



# VIVA International Congress

Gateway Building, University of St Andrews

21-22 March 2013

*V is for Vegetable: applying learning theory to liking and intake of vegetables – The early years of life provide a window of opportunity for the development of future healthy eating habits*

## Poster Abstracts

1. **An investigation into vegetable consumption in pre-school children and the role of exposure.** S. M. Ahern, S. J. Caton, M. M. Hetherington. Institute of Psychological Sciences, University of Leeds.

The diets of most European children fail to include sufficient fruits and vegetables. In a survey of mothers of pre-school children across 3 EU countries (N=234) older children (25-36m) had been exposed to more vegetables than younger children, but infants aged 6-12m liked and consumed vegetables more than the older children (1). Adding seasonings to improve flavour was a common practice across countries. Flavour flavour learning (FFL) and flavour nutrient learning (FNL) have been compared to repeated exposure (RE) to improve vegetable intake, although to date repeated exposure appears sufficient to increase intake (2,3,4). To test the hypothesis that FFL will increase intake of a novel vegetable compared to RE, pre-school children (N=33) received 8 exposures to two vegetable purees, one with apple sauce (FFL) and one without (RE), and a third vegetable served as a control. Intake was measured before, during and three times after the intervention. Preliminary analyses show significant increased intake of all three purees at post-test with no significant effect of condition on magnitude of change. This confirms the observation that familiarity is sufficient to promote intake and there is no additional benefit of adding flavour or energy to vegetables in order to increase their acceptance.

2. **The effects of weaning with either fruits or vegetables at the age of 4 - 6 months on vegetable and fruit acceptance at 12 and 23 months.** C. Barends, J. de Vries, C. de Graaf, Division of Human Nutrition, Wageningen University, PO Box 8129, 6700 EV Wageningen, The Netherlands.

We investigated whether weaning exclusively with vegetables would increase vegetable intake at 12 and 23 months of age as compared to weaning exclusively with fruits. A 19-day intervention study was conducted in 101 infants, aged 4-6 months. One group was weaned with only vegetables, the other group with only fruit. On day 19, the vegetable group received their first fruit (apple) and the fruit group their first vegetable (green beans). At 12 (n = 86) and 23 (n = 81) months of age the children's consumption was measured in our laboratory and reported by their parents using a 3-day food diary for home intake. After the 19-day intervention, green beans intake was significantly higher in the vegetable group than in the fruit group. At 12 and 23 months of age apple and green beans intake did not differ significantly between the groups in the lab. However, home intake of vegetables at 12 months of age was significantly higher in the vegetable group than in the fruit group, but not at 23 months of age. These findings suggest that starting weaning with vegetables results in a higher vegetable consumption to at least 12 months of age.

3. **It's never too late to learn – applying learning theory to improve liking and intake of vegetables in pre-school age children.** J. Cecil<sup>1</sup>, M. Wilson<sup>1</sup>, A. Wright<sup>1</sup>, C. Allais<sup>1</sup>, C. Schwartz<sup>2</sup>, D Jackson<sup>3</sup>, H. Weenen<sup>4</sup> M. Hetherington<sup>5</sup>. <sup>1</sup>School of Medicine, University of St Andrews, St Andrews KY16 9TF Scotland; <sup>2</sup>Centre de Recherche de l'Institut Paul Bocuse, Château du Vivier, 69130 Ecully, France; <sup>3</sup>Public Health Nutrition Research Group, Rowett Institute of Nutrition and Health, University of Aberdeen, Aberdeen, AB21 9SB; <sup>4</sup>Danone Research - Centre for Specialised Nutrition, 6704 PH Wageningen; <sup>5</sup>Biopsychology Group, Institute of Psychological Sciences, University of Leeds, Leeds LS2 9JT, UK.

It is important to establish liking and intake of vegetables early in life to facilitate later healthy eating. However, food preferences are not fixed in infancy. Short-term liking for the taste of fruit and vegetables can be improved in children through flavour consequence learning (FCL), whereby the degree of liking for specific fruits and vegetables is associated with the degree of post-ingestive consequence. This study investigated the efficacy of conditioning mechanisms using FCL in influencing vegetable rank preference and liking (based on measured intake) in 33 children (3-5 years) beyond the short-term, recruited from nurseries in St Andrews and Leeds. Testing was conducted in groups in the nursery setting. Rank preference and liking (intake) of vegetables (carrot, pepper, celery) and smoothie drink was assessed pre and post intervention. Children received 8-10 exposures (intervention) to their moderately preferred (target) vegetable via a smoothie drink (100g). Child height (m), weight (kg), eating behaviour profile and milk feeding history were measured. The novel vegetable smoothie drink (intervention) was accepted over 8-10 consecutive occasions. Exposure to a moderately preferred (target) vegetable smoothie drink did not increase intake of the target vegetable. FCL associative conditioning was not effective in this context, intake of vegetables remained stable.

4. **Repeated exposure more effective than flavour flavour learning as mechanism to increase vegetable consumption in pre-school children.** V. de Wild, K. de Graaf, G. Jager, Wageningen University, Division of Human Nutrition, PO Box 8129, 6700EV Wageningen, the Netherlands.

Children's habitual diets contain too much high-energy-dense foods but little low-energy foods like vegetables. Since most children dislike vegetables, increasing their intake is a challenge. We investigated the relative effectiveness of repeated exposure (RE) and Flavour-Flavour-Learning (FFL) in increasing vegetable intake and acceptance in pre-schoolers (n=39). During an intervention period of seven weeks, toddlers consumed vegetable crisps (freeze-dried red beet and parsnip) twice per week. Half of the group received red beet crisps with a dip of tomato-ketchup and parsnip with a neutral white-sauce, whereas for the other half the order was reversed. Outcome measures were preference and ad libitum consumption measured before and after the intervention. Intake increased significantly after the intervention for both vegetables (on average with 8g; an increase of approx. 300%), and this effect was persistent even six months afterwards. The increase was irrespective of crisps being offered with C+ or C- dip sauce. No changes in initial preference for either red beet or parsnip were found. This suggests a robust and persistent effect of RE but no effect of FFL. In conclusion, simply offering pure vegetable tastes repeatedly is sufficient to increase intake over time, rather than adding flavour to the food.

5. **Early exposure to vegetable variety on infants' liking and consumption: the TASTE intervention study.** A. Fildes, J. Wardle & L. Cooke. Health Behaviour Research Centre, UCL.

Recent research suggests that repeatedly offering infants a variety of vegetables early in the weaning process, increases intake and liking of these vegetables. Furthermore, the effect may extend to novel foods and result in a longer-term increase in vegetable consumption. A community sample of 60 mothers of 4-6 month old infants were randomised to either an intervention group who were given guidance on introducing a wide variety of vegetables as first weaning foods, or a control group who received usual care. Mothers were visited at home just before they planned to start complementary feeding. The intervention comprised a brief interview at which the importance of introducing a variety of vegetables at the earliest possible stage was stressed and mothers were encouraged to offer tastes of five different vegetables for the first 15 days of weaning. Leaflets reinforcing these messages were provided. Control participants were also visited, but received no specific advice. The infants' liking and consumption (g) of an unfamiliar vegetable followed by an unfamiliar fruit was assessed at a 'taste test' 1 month and 6 months post-intervention.

6. **Food preferences among children and adolescents from selected schools in Warsaw.** D. Gajewska, K. Szymanska, A. Harton, Department of Dietetics, Warsaw University of Life Sciences.

Aim: To assess the nutritional habits and snacking habits among students from selected primary and lower-secondary schools in Warsaw (Poland). Methodology: The research was carried out in children and adolescents, aged 9-14 years (n=366). Assessments of the nutritional habits were done using a questionnaire. Results: As the least popular food products students indicated vegetables (35% of total indications), among them: spinach, broccoli, tomatoes, onions, beets, potatoes, beans and olives. Younger children (9 - 11 years) declared fish and seafood as disliked food products (9%). Soups, including cucumber, tomato, vegetable, bean and barley soup, were also not popular among students (7%). Girls, compared to the boys, indicated more often vegetables, soups, sodas and fruit juices as the least popular products. Boys more often pointed fish and seafood as products of the lowest popularity. Fruits, sweets and salty snacks were the most preferred snack-type products. Conclusions: Our findings indicate that there is a need for popularization of consumption of vegetables among children and adolescents.

7. **The development of children's food preferences: relationship between breastfeeding, food neophobia and parental feeding practises.** J. A. Harrold, C. Hall, J. Brizell & J. C. G. Halford, Department of Experimental Psychology, University of Liverpool.

Given rising levels of obesity and low intake of fruit and vegetables (F&V) by UK children, identifying factors which influence development of food choice is important. Developmentally, early feeding practices play a protective role against obesity. Socially, the family environment also impacts on food preferences. This study investigated how these factors interact and contribute to the development of food preferences. Ninety four children (3.54±0.61 years) completed a paired preference task to assess food preferences. Parents completed questionnaires assessing parental feeding style, control exerted over their child's eating, parental and child neophobia and F&V consumption and also child's diet from birth. Feeding practice at birth was found to be associated with intake of F&V by the children (p<0.05). Children exclusively breast-fed had significantly greater F&V intake than those exclusively formula-fed (p<0.05). In addition a positive correlation was found between age of weaning and child neophobia and between age of introduction to fruit and child neophobia. However, preference for F&V negatively correlated with child neophobia (all p<0.05). These data suggest that breastfeeding represents a protective factor against food neophobia. The type and timing of exposure to foods at weaning also appears critical to the development of food preferences.

8. **Vegetables and fruits in teenagers' diet.** A. Harton, A. Ziębac, D. Gajewska, Department of Dietetics, Faculty of Human Nutrition and Consumer Sciences, Warsaw University of Life Sciences, Poland.

Aim: To assess the contribution of vegetables/fruits in breakfasts and school snacks consumed by teenagers and to evaluate the frequency of vegetables/fruits intake in this population. Objectives: The research was carried out in teenagers aged 14-16 years (n=60), residing in Warsaw, Poland. Methodology: Assessment of the contribution of vegetables/fruits in selected meals and frequency of their intake was performed using a questionnaire. Statistical differences were analyzed with Chi-square test. Results: The frequency of vegetables and fruits intake was too low. Vegetables were consumed at least 5 times a week by 63%, while 24% of teenagers consumed them 1-2 times a week, in the case of fruits these values were lower and reached respectively 53% and 20%. Referring to the range of products consumed by teenagers for breakfasts and snacks at school, vegetables and fruits were not present in the examined meals. Taking into account products purchased by the youth in the school shops there were no vegetables and fruits too (mainly soft drinks and sweets were chosen) (no statistical differences between girls and boys). Conclusions: Diet of teenagers was characterized by low participation of vegetables and fruits, whereas breakfast and school snacks did not include them at all.

9. **A step-by-step introduction to vegetables at the beginning of weaning: the effects of early and repeated exposure.** M. Hetherington<sup>1</sup>, C. Schwartz<sup>1,2</sup>, F. Croden<sup>1</sup>, J. Madrelle<sup>1</sup>, C. Vereijken<sup>3</sup>, H. Weenen<sup>3</sup>. <sup>1</sup>Biopsychology Group, Institute of Psychological Sciences, University of Leeds, Leeds LS2 9JT, UK; <sup>2</sup>Centre de Recherche de l'Institut Paul Bocuse, Château du Vivier, 69130 Ecully, France; <sup>3</sup>Danone Research – Centre for Specialised Nutrition, 6704 PH Wageningen, The Netherlands.

Breastfed infants are more willing to try and to like vegetables, this is thought to be due to flavour exposure via breast milk. This study investigated the effect of a step-by-step introduction of pure vegetables added to milk and rice at the start of weaning. Just before the start of weaning, enrolled mothers were randomised to either the intervention (IG, n=18) or control (CG, n=18) group. IG infants received 12 daily exposures to vegetable puree added to milk, then 12 daily exposures to vegetable puree, added to baby rice at home. Plain milk and cereal were given to the control group. Then both groups received 11 daily exposures of vegetable puree; intake and liking were recorded and eating behaviour filmed on days 25-26 and 33-35 at the laboratory. Vegetables were provided in rotation and a new vegetable given on the final day. IG infants liked and ate the exposed vegetable purees more than CG infants. Carrots were liked and consumed more than green beans. New vegetable intake was marginally greater in IG infants. Early exposure to vegetables in a step-by-step process enhanced liking and intake of vegetables during weaning; this approach could be useful in improving vegetable acceptance.

10. **How do mothers 'know' their breastfeeding is successful? A discursive analysis of knowledge claims in internet postings.** S. Hugh-Jones<sup>1</sup>, M. Hetherington<sup>1</sup>, C.M.J.L. Vereijken<sup>2</sup>, A. Verhaeghe<sup>2</sup>. <sup>1</sup>University of Leeds, <sup>2</sup>Danone Research.

Background: Although infant feeding can be complex, few studies have examined how mothers understand and recognise 'successful' breastfeeding. Online parenting sites are fertile territory for examining mothers' claims about successful breastfeeding. Methods: We conducted a discursive analysis (Potter & Wetherell, 1987) of 300 posts. Posts were selected from a larger corpus of posts on infant feeding collated from six parenting websites. Posts selected for this analysis represented a knowledge claim about the form, feature and/or mechanism of successful breastfeeding. Results: Successful feeding was constructed as being possible only when the infant and mothers' body functioned in 'natural' harmony, particularly in relation to their joint ability to communicate around hunger and satiety and to the mother's ability to meet the infant's needs.

Infant contentment, sleep, weight gain and unproblematic nappies were constructed as indicators of successful feeding. Successful feeding was impossible when 'natural' components were faulty (eg milk supply, infant's inability to latch on), unless the discerning mother implemented strategies (eg waking to feed, boosting milk supply). Conclusions: Our analysis captures the aspects of feeding most commonly invoked by mothers to constitute 'knowledge', and indicates the diverse ways in which they produce and partake of shared theories about successful breastfeeding.

11. **Comparison of Repeated Exposure, Flavor-Flavor Learning, and Flavor-Nutrient Learning to increase artichoke intake in weaning infants.** E. Remy<sup>1</sup>, S. Issanchou<sup>1</sup>, V. Boggio<sup>2</sup>, S. Nicklaus<sup>1</sup>.  
<sup>1</sup>Centre des Sciences du Goût et de l'Alimentation, UMR 1324 INRA, Dijon France; <sup>2</sup>CHU Dijon, France.

The present study compares the efficiency of learning mechanisms in weaning infants: Repeated exposure (RE), Flavour-Flavour Learning (FFL), and Flavour-Nutrient Learning (FNL). A target vegetable (artichoke) prepared according to a basic recipe and a control vegetable (carrot), were proposed to 95 infants (6.4 ± 0.8 months) at 2 meals, before and after an exposure period. Infants were randomly assigned to three groups and were exposed 10 times to a basic artichoke recipe (n = 32, 48 kcal/100g), a sweet artichoke recipe (n=32, 51 kcal/100g), or an energy-dense artichoke recipe (n=31, 144 kcal/100g). Follow-up measurements (intake and liking, evaluated by parents) were performed after 2 weeks, 3 months and 6 months. During the 10 exposures, artichoke intake increased for both RE and FFL groups, but not for FNL group. The basic artichoke intake increased significantly between the Pre and Post-exposure in RE (+52 ± 11 g) and FFL (+40 ± 13 g) groups, but not significantly in the FNL group (+9 ± 16 g) and this result was stable at each follow up. RE and FFL equally improved acceptance of the vegetable in weaning infants; but FNL appeared less efficient than the two other mechanisms. Funding: European Community's Seventh Framework Program FP7-245012-HabEat.

12. **Analysis of video recorded eating behaviours of infants: a better way to assess liking of foods by infants?** J. Madrelle<sup>1</sup>, C. Barends<sup>2</sup>, M. Pinilo<sup>1</sup>, H. Weenen<sup>3</sup>, M. Hetherington<sup>1</sup>. <sup>1</sup>Biopsychology Group, Institute of Psychological Sciences, University of Leeds, Leeds LS2 9JT, UK; <sup>2</sup>Division of Human Nutrition, Wageningen University, PO Box 8129, 6700 EV Wageningen, The Netherlands; <sup>3</sup>Danone Research – Centre for Specialised Nutrition, 6704 PH Wageningen, The Netherlands.

Background: Currently measures of infants' liking are indirect (intake) or subjective (liking perceived by another person). This study set out to investigate the relevance of specific behaviours displayed in reaction to a spoon with food approaching the mouth of an infant, to assess the infant's liking. Methods: Videos of feeding sessions of 15 dyads over the first two days of eating a vegetable puree were coded independently by two assessors during the first 9 spoonfuls of a feed. For all nine spoonfuls the following behaviours were counted: turns head away (THA), arches back (AB), cries (CR), pushes spoon away (PSA) and leans forward (LF); rate of acceptance (ROA) was rated as follows: early +3, late +2, only when touching the lips +1, refusal 0. Results: Reliability: Inter-assessor correlations for THA, AB, CR, LF and ROA were significant. Factor analysis showed three factors, the main factor included THA, AB and ROA. Validation: Intake correlated with THA, AB and ROA, mother's and researcher's assessment of liking correlated with THA and ROA only. Best correlation with intake, mother's and researcher's assessment of liking was obtained for ROA. Conclusion: ROA and THA are reliable and valid assessments of infants' liking of foods.

13. **An economic evaluation of the introduction of the new school food policy in North East England.** H. Mason<sup>1</sup>, J. Shen<sup>2</sup>, L. Vale<sup>2</sup>, J. Critchley<sup>3</sup>, S. Spence<sup>2,4</sup>, A. Adamson<sup>2,4</sup>. <sup>1</sup>Yunus Centre for Social Business and Health, Glasgow Caledonian University; <sup>2</sup>Institute of Health & Society, Newcastle University; <sup>3</sup>St George's, University of London; <sup>4</sup>Human Nutrition Research Centre, Newcastle University.

In 2006 a major initiative to improve school food in England was launched. This set out food and nutrient-based requirements for school lunches to which all schools had to adhere to by September 2009. An economic evaluation of the change in the school food policy in the North East of England was conducted looking at two time periods. The short term costs associated directly with the change in food policy itself were compared to the short-term outcomes in a cost-consequence analysis. The longer term effects on future health events, particularly cardiovascular events, resulting from dietary changes were also estimated to assess the impacts on costs and QALYs. A cost-consequence analysis highlighted the trade-offs between the findings for change in diet and the net costs of the school food policy. There are significant improvements in dietary intake post-implementation of the school food policy. These benefits are accompanied by a slight increase in costs (an increase of £55 per child per year) of providing school meals following the implementation of the school food policy. The extent that these short-term effects might influence longer term outcomes was explored within an exploratory modelling exercise of the costs and consequences of future cardiovascular events.

14. **Systematic review of the literature on 'Food Learning' (how children learn about food) from the start of complementary feeding until 36 months.** M. Mura Paroche<sup>1</sup>, C. Vereijken<sup>1</sup>, S. Caton<sup>2</sup>, C. Houston-Price<sup>3</sup>, H. Weenen<sup>1</sup>. <sup>1</sup>Danone Research - Centre for Specialised Nutrition, 6704 PH Wageningen, The Netherlands; <sup>2</sup>Division of Psychology, University of Bradford, Richmond Road, Bradford BD7 1DP, UK; <sup>3</sup>School of Psychology & Clinical Language Sciences, University of Reading, Earley Gate, Whiteknights, Reading RG6 6AL, UK.

Infants are born with few taste preferences but a strong capacity to learn. A systematic review methodology was employed to identify the mechanisms that support children's learning about food from the start of complementary feeding until 36 months. The literature search was conducted using three databases: OvidSP, Pubmed and Web of Science. Search strings were combinations of three different fields relating to "food", "learning process" and "children". A set of inclusion and exclusion criteria was developed to enable systematic selection of relevant papers from the 1970 to 2012 period. Reliability statistics (Fleiss's Kappa) indicated substantial inter-rater agreement over the selection of 33 articles. The papers identified by the systematic review suggest that familiarization, associative and observational learning are considered the core food learning mechanisms for children in the 0 to 36 month age range. Categories and cognitive schemas relating to foods, although less well-researched, also appear to support children's developing understanding of the food domain. This is the first systematic review of the mechanisms that underlie children's developing knowledge about food from the start of complementary feeding until 36 months. We propose 'food learning' as a useful concept for considering the development of PERCEPTION, COGNITION and BEHAVIOR related to food.

15. **Description of maternal feeding practices and their impact on infant's acceptance of new foods.** C. Lange, M. Visalli, S. Jacob, C. Chabanet, P. Schlich, S. Nicklaus. Centre des Sciences du Goût et de l'Alimentation, UMR 1324 INRA, Dijon France.

The introduction of solid foods is a major step in the development of infant's eating behaviour. The aim of the present study was (i) to describe precisely maternal feeding practices in the first year, (ii) to relate them with mothers' and infants' characteristics, (iii) to study if these practices could impact infant's further acceptance of new foods. Mothers from the French OPALINE cohort (n=138) were requested to record each food proposed to their infant and to score the level of its

acceptance for the first 4 presentations. The age of introduction of each food and each category, the total number of foods over all categories and the infant's acceptance of each food were analysed. Finally, the link between feeding practices and infant's acceptance of new foods was studied. The age at initiation of weaning (5.5 mo) was significantly correlated with the duration of the infant's exclusive breastfeeding. The number of new foods introduced differed a lot from one infant to another one but was not linked to any individual characteristic. Most of the reactions to new foods were quite positive and significantly correlated to the number of different foods introduced, suggesting a link between early variety and further food acceptance.

16. **Type of milk feeding in infancy and health behaviours in adult life: findings from the Hertfordshire Cohort Study.** S. Robinson, G. Ntani, S. Simmonds, H. Syddall, E. Dennison, A. A. Sayer, D. Barker, C. Cooper, Hertfordshire Cohort Study Group. MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton SO16 6YD.

A number of studies suggest that breastfeeding has beneficial effects on adult cardiovascular risk factors in adulthood, although the mechanisms involved are unknown. One possible explanation is that adults who were breastfed differ in their health behaviours. In a historical cohort, adult health behaviours were examined in relation to type of milk feeding in infancy. From 1931-1939, records were kept on all infants born in Hertfordshire, UK. Their type of milk feeding was summarised as breastfed only, breast & bottle-fed, or bottle-fed only. Information about adult health behaviours was collected from 3217 of these men and women when they were aged 59-73 years. Diet was assessed by administered food frequency questionnaire; the key dietary pattern was a 'prudent' pattern, that described compliance with 'healthy' eating recommendations. 60% of the men and women were breastfed, 31% were breast & bottle-fed, 9% were bottle-fed. Type of milk feeding did not differ according to social class at birth, and was not related to social class attained in adult life. There were no differences in smoking status, alcohol intake or reported physical activity according to type of milk feeding, but there were differences in the participants' dietary patterns. In a multivariate model that included gender and infant weight gain, there were independent associations between type of feeding and prudent diet scores in adult life ( $P=0.009$ ), such that higher scores were associated with being breast fed. These data support experimental findings that suggest that early dietary exposures can have lifelong influences on food choice.

17. **Complementary feeding: comparison and evaluation of national and international guidelines.** C. Schwartz<sup>1\*</sup>, P. Scholtens<sup>2</sup>, A. Lalanne<sup>3</sup>, H. Weenen<sup>2</sup>, S. Nicklaus<sup>1</sup>. <sup>1</sup>Centre des Sciences du Goût et de l'Alimentation, UMR6265 CNRS, UMR1324 INRA, Université de Bourgogne, Agrosup Dijon, F-21000 Dijon, France ; <sup>2</sup>Danone Research – Centre for Specialised Nutrition, 6704 Ph Wageningen, The Netherlands; <sup>3</sup>Blédina SA, 383 rue Philippe Héron, BP 432, F-69654 Villefranche-sur-Saône Cedex, France.

Feeding guidelines were developed to guide parents while weaning their children. The objective of this work was to compare and evaluate to what extent selected feeding guidelines sufficiently cover recent scientific evidence regarding the development of healthy eating habits. Analysed feeding guidelines included WHO, European Network for Public Health Nutrition, US and two European national guidelines (UK and France). The review focused on topics that were selected as most important for the development of healthy eating habits. These topics were categorized according to a 3-arm-framework: 'when', 'what' and 'how' to feed, inspired by Butte *et al.* (2004). The feeding guidelines were evaluated using a 4-pt scale (0: theme not addressed at all; 3: theme addressed with detailed information including practical examples and/or recommendations). In general all guidelines were found to cover most of the topics identified as important by scientific literature and the guidelines. These topics include the importance of: the right timing of weaning, a balanced diet, how to introduce taste and texture, repeated exposure, variety, self-feeding, self-regulation and parental styles and practices. Nevertheless, some of the national guidelines were

found to be incomplete and would improve if updated with latest scientific evidence. This project was mostly funded by a grant from Danone Research – Center for Specialized Nutrition and by an additional grant from VIVA project EU FP7 Marie Curie IAPP 230637; RCN 90766.

18. **For French mothers complementary feeding is a 'taste journey'**. C. Schwartz<sup>1,2</sup>, J. Madrelle<sup>1</sup>, C. M. J. L. Vereijken<sup>3</sup>, H. Weenen<sup>3</sup>, S. Nicklaus<sup>4</sup>, M. M. Hetherington<sup>1</sup>. <sup>1</sup>Biopsychology Group, Institute of Psychological Sciences, University of Leeds, Leeds LS2 9JT, UK ; <sup>2</sup>Centre de Recherche de l'Institut Paul Bocuse, Château du Vivier, 69130 Ecully, France; <sup>3</sup>Danone Research – Centre for Specialised Nutrition, 6704PH Wageningen, The Netherlands ; <sup>4</sup>Centre des Sciences du Goût et de l'Alimentation (CSGA), UMR6265 CNRS, UM1324 INRA, Université de Bourgogne, AgroSup Dijon, France.

Early food habits track into later life, thus differences in weaning practices may affect later dietary habits. Knowing what mothers think about and do around the start of complementary feeding (CF), especially with vegetables, could help to identify strategies which enhance later vegetable consumption. This study examined attitudes and CF practices amongst French mothers (n=18, 25-39 years) using a qualitative approach. The CF period was viewed a critical milestone for development. As CF was described as emotional and complex, advice was sought from official sources but feeding practices were tailored to the needs of the infants. In mothers' discourses, pleasure and taste discoveries were of primary importance. This contrasts somewhat with the discourse of British mothers, who place emphasis on health and balanced diet (Caton et al. 2011). Mothers acknowledged that introducing foods during CF is easy and that in later childhood there would be rejection of foods including vegetables. Strategies to counter rejection were mentioned (e.g. repeated exposure, adding familiar ingredients). This study raises the question to what extent promoting the idea of "developing the palate" from the start of CF would be helpful to favor later vegetable intake and, if so, whether this is transmissible to other cultures.

19. **The effect of three learning techniques on Dutch children's vegetable consumption.** G.G. Zeinstra & V. Kooijman, WUR Food & Biobased Research, The Netherlands. The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/ 200732013) under the grant agreement n°FP732450123HabEat.

Despite the health benefits, children's vegetable consumption is below the recommendations. We tested the efficacy of three learning techniques on children's vegetable consumption: repeated exposure to two vegetable shapes (N=79), imitation of an idol or teacher (N=101; N=103), and participation in vegetable preparation (N=101). Children aged 4 to 6 years participated. The exposure and imitation studies were performed at primary school and used raw carrots as target vegetable. The preparation study used boiled carrots and boiled French beans and was executed at the Restaurant of the Future. Mean vegetable intake was 40 grams during the exposure study, 25-30 grams during the eating sessions of the imitation studies and 50 grams during the sessions of the preparation study. There was no increase in vegetable intake over time. This might have been due to the large variations in children's vegetable intake (between-subjects as well as within-subjects over sessions). Further analyses of our questionnaire data may provide more insight into these large variations and will indicate whether specific subgroups are more responsive to learning. Although we did not see an increase in vegetable intake, offering children vegetables as snack during the school day may be a valuable addition to their current vegetable intake.