mentioned that the pupils would receive a £10 gift token to thank them for participating in the project once completed. In School A, this was not mentioned until the second measurement week.

4.3 Questionnaire

A questionnaire to assess pupil knowledge and attitudes regarding healthy eating and their opinions about the school food was given to the study pupils to complete anonymously during the first measurement week (Appendix I). This was repeated again after the second measurement week with the addition of the questions provided in Appendix J needed to assess perceptions of the project and the changes it facilitated. The questionnaire provided qualitative and quantitative data. Before designing the questionnaire a literature search was conducted to identify a previously published and validated questionnaire in this

field. Unfortunately no suitable documents were found. The final questionnaire was designed by the project officers. Some of the questions within the questionnaire were based on information taken from the Barnado's report 'burger boy and sporty girl'[7]. The Questionnaire was piloted with 6 pupils aged 11 to 14 who were not pupils at either of the schools involved in the project. The pilot questionnaire was completed successfully by all pupils and there was no feedback from pilot participants that necessitated changes to the questionnaire before general distribution.

At School A, questionnaires were given to the participating pupils during PHSE lessons, both during the first measurement week and following the second measurement week.

At School B, on the first day of the first measurement week, the study group were gathered together during registration and asked to complete their questionnaires together. For the second questionnaire, due to timetable constraints, pupils were requested to come to the assistant head teacher's office during registration to collect their questionnaire and complete it the same day.

4.4 Leaflet

An information leaflet was written for each school by the project officers explaining the purpose of the project and who was involved (Appendix K and L). The leaflets also provided information about healthy eating and the Balance of Good Health and requested that pupils become involved in the project by sharing their ideas and opinions regarding current meal provision. The leaflets contained tear off slips upon which the pupils could write their comments. Pupils were requested to include their names and year groups on the reply slips, as it was felt that this would help to ensure more coherent responses. The data collated from the leaflets was later made anonymous. The leaflets also contained a small section of information pertinent to the individual schools regarding recently recorded eating practices within each school. This information was taken from the Health Related Behaviour Survey completed in 2004. This section of information was the only variation between the leaflets designed for School A and School B.

The leaflets were distributed to all the pupils in School A during PHSE or food technology classes. In School B leaflets were distributed during food technology lessons or registration time. They were all distributed the week after the first measurement week as they were deemed to be part of the intervention, containing information about healthy eating that had the potential to confound results.

4.5 Pre-Intervention Measurement Week

The same week in each school was chosen for the measurement of the study pupils' food choices at lunchtime. This was done in 3 ways:

- The pupils used their cashless cards to buy all their food at lunchtime and so this data was automatically collected.
- The pupils were given food diaries to record all the food eaten during the day at school (to include break time also). This allowed pupils to become directly involved in the collection of dietary information and meant that information about food choices at break time could also be commented on. Food diaries were needed to back up the information provided by the cashless catering system.
- Once the pupils had finished their meal they were requested to come to a table to have their wastage measured by a dietetic assistant or dietitian. At School A the table was located at the back of the dining room. At School B the table was located in a small serving hatch near the main servery. The wastage was recorded on a food wastage sheet for every pupil. Even if they had no wastage they were still asked to come and show their food diary to the dietetic assistant or dietitian who checked it and made sure the food eaten was described and recorded in as much detail as possible. There was insufficient time in the project timetable and school calendars to allow for the pupils to be involved in the measurement process further. The pupils were made aware of the purpose of the measurements taken and what the data collected would be used for.

4.6 Post-Intervention Measurement Week

The post-intervention measurement week followed the same format as the pre-intervention measurement week. At School A the weighing table was located nearer the servery so the dietetic assistant was more visible. At School B it was located near the servery. Rewards for participation, in the form of £10 gift vouchers, were given to pupils following the second measurement week.

4.7 Dietary Analysis

- The data from the food measurement weeks was entered into Dietplan 6 by two dietetic assistants.
- For ease during the data entry phase, pupil's names were used on spreadsheets and Dietplan. All names were replaced with code numbers at the end of the project to ensure lasting anonymity.
- All CCS's recipes were put onto Manna, the Megabyte menu and recipe system which uses Dietplan for nutritional analysis. The analysis was therefore based on raw ingredients and it should be noted that vitamin intakes in the analysis will be slightly overestimated as a result.
- It was known how many portions each recipe made, hence there was generally no need to weigh cooked portions. There is some discrepancy here as cooked waste leftovers from the pupils plates were weighed, however this was felt to be a small error as cooking losses were small for the foods the pupils were eating e.g. pizza, chips, cakes. Where there was a large discrepancy e.g. pasta, then the cooked weight of an average portion was weighed.

- Where food was bought in, the manufacturers nutritional information was used if complete. If not, the food e.g. a sandwich was broken down into its constituent parts and entered as a separate recipe into Manna.
- It was assumed that no salt was added during coking over and above that used in the recipes; school caterers are told not to add extra salt to cooking. Any salt added by pupils was not taken into account.
- NME sugars were calculated using the MAFF method of estimating NME sugars in foods (method 2 in the FSA report on methods to estimate NME sugars in food[8]). This was simply the total sugars minus lactose. This method was used as it was the simplest to use within the short timescale of the project. It is not as accurate as other methods and tends to give higher values than the other methods available.
- The number of portions of fruit and vegetables consumed by the pupils were calculated manually from food diaries and cashless printouts. One portion was taken to be 80g.

4.8 Break Time Food Choices

Break time food choices were not analysed through Dietplan but the pupils did record what they had eaten at break time in their food diaries. A dietetic assistant looked at the food diaries pre- and post-intervention and collated the number of different food items eaten at break time.

4.9 SNAGs

School Nutrition Action Groups (SNAGs) were set up immediately after the first measurement week and meetings were held regularly until after the second measurement week. Five meetings were held altogether at School A and four at School B.

At School A the SNAG comprised of the project officer, the CCS catering manager, the school caterer, the business manager (the school link for the project), a school governor, the school nurse (who unfortunately could only attend the first meeting), members of the school council and another interested pupil.

At School B the SNAG comprised of the project officer, the CCS catering manager, the school caterer, the assistant head teacher (the school link for the project), a school governor and the school council (10 pupils, 2 representatives from each year group).

At School A the first SNAG meeting was held after school but was poorly attended. The pupils were consulted on the best time for them to attend and they agreed that during school time was best. Future SNAG meetings were therefore held in PHSE time and lasted one hour. There was a certain amount of resistance from some staff members regarding PHSE time being used for SNAG meetings and it proved difficult to get the same school council members every time. At School B the SNAG meetings were held over lunchtime or during

PHSE lessons, lasting approximately one hour. At School B there was a more consistent SNAG membership.

The project officer for each school chaired the SNAG meetings and wrote up the minutes. The meetings involved as much pupil led discussion as possible.

4.10 Focus Groups

One focus group at each school was held after the second measurement week. The group was led by the project officer working with each school and included a small number of the sample pupil population involved in the study. It was difficult to access the pupils by the summer term due to exams, trips etc. so available pupils from the study population were invited to attend the focus groups. The purpose of the focus groups was to evaluate the thoughts and feelings of pupils regarding the processes involved in the project. The focus groups were also used to investigate the potential impact of the project upon pupils and the changes that it facilitated.

During focus groups, the project officer asked a series of structured questions and a dietetic assistant or the other project officer wrote as much as possible of what the pupils were saying. The focus groups followed the same format at each school. Along one wall of the classroom where the focus group was held, an imaginary line was described to the pupils, with one end of the line representing ‘very good’ and the other end representing’ not very good’. The pupils were asked a series of questions relating to the project and asked to line up against the wall, standing at a point on the line which best represented their response to the questions asked. During the second part of the focus group, pupils were asked to return to their seats and further questions were asked which generated general discussion regarding the project. Questions focused on each of the stages of the project in turn.

5. Results

Sampling and Final Study Population

Fifty-two pupils agreed to participate in the study at School A and 51 agreed to participate at School B. Reasons for not wanting to participate included planned holidays during the first measurement week and general disinterest in participating.

Due to the tight timescale, in School A, consent forms were still being received during the study period. At School B, all consent forms were received back by the beginning of the first measurement week.

5.1.1 Ensuring a representative sample

Tables (iii) and (iv) show that food selection of the study population was a fair representation of the whole school population at both schools.

Table (iii). Uptake of 6 foods at School A. Whole school compared with study population during first measurement week

Food bought	Whole school	Study population
Pizza topped	14%	10%
Pizza	13%	8%
Calypso	10%	17%
Muffin	10%	6%
Chips	8%	13%
Pasta bowl	0.1%	-

Table (iv). Uptake of 6 foods at School B. Whole school compared with study population during first measurement week.

Food bought	Whole school	Study population
Pizza (cheese & tomato)	6%	9%
Chips	31%	26%
Pic ‘n’ poppin chicken	18%	15%
Muffin	6%	9%
5 Alive	6%	13%
Sausage roll	5%	9%

5.2 Pre-intervention Questionnaire

Appendix M and N provide tabulated results from the pre-intervention pupil questionnaires at both schools. At School A, 47 of the 52 pupils who had agreed to take part in the study completed and returned questionnaires. At School B, all of the 51 pupils who received parental consent to take part in the project completed and returned pre-intervention questionnaires.

Questions 3-6 inclusive investigated pupil knowledge regarding healthy eating. Overall pupil knowledge was found to be good at both schools, with the majority of pupils being able to identify key aspects of a healthy diet and distinguish between high fat and low fat foods correctly. Pupils at both schools appeared to have a poor knowledge of the Balance of Good Health Model (HEA 1994). Pupils' responses to this question were scored according to the number of food groups they were able to put in the right section of the plate model (represented as a simple pie chart).

Encouragingly, 84.8% of pupils at School A and 81.6% of those at School B felt that eating a healthy diet at this stage in their lives was either important or very important.

There was similarity at both schools between pupils perceived influences on food choice at school and out of school. Pupils at both schools felt that the greatest influences on their food choices whilst at school were: taste, what is fancied at the time, availability of food, appearance of food and cost. Pupils at both schools felt that their food choices whilst at school were influenced little by their friends, teachers, parents, TV and magazines. Out of school, pupils at both schools felt that the greatest influences on food choice were: taste, what is fancied at the time, appearance of food, availability of food and how food will affect health. Three pupils at School B and 2 pupils at School A added that their vegetarian practices were an additional factor influencing food choice both in and out of school.

Questions 10 and 11 asked pupils to rate how healthy they feel their current diets are, both at school and out of school. Pupils from both schools rated their diets out of school as being more healthy than in school. Encouragingly, 98% of pupils at School A and 100% of pupils at School B felt that it was their own responsibility to eat a healthy diet.

Question 13 asked pupils to comment on whether they felt the drink options given were healthy or unhealthy and also whether they felt that these drinks should be available in school. Overall it was felt that this question was poorly understood by pupils as many only answered one part of the question. At both schools, the majority of pupils felt that semi-skimmed milk, water, fruit squashes and fresh fruit juice were healthy drinks, whereas non-diet and full sugar sweet carbonated drinks were rated as unhealthy by the majority of pupils. The drinks that most pupils felt should be available at school were fruit squashes and fresh fruit juices.

Question 14 sought to investigate what changes in school would enable the consumption of healthier food choices. At School A, the only proposed change that more pupils disagreed with than agreed, was the introduction of rewards for eating a healthier diet (52.2% v's 47.8%). At School B, more pupils agreed than disagreed that all the proposed changes listed.

When asked to give examples of healthier foods that should be available in the cafeteria, pupils at School A suggested salad, fruit, sandwiches/rolls, pasta and generally lower fat/ less greasy foods. Pupils at School B mentioned, in order of

popularity: salad, fruit, vegetables and pasta salad. Interestingly, at both schools, many of the pupils' ideas for more healthy foods and drinks were already available in some format at the start of the project. This observation also applied to pupils' ideas for healthy drink choices which included fruit juices, milk, water and squash.

Foods that pupils felt should be reduced in the cafeteria included sweet carbonated drinks, chips, pizza, burgers and cakes. Three pupils at School A made comments that expressed a desire to keep some unhealthy foods on the menu. Pupils at School A suggested that chocolate, merits and certificates may be suitable incentives to encourage healthier eating at their school. At School B, additional points on cashless catering cards, discounted food and cash rewards were seen by some pupils as suitable rewards.

5.3 Post-Intervention Questionnaire

Twenty-eight post-intervention questionnaires were received back from School A and 38 from School B. Appendix O and P provide tabulated results from the post-intervention pupil questionnaires. The questionnaire results were not statistically analysed as there were few differences in responses observed when pre- and post-intervention data was compared. The small sample size, due to poorer response rates post-intervention, also contributed towards this decision. It was felt that the questionnaire was not sensitive enough to pick up on small changes in pupil opinion that might be expected over such a small period. Furthermore, due to the short study period, few interventions were attempted specifically aiming at altering pupils knowledge, attitudes and beliefs with regards to school food.

At School A, pupils' nutritional knowledge, as assessed in questions 3-6, appeared to be similar to the pre-intervention questionnaire. An increased percentage of pupils were able to answer question 6 (the Balance of Good Health) correctly, with 25.9% of pupils scoring 5/5, compared with 14.9% who had answered this question correctly during the pre-intervention stage. This may be due to the fact that information regarding the Balance of Good Health was included in the information leaflet distributed to all pupils during the intervention phase. There also appeared to be an increase in pupil knowledge regarding the Balance of Good Health at School B.

Influences on food choice remained the same at both schools post-intervention. At School A, time was cited as a more important influence compared to pre-intervention. Out of school, a higher percentage of pupils felt that TV, calorie content of food and time influenced their food choices compared to opinions pre-intervention. At School B, magazines, calorie content of food and the impact of food on health became more important influences on food choice compared to pre-intervention. There appears to be little explanation for these changes in opinions that can be drawn from the interventions implemented at both schools.

The qualitative data provided by the post-intervention questionnaires did show pupil response to the project interventions. When asked for ideas of healthy

options that should be available at school, two pupils at School A made comments that recognised the current availability of healthy options at school. These were: ‘already healthy’ and ‘we have enough now’.

Question 15 of the post-intervention questionnaire asked pupils whether they had enjoyed being part of the school meals project. There appeared to be a positive response to this question at both schools with 71% of pupils at School A, and 73% of pupils at School B reporting that they had enjoyed the experience.

Questions 16 and 17 investigated pupils’ knowledge and opinions regarding the menu changes at their schools which had been implemented as a result of the project. Eighty-four percent of pupils at School A and 78% of pupils at School B reported that they had noticed changes in the food provided or promotion of healthier choices at their schools. At School A, the most commonly noted change was the removal of sweet carbonated drinks. At School B, the jacket potato bar and general comments regarding an increase in healthier food were the most common responses. Sixty-four percent of pupils at School A and 75% of pupils at School B felt that the menu changes implemented may help to improve the diets of pupils at their schools.

Question 18 of the post-intervention questionnaire sought to investigate which of the selected pupils would be willing to take part in focus group discussions regarding the project. Unfortunately, as it was felt the questionnaire must remain anonymous, the project officers were unable to directly identify the pupils who registered their interest in focus group work. Sixteen percent of pupils at School A and 31% of pupils at School B answered that they would like to take part in a small discussion group.

5.4 Leaflet

Five hundred and thirty eight leaflet responses were received from pupils at School A (out of 1172), 688 were received from School B (out of 1100). At both schools a small number of replies were also received from teachers.

In order to process this large quantity of data, for each question all responses were read and categorised into broad topic areas according to the general theme of the response to that question. There was much agreement amongst pupil’s responses to each of the questions. Appendix Q shows the responses received from pupils at School A. Appendix R shows the responses received from pupils at School B. It should be noted that the categories in the tables are the pupils’ responses and therefore pupils identified a difference between “ more variety of healthier foods” and “ more healthier food”.

Not all pupils responded to every question on the leaflet. Therefore two sets of percentages are provided, one set calculated out of the total sample and the other out of the pupils who answered each question.

At School A the most popular menu changes that the pupils thought would encourage them to eat more healthily were: cheaper foods, more fresh fruit, healthy foods should be cheaper than junk foods, healthy foods and more variety of healthier foods. At School B the most popular responses were: healthier food, less expensive, fruit salad and less fatty food.

Healthy food and drinks the pupils would like to see introduced at School A were: more fresh fruit juice, more fruit (including fruit salad), healthy sandwiches and smoothies. At school B responses were: healthy wraps and salads, pure fruit juice, smoothies and juice.

Foods or drinks that pupils felt should be taken off the menu at School A were; pizza, sweet carbonated drinks, greasy foods and cakes. At School B responses were: pizza, sweet carbonated drinks and chips.

The most popular ideas that may encourage healthy eating in school A were: less unhealthy foods and more variety of healthy foods, cheaper prices and healthy foods cheaper than junk food. At School B responses were: price reductions, cheaper healthy foods and an education programme.

5.5 Dietary Analysis Of Pre-Intervention Measurement Week

- The attendance of participants at the wastage table was recorded daily.
- At School A, poor attendance of pupils on some of the days led to the decision to include an extra measurement day in the analysis.
- The number of days included in the analysis for each pupil varied from 2 days to 5 days, this was due to school absences.
- At School A, 40 food diaries were received at the end of the analysis week. At School B, 48 food diaries were received.
- A printout from the cashless catering system of all food purchased during the measurement week for every participating pupil was provided by the school finance departments.
- Two dietetic assistants, one for each school, then collated the cashless printout, the food diary, and the food wastage sheet for every pupil and cross-checked these documents to calculate exactly what each pupil had eaten at lunch-time.
- Food eaten at break was omitted from the analysis as the comparison CWT Guidelines are for food eaten at lunch-time only.
- Unfortunately, at School A the information from the cashless printout was more difficult to interpret that that collected at School B. This was due to the use of ‘open keys’ by staff working on checkouts to ring a variety of food and drinks that did not have allocated keys on the tills being used. The dietetic assistants were provided with a list of all foods sold with their price to assist them in their interpretation of the data.
- The data collected was sufficient to allow nutritional analysis for the lunches eaten by 52 pupils at School A and 49 pupils at School B.
- Once the data had been entered into Dietplan it was then exported into an Excel spreadsheet.

Appendix S gives tables of the pre-intervention dietary analysis results compared with the guideline amount. The guideline amounts are taken from the Caroline Walker Trust Nutritional Guidelines (see Table (ii)) for school meals. The guideline amounts for sodium and fruit and vegetable portions are taken from the Scottish Nutrient Standards for School Lunches[4].

Energy

Energy intakes at both schools were below the CWT guideline. At School A intakes were 13% below the guideline and, at School B, 7% below. It would be therefore be likely that other nutrient intakes would be correspondingly lower. Underreporting would be unlikely as food diaries were backed up by the cashless printouts. Pupils consumed a wide range of lunchtime energy intakes at both schools, from 232 kcal to 1518 kcal and this was reflected in the variety of choices the pupils were making; from a bottle of cola and biscuit to pizza, chips and a cake.

Fat

School A met the guideline amount of fat and saturated fat but School B was slightly above guidelines in both. When expressed as percentage energy from fat, the results are slightly different because of the low energy intake. School A met the guideline for percentage energy from fat, but this was high at School B at 42%. Percentage energy from saturated fat (12%) was slightly higher than the guideline (11%) at both schools.

Carbohydrate

Both schools were below the guideline amount of carbohydrate but when expressed as percentage energy from carbohydrate, School A met the guideline with School B only slightly below it.

NME sugars

Percentage energy from NME sugars was higher than the guideline amount at both schools. School A was particularly high at 22% compared with the guideline of 11%. This equated to a mean intake of 33g NME sugars (range 1 to 102g), compared with the guideline amount of 18g. The MAFF method used to calculate NME sugars does give higher values than other methods but it is still unlikely that this would have met the guideline using the other methods.

Fibre

Dietary fibre intakes (Englyst fibre) were the same at both schools, 2.7g compared with the guideline of 5.1g. This is due to low intakes of fruit and vegetables and wholegrain foods.

Protein

The guideline for protein was met at both schools.

Iron

Iron intakes at both schools were similar. Iron intakes represented just 32% and 34% of the recommended levels at School A and School B respectively. This is reflected in the poor uptake of the ‘Meal of the Day’ and the popularity of snack foods. Low iron intakes are of concern because of the importance of iron in

preventing anaemia. Iron deficiency may also have adverse effects on intellectual performance and behaviour[3].

Calcium

Calcium intakes in both schools were approximately 43% of the guideline amount. This is due to the low intake of dairy products, including milk and desserts with custard. Yoghurts, however, were fairly popular.

Vitamin A

Neither school achieved the guideline for vitamin A. The mean intake at School A was 54% of the guideline amount and, at School B 68% of the guideline amount.

Folate

Similarly, folate intakes only reached 73% of the guideline level at both schools.

Vitamin C

The mean vitamin C intake at School A was just below the guideline amount. However, there was a wide range of intakes (0 to 43mg). At School B the guideline amount was exceeded but again the range was wide (0 to 64 mg). At both schools there were five pupils out of the final study group who had vitamin C intakes of zero. Items which contributed most significantly to vitamin C intakes were fruit juice, soft drinks, fruit salad, jacket potatoes, chips and jacket wedges. As stated before it is likely that vitamin C intakes are overestimated as the analysis was on raw foods.

Sodium

Sodium intakes at both schools were below the maximum guideline amount recommended in the Scottish Nutrient Standards for School Lunches[4]. However, this mean intake value does not take into consideration salt added to food at the table.

Fruit and Vegetables

The Scottish Nutrient Standards for School Lunches[4] also recommend a minimum intake of 2 fruit and vegetable portions at lunchtime. Mean intakes at both schools were far below the guideline, with pupils at School A consuming just 0.2 portions and School B at 0.3 portions per lunch. Twenty-seven pupils at each school did not have any fruit and vegetables, making the median value zero. The maximum fruit and vegetable portions were 1.2 at School A and 1.4 at School B.

It is interesting to note that the results for both schools are similar, the main differences being the percentage energy from fat, the percentage energy from NME sugars and vitamin C intakes.

5.6 SNAGs

A short summary of the areas discussed and outcomes of the SNAG meetings held at each school can be found in Tables (v) and (vi). Appendix T gives a

fuller summary table of each meeting. At School A, pupil attendance ranged from 3 to 12, average 7. At School B pupil attendance ranged from 6 to 10, average 8. The pupils in the meetings were fully involved in the discussions, both in identifying areas for change and possible actions. As results became available from the leaflets, questionnaires and dietary analysis, these were fed back to the SNAG for discussion.

Table (v). Summary of School A SNAG Meetings.

Areas for discussion	Specific Actions	Outcome
Healthy options running out	Poster to remind pupils to ask	Poster put up
Salads contain too much mayonnaise	Less mayonnaise in salads	Salads had mayonnaise and coleslaw removed
Plain salads needed.	Pick up and go salads in suitable container to be investigated.	Small bags of vegetables on sale for 20p and bags of fruit for 25p.
Salad bar needed	To be investigated	Small salad bar in chiller cabinet started in first measurement week.
Litter in dining room	More bins needed	6 bins bought for dining room
Sweet carbonated drinks to be removed	All sweet carbonated drinks to be removed by beginning of summer term.	Achieved. Oasis, Capri-sun, 5 Alive remain. Good response from pupils once implemented. Teachers report pupils better behaved in afternoon.
	Whole school ban on sweet carbonated drinks, including teachers	Achieved.
New drinks needed.	Smoothies to be investigated. Plain milk to be investigated.	Bought in smoothies introduced for short time. Found to be too expensive. Still need to investigate making own. Plain milk in cartons introduced. Smaller bottles of water for 35p introduced.
Water tap needed for pupils to fill up their own water bottles	Suitable location to be investigated.	Three outside push taps installed at beginning of summer term.
Pizza's felt to be too greasy.	Modifications to be investigated e.g. low fat cheese/less cheese, more vegetables	Low fat cheese trialled and not acceptable result. Less cheese being used, broccoli being added to tomato based sauce.
Need to decrease unhealthy options such as pizza, chips, sausage rolls.	To trial one chip free, one pizza free and one sausage roll free day a week and to monitor uptake of other options.	Not trialled until second measurement week. Uptake of chocolate brownies and biscuits increased. To go back to pizza daily but healthy modified pizza.
Need incentives to eat healthily e.g. accumulating points on cards	Accumulated points leading to buying items on the internet to be investigated	Group of year 10 pupils to trial on-line incentive scheme to be ready for September 2005
Positioning of healthy options	To place 'Meal of the Day' more centrally so	Achieved

	seen more and not hidden behind trays.	
Insufficient space to sit down to eat	To trial some year 11/10 pupils sitting on the stage and the teachers sitting with the pupils.	Stage open to all pupils to use if main hall busy.
Need for more themed days	To be investigated.	Mexican day very successful.
Need to promote 'Meal of the Day' more	To investigate putting more notices around the school, putting menus on parentmail.	Posters in the process of being put around the school in different sites. Further IT support needed to put menus on parentmail – to be investigated.
Healthy eating/health day to increase knowledge	To be investigated	To be taken forward in year groups in PHSE.
Range of cakes and biscuits large	To look at slightly decreasing range	Slightly decreased. Increased range of 'slab cake'.
CCS proposed revised menu presented and discussed	To be implemented	Implemented in second measurement week.
All pupils need to be informed of all the changes made	To consider assemblies/form time	Feedback about the results of the whole project to be presented in assembly. Pupils informed about menu changes at the beginning of the second measurement week via leaflet which was felt to be useful
Insufficient space to sit down and eat	To investigate designated eating area outside with picnic benches and bins	Insufficient funds for picnic benches. Picnic area outside has been designated.
	To put in capital bid for more space for dining room and kitchen	Letter written and about to be sent off.

Table (vi) Summary of School B SNAG Meetings

Areas for discussion	Specific Actions	Outcome
Pizza too fatty	Use lower fat cheese, increase wholemeal flour content	Wholemeal flour content already at 1/3. CCS will trial the inclusion of more wholemeal flour. Fat content of pizza base has been reduced.
Poor uptake of free water	Improve presentation – try plastic jugs with coverings	Smaller plastic jugs covered with cling film put out.
Increased availability of lower fat brands of crisps	Investigated by dietitan – ideas for possible brands provided to CCS	Lower fat brands purchased, stocks of higher fat crisps being run down
Reduced salt content of Chinese International dishes	CCS to investigate	Ongoing – recipe to be put through nutritional analysis
Poppadums to be cooked in less fat	Catering manager to liaise with catering staff	Implemented
Poor uptake of free water	Urn will be placed in dining hall with iced water. School council to make poster promotion	Implemented
'Meal of the Day' – needs more promotion as pupils generally unaware of discounts to be made	CCS and school council to investigate methods of promotion	Posters designed by CCS and School council. Announcement in School Assembly by member of school council
Baked potatoes – promotion, location, fillings	To be located at separate servery on way into dining hall. Choice of 3 fillings plus 1 special/ day. Needs promotion – CCS to design posters, price lists and lists of fillings. School council to display posters around the school.	Baked potato bar now in use. Sales gradually increasing.
Full sugar sweet carbonated drinks – possible removal/ replacement	Post-mix machine drinks to be taken off sale during measurement week and success/ failure observed. Other full sugar chilled sweet carbonated to be removed.	Post-mix machine out of use, this will continue indefinitely. Stocks will be used up before removal of machine.
Milk and water – increased promotion over other less healthy drinks	Posters designed by School Council to be printed off and displayed around the school and cafeteria	Posters displayed. Uptake of free water increased greatly. Milk from dispenser increased a little.
Soup-and-a-roll – introduction as a healthy snack option, promotion	To be introduced by the 2nd measurement week as a daily feature. Home made in kitchen. Insulated cups bought in.	Introduced and proving popular.
Hot snacks – reduced/ controlled availability.	New menu plan includes 4x hot snack options/ day – to be gradually reduced to 2	On Mondays, Tuesdays and Thursdays there are 2 hot snack options available, on all

	over a period of time as meal deals and healthier options grow in popularity	other days only 1.
Chip-free day – 1 more to be introduced	To be implemented in time for 2nd measurement week	Implemented, initially unpopular. Hot pasta dish to be included on these days.
'Meal of the Day'/ meal deals – composition, introduction and promotion	Proposed ideas to be implemented in time for 2nd measurement week. To encourage uptake of fruits/ vegetables. School council and CCS to design posters and other promotional literature to support their introduction	Posters displayed
Biscuits and cakes – possible reduction in choice at lunch time, healthier recipes	CCS to reduce fat and sugar content of some recipes, increase fruit content. Gradual reduction in lunch-time biscuit range to be implemented over time.	Fat and sugar content reduced. No reduction in biscuit range so far.
More education needed re – healthy eating and benefits of eating specific foods and nutrients	Increased food and nutrition element to PHSE will be investigated for next term. Pupil information cards and point-of-choice info also a possibility. Dietitians to use pupil suggestions to design display for school detailing project results and nutritional information requested.	
Promotion of meal deals	Assembly announcement and inclusion of benefits in school display	

5.7 Other Interventions

At School A, two student dietitians produced a poster display to support the removal of sweet carbonated drinks. This was completed just before the Easter holidays. The ban on sweet carbonated drinks was planned for the beginning of the summer term. The display explained why the sweet carbonated drinks were being removed (including results from the leaflets, questionnaires and the SNAG meeting decision) and explained why sweet carbonated drinks were deleterious to health, including photos of dental decay and dental erosion. The display was presented over a lunch time at School A and was manned by the two student dietitians and the project officer for the school. A quiz was developed for pupils to enter voluntarily. This involved reading the display to find the answers. A smoothie recipe book was given as a prize. There were also some bought-in smoothies to taste. The student dietitians produced a pupil leaflet to accompany the display and a leaflet for parents which was sent out with a letter from the head teacher explaining about the ban on sweet

carbonated drinks. The display was positively evaluated by pupils at the following SNAG meeting.
At School B, a further dietetic student was involved in developing pupil education related to the project. During the final SNAG meeting at School B, pupils identified a need to expand their knowledge regarding healthy eating, particularly regarding the nutrients found to be low in pupil diets from the nutrient analysis element of the project. An interactive foyer display was designed by the dietetic student taking into account the ideas of the school council. This included the results of the project so far and ideas for increasing key nutrients within the diet. A quiz was developed to accompany the display, which required pupils to read the information presented and answer questions based on this. A £10 gift voucher was offered as a prize. The display was placed in the school after the May half term and hence did not form part of the intervention phase between the two measurement weeks.

5.8 Post-Intervention Menu Range, Tariff and Sales Mixes

Menus were modified for the intervention stage, informed by the SNAGs, and included a number of meal combinations (deals). Meal deals were introduced with the aim of providing a better nutrient intake, these included a healthy food item in combination with a less healthy food. Recipes were further modified to reduce fat, salt and sugar, and the range of items chosen to reflect these objectives. Meat dishes were made using meat that had a lower visible fat content.

Prominence was given to the positioning of the ‘Meal of the Day’ and meal deals with counter and menu displays promoting the healthier options.

The menu for this stage is shown in Appendix C.

The break-time provision was largely the same range as the pre-intervention stage, however bakery items included those that had lower fat and sugar content.

The overall weekly sales mix on items and groups of items is shown in Appendix E and indicates reductions on some less healthy items. However it has to be noted that this has occurred where items have been served less frequently or the number of choices have been reduced.

The short-time scales involved in introducing change did cause a significant short-term reaction, but in overall terms the income/sales levels have not been adversely affected.

Appendix U shows the daily average takings for the two measurement periods and together with the immediate pre and post measurement dates.

This is also shown against the same time in the previous year, however it has to be noted that the Easter break was earlier in 2005, and take up can be affected by this and the timing of school examinations.

- The take-up of the 'Meal of the Day' increased marginally in School B but not at all in School A.
- The introduction of meal deals did not prove to be popular at either school and pupils reacted adversely to not being able to purchase items individually. It is thought that as these offers increase the average spend and provide less flexibility of choice.
- The number of days per week on which chips were served was reduced, however sales of chips on days when they were served did increase.

5.9 Dietary Analysis of Post-Intervention Week

- The dietary analysis of the post-intervention week followed the same process as described for the pre-intervention week.
- During the second measurement week, pupil attendance was better at School A and the measurement week lasted the same 5 days as at School B.
- Due to staffing changes, only one dietetic assistant analysed the results on Dietplan.
- Thirty-six food diaries were received back at School A and 33 at School B. The data collected following the second measurement week enabled dietary analysis to be conducted for 41 pupils at School A and 42 pupils at School B.
- It was hoped that new touch screen tills would be installed at School A in time for the second measurement week, in order to make the process more accurate and eliminate the open keys, but unfortunately these were not installed until the last day of the second measurement week.

Appendix V gives tables of the post-intervention dietary analysis results compared with the guideline amount. The guideline amount is taken from the Caroline Walker Trust Nutritional Guidelines for school meals.

Table (vii) is a summary of the pre- and post-intervention dietary analysis results compared with the CWT Guidelines.

Table (vii). Summary of pre- and post-intervention dietary analysis results at School A and School B compared to Caroline Walker Trust Guidelines

	Caroline Walker Trust Nutritional Guidelines for school meals		Unit	Guide-line Amount	School A					School B				
					Pre-intervention		Post-intervention			Pre-intervention		Post-intervention		
					Mean	s.d	mean	s.d		mean	s.d	mean	s.d.	
Energy	30% of the EAR		kcal	634	549	214	490	153	↓	587	218	514	212	↓
Fat	Not more than 35% of food energy	max	g %	24.7 35	21.1 34.6	9.9 10.2	20.7 37.9	7.9 8.2	↓ ↑	27.3 41.7	11.5 7.9	22.1 37.8	10.9 6.9	↓ ↓
Saturated fatty acids	Not more than 11% of food energy	max	g %	7.7 11	7.0 11.7	9.9 4.8	6.7 11.9	3.1 4.4	↓	7.8 12.2	4.1 4.8	6.7 11.3	4.1 4.0	↓ ↓
Carbohydrate	Not less than 50% of food energy	min	g %	84.5 50	78.6 53.5	34.7 11.3	65.1 49.6	23.2 8.7	↓ ↓	72.4 46.2	29.7 7.4	67.9 50.4	26.9 6.3	↓ ↑
NME sugars	Not more than 11% of food energy	max	g %	18.0 11	32.7 22.4	23.7 14.1	23.8 17.6	17.0 11.7	↓ ↓	24.6 15.6	20.9 10.3	22.6 16.9	14.8 9.5	↓ ↑
NSP	Not less than 30% of calculated Reference value	min	g	5.1	2.7	1.7	2.8	1.3		2.7	1.5	2.5	1.4	
Protein	Not less than 30% of RNI	min	g	13.0	15.2	6.7	14.6	4.8	↓	16.9	7.2	14.6	7.3	↓
Iron	Not less than 40% of RNI	min	mg	5.9	1.9	0.8	2.0	0.7		2.0	1.1	1.9	1.0	
Calcium	Not less than 35% of RNI	min	mg	350	149	85	183	91	↑	154	93	184	146	↑
Vitamin A	Not less than 30% of RNI	min	µg	183	99	65	123	77	↑	124	99	139	97	↑
Folate	Not less than 40% of RNI	min	µg	80	58.2	34.2	51.5	14.3	↓	57.7	29.6	55.5	29.6	↓
Vitamin C	Not less than 35% of RNI	min	mg	13	12	12	15	14	↑	16.7	13.8	21.1	16.6	↑
Sodium*	Not more than 33% of SACN** recommendation	max	mg	786	604	423	596	200	↓	590	230	489	259	↓
Fruit and veg*	1/3 of 5 portions per day		portions	2	0.2	0.3	0.4	0.4	↑	0.3	0.3	0.3	0.3	

* Sodium and fruit and vegetable guidelines from the Scottish Nutrient Standards for School Lunches[4]

** Scientific Advisory Committee on Nutrition (2003) Salt and Health[6].

Nutrients in red are those achieving the CWT Guidelines

↓↑ show a decrease or increase from pre-intervention.

Energy
Energy intakes at both schools had decreased from the first measurement week, making energy intakes at School A now 23% below the guideline amount and at School B 19% below the guideline amount. This is possibly due to the decrease in availability of popular high calorie foods such as chips and pizza.

Fat
Fat intakes at School A stayed approximately the same but due to the decrease in energy intake, percentage energy from fat actually rose from 34.6 to 37.9%. At School B, fat intakes decreased from 27.3g/day to 22.1g/day and percentage energy from fat also decreased from 41.7 to 37.8%, still above the guideline of less than 35%. Saturated fat intakes fell at School B and percentage energy from saturated fat also fell from 12.2 to 11.3% at School B, almost meeting the guideline of less than 11%. The decrease in fat intakes were also probably due to a decrease in fatty foods such as pizza, chips and hot snack options.

Carbohydrate
Carbohydrate intakes fell at both schools, due to the decrease in energy intakes. Percentage energy from carbohydrate increased at School B but both schools met the guideline in terms of achieving 50% energy from carbohydrate.

Protein
Protein intakes fell at both schools but still met the guideline amount.

NME sugars
NME sugars showed a large decrease at School A from 32.7g to 23.8g/day and there was a smaller decrease at School B from 24.6g to 22.6g/day. This was due to the removal of sweet carbonated sugary drinks from the schools. This had a larger impact at School A where 500ml bottles of coca cola and other sweet carbonated drinks were popular pre-intervention. At School B the post mix machine was not that popular. However, the percentage energy from NME sugars was still approximately 6% higher than the guideline of 11% energy from NME sugars at both schools.

Fibre
Fibre intakes showed very small changes but were still very similar to pre-intervention intakes and still almost half the guideline amount.

Iron
Iron intakes showed very small changes and intakes were still almost only a third of the guideline amount. The best source of iron on the menu was probably the main ‘Meal of the Day’, and as uptake of this did not increase, the static iron intake was expected.

Calcium
Calcium intakes showed good increases at both schools and post-intervention intakes were similar at 183 mg/day, a good increase from approximately 150 mg/day but still only half that of the guideline amount. This was likely to be due to the increased consumption of milk and milk drinks.

Vitamin A
Vitamin A intakes increased at both schools but still fell short of meeting the guideline amount.

Folate
Folate intakes decreased slightly at each school.

Vitamin C
Vitamin C intakes increased at both schools, meeting the guideline amount. This was probably due to the increased consumption of fruit juices instead of sweet carbonated drinks and the slight increase in fruit and vegetable intake.

Sodium
Sodium intakes decreased at both schools, so still achieved the SACN recommendation (although salt added at the table was not measured).

The increases in calcium, vitamin A and vitamin C are encouraging considering the reduction in energy intakes.

Fruit and vegetables
Fruit and vegetable intake increased at School A but remained the same at School B. Intakes were still considerably lower than the guideline amount.

5.10 Statistical Analysis

Statistical analysis was undertaken on the dietary intakes of the 85 pupils that completed a food diary pre- and post-intervention from both schools combined. They were analysed combined to give a greater statistical power. Data was analysed using SPSS version 13. A paired t-test was used to compare the pre- and post-intervention dietary intakes of the 85 pupils. A table to show the results can be found in Appendix X. Protein, fat, carbohydrate and energy intake was significantly lower and calcium and vitamin A intake was significantly higher.

5.11 Break-time food choices

Results of the number of break time foods chosen pre- and post-intervention analysed by looking at the food diaries of the study sample can be found in Appendix W.

The interventions only targeted lunch-time and not break time. Few conclusions can be drawn from the results as there were different numbers of food diaries pre- and post-intervention. However, it can be seen which foods are popular at break time at each school; sandwiches, cheese toasties, pizza, iced buns and other cakes and biscuits at School A, and muffins, crisps, sausage rolls, bacon rolls, pizza and cakes and biscuits at School B. Some of these foods will contribute significantly to energy and nutrient intake. Many pupils consumed a large quantity of food and calories at break time.

5.12 Impact on Service and Resources

It is evident from the experience in both schools that a considerable input by all parties is essential to raising the awareness and knowledge of healthy eating amongst pupils. This combined with their involvement in the process of revising the food choices offered, is the only way to bring about meaningful change.

Without this the impact on sales would be damaging to the viability of the service and the contractual relationship of school and provider.
In the longer term, more skilled staff hours would be needed to sustain the increase in kitchen prepared dishes. At this stage it is difficult to quantify, and would depend on the structure and staff time currently allowed for, but it could bring significant increase to the cost of provision.

In School A, the kitchen and service space is very restricted. This is not untypical of a large number of school kitchens, and so balancing the need for more preparation space with food safety issues has the potential for causing unsafe conditions without future investment in both premises and equipment.

At both schools the provision of equipment has, over a number of years, been geared to a mix of bought in products and on site cooking to maximise efficiency and reduce cost. The focus has been on increasing frozen storage capacity, both for the products sourced but also for reducing the number of deliveries and therefore cost.

In order to continue and progress the revised service there are a number of factors that need to be addressed:

- The type and quantity of heavy equipment needed, e.g.
  - More chilled capacity
  - Increased dry goods storage space
  - Oven and steaming capacity increased as the use of fryers is reduced
  - Service counters to provide for both hot and chilled units
- Increased staff costs particularly at skilled level
- Sufficiency of budgets if take up levels decline
- Contracts often have a payback element to the school which are used to fund other parts of the school budgets, ie teachers
- Higher food costs with lower margins against income.

Setting up a system to nutritionally analyse all CCS recipes and products has been a costly and time-consuming exercise. The food industry is not yet geared up to supplying all product nutrient information, and each catering provider has their own recipes to load on to a system. Whilst CCS has managed to achieve this and within a very short timescale, this would not necessarily be the case for other providers, particularly for individual schools.

6. Focus Groups

6.1 School A Focus Group

The School A focus group was difficult to set up; by the summer term there was a lot going on and it was difficult to access the pupils. An after school group was planned but was cancelled due to only one pupil being able to attend out of the 8 that were invited. Once rearranged in PHSE time only 3 pupils were able to attend, the rest being on school trips, taking exams, in assemblies or tutor groups.

The 3 pupils that eventually attended were all year 7 pupils, two girls and one boy. It was not possible to access any older year groups.

As a warm up question, pupils were asked why they had decided to take part in the project. Their reasons varied: one girl was vegetarian and hoped that better choice for vegetarians might result, another had a friend that was vegetarian and wanted to improve choice for her, another's mum had thought it was a good idea, and that healthier food might result.

Leaflet

The pupils all felt the information about healthy eating in the leaflet was good. They felt the questions on the back of the leaflet (asking their views about the school food) needed to be more specific. One pupil had not filled in the questions because he did not understand them. It had however made him think about what he was eating and drinking at school.

Selection Process

The random selection of the pupils was explained and the pupils were asked if they felt good about being part of the project. Two said they liked being able to make a change and one said he had enjoyed being part of the project. They all felt very good about being part of the project.

Measurement Weeks

The pupils were asked about the measurement weeks. They all felt it had been good to take part in the measurement weeks. One pupil said it had been difficult to write down the quantities of food in the food diary. Other comments were 'difficult to find time to come', 'needed to be reminded to come'. The pupils all agreed the second measurement week was easier as the dietitians were sat nearer to the servery, so there was not so far to go and they were more visible. The pupils found themselves reminding friends to fill in their food diaries as well. The pupils present were not embarrassed at having to see the dietitian or fill in the food diary but one pupil felt that others might have been embarrassed if other people were assuming that the pupils had been selected because they ate unhealthily. Everyone agreed there should have been more advertisement of the fact the pupils had been selected randomly and not because of what they ate. When asked about why some of the other pupils had not completed their

food diaries, even though there was a reward, it was felt that some people would of forgotten and others ‘couldn’t be bothered’. One pupil said she had ‘enjoyed the reward ‘and had already spent her reward token on a book.

SNAG and School Council

The SNAG meetings were explained and the pupils were asked how good an idea it was to use the school council as a way of making their voices heard. They all felt it was a fairly good way. They all said that it would have been better to randomly select pupils from the 50 already involved to get more varied opinions. One pupil said that people tended to vote for the sort of person they would expect to be on the school council. She felt that it tended to be ‘posh’ people who were already likely to be eating healthily. People on the SNAG tended to feed back to their friends and not the whole class.

Healthy Eating Changes

The pupils were asked overall how had the project gone and had it brought about healthy eating at their school. They all agreed it had been successful. One pupil said he now ate more healthily and had noticed others too eating more healthily. He felt it was good they had not just been told to eat more healthily because ‘when we get told we do the opposite’. Another pupil had encouraged her friends to eat more healthily which they were doing with both packed lunches and school food. She felt caterers have only some of the responsibility for healthy eating; pupils have the choice and some will eat healthily and ‘others are just not interested’. Another pupil said she now ate more fruit and drank less sweet carbonated drinks.

Biggest Change

The pupils were asked what had been the single biggest change in healthy eating. They all agreed it was the sweet carbonated drinks and then the fruit e.g. grapes in bags which two of them had every day. Other changes were that the food in the hall looked healthier. Instead of lots of pizza there was now soup, jacket potatoes, pasta and only a small amount of cakes and biscuits. Other changes were noticing their friends eating more healthily and the drinks tasting better.

Future Changes

Changes that they would still like to see were bringing in some of the food from the corridor into the hall e.g. sandwiches, tortillas fruit salad and drinks. One pupil said her friend liked the triangle sandwiches as she felt ‘grown up’ eating them. Queues in the hall were shorter than the servery but still a problem. One pupil ran to get a seat and generally got one. Only one of the pupils had tried a meal deal as ‘they take too long to eat’. They all felt they needed more time to eat. One pupil said ‘I don’t get to eat as much as I would like to’. Hot snack options they would like to see were tortillas and jacket potatoes in polystyrene boxes.

Overall the pupils felt it had been a ‘really good opportunity to change things’ and they had all felt listened to. Some vegetarian foods had improved but more variety for the vegetarians was needed.

6.2 School B Focus Group

Twenty of the fifty pupils selected for study were invited to attend the focus group discussions at School B. These were held during class time in one of the spare classrooms within the school. Although only 8-10 pupils were needed for the focus group, it was felt that due to busy schedules during the exam period, overbooking would result in the appropriate amount of pupils attending at the specified time and place. Fifteen pupils wished to attend the focus group and all asked to stay within the group. One of the pupils was a member of the school council who was not one of the 50 selected pupils but wished to take part in the focus group and receive feedback from his fellow pupils regarding the project that may be fed back to other council members.

As a warm up question, pupils were asked why they had decided to take part in the project, comments included 'we thought people would start taking notice of our opinions' and 'things might change'. Other pupils agreed with these broad statements. The £10 gift voucher was also seen as a major incentive for taking part. All but three of the pupils reported that they would have taken part in the project without this incentive.

Leaflet

Pupils then answered questions relating to the information leaflet distributed at the beginning of the project throughout the school. Pupils felt the leaflet provided good information but that they had received the same information many times before from TV and magazines. Three pupils reported that they had not read the information within the leaflet as they had been rushed by teachers to complete the reply slip during lesson time. Most pupils threw away the information section of the leaflet after returning the tear-off slip. Six pupils felt that the questions on the leaflet were a good way of providing their opinions about school food. When asked why they felt this element of the leaflet was good, pupils reported that they had been provided with enough space to write and some felt that the leaflet had prompted them to discuss school food issues with friends. The remaining 9 pupils couldn't remember filling in the leaflet.

Selection Process

Pupils were then asked how they felt about being part of the project. All pupils felt good/ very good about their participation. One pupil stated: 'the project seemed to be done professionally therefore it seemed that things might really change in the canteen…. we have been given leaflets before but nothing ever happens afterwards'. One pupil felt that the project had been good as completing the food diary had made her more aware of what she was eating. Some pupils felt that the project had not really affected them.

Measurement Weeks

The pupils reported on their feelings about taking part in the measurement week. Again, feelings were generally positive with pupils congregating towards the 'very good' end of the continuum. Comments included: 'it was just something to do'; 'it didn't seem like extra work'; 'didn't mind because I could see why it was happening'. One pupil felt that there were occasionally long queues at the wastage weighing table which held him up.

SNAG and School Council

The SNAG membership was discussed and the role of the school council as pupil representatives on the group was evaluated. Pupils reported that they currently vote for their year council representatives who themselves vote for school council representatives. Pupils generally felt that the selection of pupil representatives for the SNAG should have been a mixture of randomly selected pupils and some school council members. A further consensus opinion was that issues discussed at the SNAG were not fed back to other pupils by the school council representatives, and pupils felt that their opinions had not been asked for by the school council to be taken forward to the SNAG meetings. Pupils felt there was generally a lack of knowledge throughout the school that the project was happening. They suggested that notes should have been sent through with registers to all pupils, they should have been given more time to complete their leaflet replies and there should have been more work in class relating to food during the project.

Healthy Eating Changes

The pupils were then asked if they felt the project had bought about healthy eating changes at School B. Comments included: 'it has changed but the soup is expensive and the milk dispenser runs out'; 'a carton of fruit juice is too expensive (50p), juice dispensers would be better'. There was consensus that the jacket potato bar is 'really good' and a healthy alternative to chips. There was concern amongst three of the pupils that the polystyrene boxes used to package jacket potatoes are not environmentally friendly and the plastic disposable cups are also increasing waste. There was some disagreement between pupils regarding whether plastic disposable cups were better than glass. Some pupils felt that the disposable cups ensure that cups are always clean. Recycling policies within the school were discussed. Pupils felt that recycling the plastic cups and polystyrene boxes would be an acceptable solution to this problem.

Pupils felt that they still need a system for reserving a sandwich at break time to collect at lunch as sandwiches run out too quickly forcing them to make less healthy choices. Not all pupils had noticed that the sweet carbonated drink dispenser was out of use. They concluded that this was therefore a positive change as there have been no complaints from their peers. Pupils requested that the sweet carbonated drink dispenser should be replaced with a fruit juice dispenser. One pupil commented: 'the burgers are now served with salad which is better for you', one other pupil commented: '…they (burgers) are still greasy'.

Biggest Change

Pupils were asked to comment on what they felt the single biggest change had been (related to healthy eating) since the beginning of the project. All but 13 pupils thought the biggest change was the introduction of the jacket potato bar, and concluded that this had encouraged some pupils to make healthier lunch choices. Two pupils felt the biggest change was the extra chip free day. Two pupils felt that there should only be chips on one day of the week, as if they're not available they can't be eaten. Some pupils felt that pizza should available every day but served with salad.

7. Key Findings

7.1 Pupil Participation

SNAGs

SNAGs were an effective way of making pupil-led changes. They allowed the identification of a variety of changes in and around the school dining area that may encourage the consumption of a healthier diet (summarised in Tables (v) and (vi).

During focus group discussions, pupils at both schools expressed the opinion that pupil representatives on SNAGs should not necessarily be school council members. Pupils felt their opinions may not have been fully represented by the school council at SNAG meetings due to ineffective routes of communication between school council members and the general pupil population. Pupils at both schools were found to be articulate and were active participants in SNAG discussions, contributing a variety of ideas.

Pupils at both schools suggested that SNAGs should include a number of interested pupils, who were part of the sample population but who were not part of an elected group.

Focus Groups

Focus groups were an invaluable method of involving pupils in the project and evaluating pupil opinions with regards to the processes involved in the project. Focus group discussions led to the discovery of useful information, which may inform change within both schools in the future. Pupils at School A expressed satisfaction with their involvement in the project and it's outcomes and raised issues regarding the impact of time constraints on food choice. Pupils at School B reported that some teachers had provided insufficient time to complete leaflet reply slips and raised environmental issues relating to the use of disposable water cups and polystyrene boxes.

Dietitians

Dietitians played a key role within the project by ensuring pupil involvement and developing the ideas of the SNAG into realistic outcomes. Dietitians, ensured that suggested changes by both pupils and caterers would ultimately lead to an improvement in the nutritional intake of pupils.

Both schools expressed a desire to maintain dietetic input into future SNAG meetings on a consultative basis.

Questionnaires

Pre- and post-intervention questionnaire responses showed little differences (Appendices M, N, O and P). Healthy eating knowledge, perceived influences on food choice, and changes that may encourage healthy eating choices

remained relatively constant when pre- and post-intervention responses were compared.

Pupils at both schools had a good level of healthy eating knowledge both pre- and post-intervention.

The majority of pupils were able to specify that a healthy diet should be low in fat, high in fibre, include regular meals, be rich in fruit and vegetables, and that breakfast is an important meal to start the day.

Pupils were able to correctly identify whether a range of foods were high or low fat options.

Pupil knowledge regarding the Balance of Good Health was poor at both schools pre-intervention, but increased at School A post-intervention. The statistical significance of these differences was not investigated.

7.2 Nutritional Analysis and Influencing Change

Nutritional Intake

Small but positive changes were made to the nutritional intake of pupils at lunch-time, over a short period of time.

Main dietary changes observed between pre- and post-intervention data were:

- A reduction in total and saturated fat (School B)
- A reduction in percentage energy from fat and saturated fat (School B)
- A reduction in NME sugars (Schools A and B)
- An increase in calcium, vitamin A and vitamin C intakes (Schools A and B)
- A reduction in sodium intake (Schools A and B)
- An increase in fruit and vegetable intake (School A)

Statistical analysis of combined data for the two schools showed that protein (P=0.045), fat (P=0.027), carbohydrate (P=0.013) and energy intakes (P=0.007) were significantly lower post intervention, and calcium (P=0.01) and vitamin A intakes (P=0.019) were significantly higher post intervention.

Macronutrients appeared to be easier to effect than micronutrients. Iron remained particularly low in the post-intervention analysis.

Cashless catering systems

Cashless catering systems can be a useful tool in determining the food selection of individual pupils as long as the system has the capability of identifying all products on the point of sale tills. Food diaries and wastage sheets provided vital clarifying information where necessary, allowing more accurate determination of food intake, and raising the awareness of healthy eating to pupils.

Nutritional Standards

The meal provision at both schools would meet the current National Nutritional Standards for School Meals[1]. However, pre-intervention, mean intakes of nutrients at School A met just three of the CWT Guidelines, at School B, two of the guidelines were met. Post-intervention, mean nutrient intakes at both schools met four out of twelve CWT Guidelines.

Break-time

Break-time food and drink choices were not analysed in the study but were recorded by pupils in food diaries.

Pupils consumed a large number of calories at break-times from a variety of energy dense hot and cold snack options, the most popular being cheese toasties, pizza and iced buns (School A); and muffins, pizza and sausage rolls (School B).

Environment

The dining environment and length of lunch period is an influence on eating habits within schools. At School A, pupils had a smaller dining environment with insufficient seating for all pupils. School A also has a shorter lunch period than School B. As a result, it was observed that many pupils chose fast-food items which could be eaten quickly whilst standing up. This issue was raised frequently at SNAG meetings by pupils at School A. However, the impact of space on food choices was not highlighted in leaflet responses or questionnaires. Post-intervention questionnaires showed 46.2% of pupils at School A felt that time limitations influenced their food choices a lot at school, compared to 23.7% of pupils at School B.

8. Discussion

8.1 Pupil Participation

Pupil empowerment and involvement in change is paramount to the success of healthy menu changes and promotion of healthy eating options. Pupils who had been given the opportunity to complete project leaflet responses felt this provided a positive opportunity to express views and opinions regarding healthy eating at school. Focus group discussions revealed issues relating to communication and effective feedback between the school council and general pupil population. School council members were invited to join SNAG meetings as they are the only formally elected pupil body within schools and it was hoped that this would ensure maximum pupil involvement within the constraints of feasibility. All pupils must feel part of the mechanisms of change within their school. As there was clearly some discontent among pupils regarding the chosen method of pupil involvement in SNAG meetings this is an issue to address.

The core skills of dietitians made them an important addition to the Steering group and SNAGs. Their evidence based knowledge of nutrition and analytical skills allowed the collection and interpretation of data relating to the nutritional intake of pupils. The abilities of dietitians to translate nutritional theory into practical terms allowed them to describe to the SNAG the key areas for change required within the schools based on the nutritional analysis data. Skills in communication, mediation and empowerment allowed the dietitians to encourage direct pupil involvement in the interventions at both schools and develop ideas into practical and feasible outcomes aimed at facilitating healthy eating practices within the schools.

The similarity observed between pre- and post intervention questionnaire responses was expected due to the short intervention period and small sample size. Due to time constraints, few interventions were possible aimed at influencing knowledge and attitudes relating to healthy eating and food choices. Instead, interventions centred around healthy menu modifications. Forty percent of pupils who completed pre-intervention questionnaires at School A and 25% of those at School B, failed to return post-intervention questionnaires. Although this drop-out rate is not greater than that observed in similar studies, the small initial sample size (47 pupils at School A and 51 pupils at school B completed questionnaires), resulted in the detection of fewer differences between pre- and post intervention data. Possible reasons for poorer response rates post-intervention include the absence of a number of older pupils due to exam periods and a number of school trips which occurred around the time of the second measurement week. The use of an unvalidated questionnaire may also have contributed to the similarity in pupil responses pre- and post intervention, as the ability of the questions asked to detect small changes in knowledge and attitudes is likely to have been poor. The development of a validated

questionnaire for use in this area of work would be a useful exercise within future research.

There was some provision of healthy eating education at school A during the intervention phase in the form of a promotional display which highlighted the dangers of sweet carbonated drinks for health and introduced the reasons for their removal from the school menu. This display was accompanied by parent and pupil information and healthy drink tasters. This display proved an effective method of supporting change within the school and was evaluated positively by the pupils. The removal of sweet carbonated drinks at School A was highlighted by focus group participants as the single biggest change in the cafeteria since the beginning of the project. This observation was supported by post-intervention questionnaire results, where the removal of sweet carbonated drinks was the most commonly cited change in school food provision. Eighty four percent of pupils who completed the post-intervention questionnaire at School A felt that the menu changes observed may help to improve the diets of pupils at their school. The success of removing the sweet carbonated drinks at School A highlights the importance of pupil, teacher and parent involvement in implementing change, in addition to the benefits of targeted educational initiatives and behavioural change techniques via opportunities to sample healthier alternatives.

8.2 Nutritional Analysis and Influencing Change

The steering group was a necessary and effective tool for ensuring communication between the agencies involved in the project. It ensured a whole school approach to change and facilitated multi-agency working and collaboration between key players in order to maximise the potential for positive healthy eating changes within the schools.

Cashless catering systems simply and quickly provide large quantities of information regarding the food and drink intake of consumers when tills clearly identify all the product ranges. Various alternative methods of measuring nutritional intake are available. A weighed analysis of all consumed food and drink prior to consumption and any wastage is possibly one of the most accurate methods of measurement. However, this method is time consuming and labour intensive and potentially unpopular with pupils who have limited time in which to eat their lunch. There are also issues regarding maintaining food temperature during this process. Nelson[9] photographed pupil's plates after they had been served with food for ratification of food intake measurements. This method avoids interference with food and delay. Further potential methods for measuring food intake include dietary recall and food diary analysis. Potential flaws with these methods are the reliance on pupil co-operation and memory. All of these methods require detailed knowledge of standard portion sizes of foods served in the cafeteria.

The high fat and sugar content of foods chosen by pupils in the school cafeteria, in the face of reasonable knowledge of healthy eating principles, may lead to the conclusion that knowledge alone does not necessarily reflect on the food

choices made by pupils. However, poor knowledge of the Balance of Good Health may have had some influence on food selection and eating habits at the two schools. Many pupils did not make full meal choices, instead they chose single hot snack options such as pizza or sausage rolls that are less likely to match the Balance of Good Health Model. This was demonstrated by poor uptake of 'Meal of the Day' and meal deal options at both schools, both pre- and post-intervention, despite attempts at promotion and prominent display of the dishes. Nelson[9] found that pupils who chose meals closest to the Balance of Good Health were most likely to meet CWT Guidelines. Further uptake of full meal options would help to ensure a wider intake of macro- and micro-nutrients, including those of most concern following the dietary analysis phase. It is therefore feasible to suggest that further knowledge of the Balance of Good Health may positively influence food choices if accompanied by other appropriate pupil-led changes that address the wider influences on food choice. Insufficient dining space and time for lunch does influence food choice and encourage uptake of hot snack items which may be high in fat and low in nutrients in comparison to meal options. The increased availability of seating and longer lunch period at School B resulted in a lower uptake of hot snack options indicating that environmental issues have an impact on food choices in schools. More research into the influences upon food selection amongst school pupils may be useful if strategies for achieving further positive healthy eating changes are to be found.

The energy density of foods consumed by pupils at break-time is likely to have a significant impact on food choices at lunch-time. This may in part account for the failure of pupils at both schools to meet CWT Guidelines for energy intake at lunch-time. Possible explanations for high calorie intakes at break-time may include the failure of pupils to consume breakfast before coming to school (Balding Data 2004)[11]. The late timing of the lunch-time break and pupil involvement in school clubs leaves little time for eating a substantial lunch, thus necessitating a larger break-time snack.

Due to the short time-scale of the project, the majority of changes agreed upon during SNAG meetings were implemented collectively on the first day of the second measurement week. This posed some anxiety and logistical problems for the catering staff at the two sites. In addition, the collective and rapid introduction of menu changes allowed little time for pupils to become familiar with the new menu before it was presented.

The positive trends in nutrient intake post-intervention were encouraging for future interventions. Over longer-time periods, larger trends towards healthier nutrient intakes would be expected, showing that effective change occurs over time. Intakes of key micronutrients investigated during the analysis remained worryingly low. This observation corresponds with those made by Nelson[9] in his report of secondary school meals. Teenagers are at particular risk of nutrient deficiencies[10] due to rapid growth and development, and habitually poor diets. Iron deficiency is implicated in poor school performance and brain development, in addition to decreased immunity. Poor calcium intakes can result in reduced peak bone mass and hence increased risk of osteoporosis in later life.

9. Recommendations and Future Plans

9.1 Pupil Participation

To ensure pupil empowerment and involvement in decision-making processes, we recommend the formation of an elected school council, or use of an existing school council to drive healthy eating changes. However, methods of nomination and election to the council need to be agreed upon by the general pupil population. Initial canvassing of pupil opinion regarding their preferred method of representation on the SNAG may be advisable. As opinions may vary between schools this should be done on an individual basis.

An agreed, effective, and proven method of communication between the school council/ SNAG pupil representatives and those they seek to represent must be in place. Teachers and senior school management should encourage and facilitate this process. Wherever possible, there should be regular evaluation of communication methods employed by the council to both canvas pupil opinion and feedback relevant information to peers.

Pupils at both of the schools studied for this report will be updated on the results of the project and the outcomes of their involvement in implementing healthy eating changes. Keeping pupils informed regarding the progress of change within their school is essential to both empower and encourage the engagement of pupils. Both schools plan to continue SNAG meetings in the future, allowing the identification and implementation of further changes aimed at improving the nutrient intake of pupils.

Registered Dietitians are ideally placed to advise on nutrition within the school environment and facilitate change in healthy eating practices. Their involvement within steering groups and SNAGs in future interventions should be encouraged and supported with sufficient provision of funding. National funding of dietitians involved in school nutrition is not uniform within the UK. With increasing emphasis being placed on school nutrition, this issue must be addressed on a local and national level.

A sufficient sample size is crucial to the detection of changes in pupil knowledge and attitudes. In a school environment there are many influences that may impede the continued involvement of a pupil study population. The support of the whole school in achieving project aims should be ensured if this issue is to be successfully overcome. This should include the canvassing of support and awareness raising amongst pupils, parents, catering staff, teachers and senior school management, with the aim of maximising pupil participation.

9.2 Nutritional Analysis and Influencing Change

Knowledge and practical application of the Balance of Good Health Model should be included in curriculum activities wherever possible in order to reinforce the key healthy eating messages it represents. As full meals/ 'Meals of the Day' rather than singular fast-food items are more likely to mimic the Balance of Good Health model, the uptake of healthy meal options should be encouraged to ensure adequate intake of macro- and micronutrients.

The wider influences on food choice such as dining environment and time constraints should be taken into consideration when developing guidance for increasing healthy food choices at school. Although increasing lunch-time periods and space available to pupils alone is unlikely to greatly improve food choices, these factors, in conjunction with other changes, would facilitate the ability of pupils to make healthier meal choices.

Future nutritional guidelines for school meals should encompass food and drink consumed during the whole school day, and should particularly take food provision over break-time into consideration. The failure of many pupils to consume breakfast before coming to school may be addressed by the introduction of healthy breakfast clubs and education regarding the importance of regular meals in terms of concentration, energy levels, and overall nutrient intake.

A commitment to the process of change throughout the school may help to produce larger positive changes in nutrient intake. Poor intakes of vital micronutrients may be partly addressed by means of targeted education in schools for 'at risk' groups, for example iron intakes in young females.

Menu changes should be introduced incrementally over a long period of time by means of a whole-school approach, encompassing curriculum activities and behavioural change strategies. These may include taster sessions, displays and discussion groups centred around pupil involvement and participation. There must be time for experimentation within school catering departments to allow catering staff to respond to changing consumer demands, leading to the identification of menu plans which are healthy but still acceptable to pupils.

The method of data collection with regards to the nutritional intake of pupils should be carefully considered. If possible, a number of reliable methods should be employed which allow cross-checking of information and accurate nutritional analysis. Cashless catering systems may be a quick and relatively simple method of data collection, however data outcomes from these systems need to be carefully specified.

The use of an Authority-wide steering group, consisting of representatives from key partners including Education (including PHSE), Catering Providers, Dietitians and Public Health Departments, should be encouraged where large scale changes to eating practices in schools are sought. This will allow effective communication and multi-agency working.

10. Conclusion

Influencing change in dietary habits is a challenging process. Time, commitment and the involvement of the whole school is essential if healthier eating practices are to increase in this environment.

The Caroline Walker Trust nutrient-based guidelines for school meals (ref) represent 30-40% of the RNI for the nutrients they include. It is advisable that school caterers should work towards a service provision that meets the CWT standards in order to ensure that pupils meet their nutritional requirements at a key time in their physical and mental development. Many children do not receive adequate nutrition outside school, therefore it is difficult to envisage how they will reach their full daily requirements whilst only the current school meal standards are being enforced. Nutrient-based standards are a more robust method of ensuring ample nutrient intake.

It is interesting to note that the recently revised Nutrient-Based Standards for School Food, jointly produced by the CWT and National Heart Forum[12], show increased recommendations for calcium, vitamin A, vitamin C, and the inclusion of a further standard for Zinc. Recommended intakes for these nutrients from school meals now stand at 40% of the RNI. The Expert Working Group who produced these new recommendations justify that nutrient increases are necessary since; "…. the majority of some nutrients are likely to be consumed at meal times rather than between meals as snacks, and therefore meals should provide a greater proportion of some important nutrients…nutrient-based standards should aim to meet the requirements of those children with the greatest needs"[12].

In practical terms, the CWT Guidelines may be difficult to achieve in view of the complexity of influences on food choice, in addition to the cost restrictions, environmental and time limitations affecting Schools and their catering providers. The revised Nutrient-based Standards for School Food[12] present an even greater challenge, and therefore a whole school approach will be required to ensure these standards are attained.

The provision of nutrient-based standards for the whole school day is to be recommended. The new CWT guidelines[12] recognise that pupils are likely to stay at school for longer periods each day, consuming more food throughout the day; therefore they offer further nutrient-based standards for meals, including breakfast, consumed after-school care. The results of this report highlight that many pupils consume a significant amount of calories at break-time, whilst calorie intakes at lunch-time are below CWT recommendations, both pre and post intervention. The issue of break-time nutrition has not been directly addressed in either of the CWT guidelines for school meals[2,12]. As a significant number of calories are consumed at break-time, it is debatable whether the nutrients obtained from these foods should fit within nutrient-based standards for breakfast provision or lunch provision at school or whether an additional nutrient based standard should be devised just for break-time. To address this

dilemma, more research into the nutrient-content of food consumed at break-time and the direct impact of this on lunch-time intake should be considered, as well as whether break-time snacks are taken up as a substitute for breakfast

Possible options for ways in which CWT nutrient based standards may be achieved include the restriction of choice to meal options, and attempts to match secondary school meal provision more closely to primary school meal provision where choice is limited and meals are the only option.

This may be achieved by limiting the food choice offered to year 7 pupils as they enter the secondary school meal system. Menu options could be restricted to an agreed number of healthy meal options which meet nutrient based standards, thereby encouraging healthier eating habits from the outset. Lunch timings and servery arrangements may need to be adjusted in order to accommodate such a scheme, requiring the full co-operation of the school. If successful, this system could then be extended to the same pupils as they enter into years 8 - 11, allowing a gradual introduction of healthy eating changes.

However it is vital through the process of change that the take up of the service is not severely damaged to the point where it is not viable to operate a catering service without the necessary additional funding that this would require.

A further possibility is experimentation with ‘meal deal’ options which encourage pupils to consume healthier single food items in combination with less healthy but more popular options in order to receive price incentives, for example pizza with salad and a glass of milk. This should be done with some caution in view of the experience in the schools studied here. The take-up of meal deals following the project have remained at a very low level, however further experimentation needs to be pursued.

The extension of nutrient-based standards to incorporate the whole school day may further reduce the barriers to meeting such standards. As noted in the CWT revised nutrient based standards for school food, recommended allowances for breakfast is now included in addition to lunch-time. However the recommendations should embrace the whole school day, including the morning break provision. Pupil involvement must underpin any approach to achieving nutrient-based standards for school meals. Education through a range of curriculum-based activities is also a vital element if such change is to be successful. Teachers must be supported in their roles with respect to nutritional education by qualified experts in the field, preferably Registered Dietitians.

The longer-term success for bringing about change must be further investment into the funding of school meals and to review the nature of the financial arrangements with schools. Greater investment in infrastructure, skilled staff time and foodstuffs are needed if pricing levels to the pupils are not to be increased substantially. There is a danger of driving away pupils who are not able to pay increased prices or do not respond to the changes. These are arguably the pupils most in need of a healthier diet.

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