



9th MEETING

29 September 2008, Conference Room 2, Aviation House

FINAL MINUTES

Chairman: Professor Alan Jackson
Members: Professor Ian MacDonald
Dr Anthony Williams
Ms Stella Walsh
Professor Marinos Elia
Professor Joe Millward
Professor Andrew Prentice
Professor Chris Riddoch

Secretariat: Dr Alison Tedstone (FSA)
Dr Peter Sanderson (FSA)
Dr Elaine Stone (FSA)
Ms Rachel Elsom (FSA)
Ms Emma Peacock (FSA)
Mr Andrew James (FSA)
Dr Sheela Reddy (DH)

Apologies:

Dr Anita Thomas

Chairs' introduction and welcome

1. The Chair welcomed Members to the ninth meeting of the SACN Working Group on Energy Requirements.
2. Apologies were received from Dr Anita Thomas.

Minutes from previous meeting (23 May 2008) - SACNenergy/08/min01

3. Members were invited to comment on the minutes of the previous Working Group meeting.
4. Professor Joe Millward requested the following addition to the minutes under Agenda Item 3:
'A Member questioned the purpose of the attempt to fit an equation to the adult

TEE data versus weight, given that TEE is unlikely to be a simple function of weight.'

Action: Secretariat

5. In paragraph 6 of the minutes, it was stated that the Working Group would exercise caution when quoting references by the author E.T.Poehlman, as the majority of the author's papers had been retracted. A Member queried whether this recommendation had been applied, as a paper authored by E.T. Poehlman was cited in paragraph 29 of the draft report. The Working Group were advised that the UK Panel for Research Integrity in Health and Biomedical Sciences had supplied a list of references that were retracted and that they had advised exercising caution when quoting other references by this author. It was noted that the paper referenced in paragraph 29 was not one of the papers retracted and that the paper had a number of well respected co-authors. Members therefore agreed that paragraph 29 of the draft report could remain unchanged.
6. Paragraph 22 – the following sentence should be removed 'This represents a serious deviation from the 1991 report'.
7. Paragraph 26 – remove 'extremely'.
8. Paragraph 37, Members noted that the decisions surrounding height had been included in the method section of the draft report.
9. Paragraph 42, 3rd bullet – remove 'HSE'.
10. The Chair then went through the action points arising from the last meeting.
11. Paragraph 9-11, Members noted that height was not an issue, as a quadratic term had now been applied.
12. During the last meeting a number of the children studies were highlighted as having outliers and Members queried whether the children in these studies were representative of the UK population. A list of studies and papers were sent to Professor Ian Macdonald to review. Members agreed that the subjects were all healthy Scandinavian children and that there was no reason to exclude them from the dataset.
13. Members considered the selection of subjects in the doubly labelled water (DLW) studies and in particular whether they were more active than the general UK population. It was agreed that there were a number of insecurities with using DLW studies to produce regression equations that would be suitable for predicting energy requirements for the UK population. It was agreed that the Working Group would revisit these issues under agenda item 3.
14. Paragraph 42, at the last meeting it was suggested that the cut off age of 75years should be applied and that the equations were re-run using the age range 19-75 years. Members noted that the standard error of the mean was smaller by running two models, dividing the age ranges 19-60 and 61-75 years.

15. Paragraph 45, Members noted that the Kaczkowski 2000 paper had been checked and the TEE value should be 7.6 and not 9.6. This had been updated in the dataset, however annex 6 still required amendment.

Action: Secretariat

16. Members noted that comments raised on the draft chapters at the last meeting had been incorporated into the draft report and the chapters had been redrafted.
17. The minutes were agreed as a correct record of the 8th meeting of the SACN Energy Requirements Working Group.

Agenda Item 3

SACN Energy Requirements Working Group Draft Report (SACNenergy/08/03)

18. The Secretariat introduced the draft report highlighting that the report had been restructured to reflect the terms of reference. The majority of the previous material had been placed in appendices, with the main chapters of the report consisting of: an introduction setting the scene, a chapter on the derivation of the equations, and a chapter on the requirements produced from the equations.
19. The Chair highlighted that there were three important issues to consider when discussing Chapter 3 (the approach used to derive energy requirement equations): 1) it should be clear that the underlying reference statements providing the basis for the dietary reference values (DRV) enable insight into what the requirement should be to maintain health in healthy individuals; 2) how representative is the reference population (subjects in the DLW studies) of the UK population; 3) for individuals who are under or overweight, what are the possible consequences of not adhering to the reference intakes and what healthy approaches should be recommended i.e. level and form of physical activity for these individuals.
20. Members noted that according to the National Diet and Nutrition Survey (NDNS) the level of energy consumption was less than the current DRV average, however, the population prevalence of overweight and obesity had increased and this might be assumed to be due to a change in patterns of energy expenditure. Reported levels of energy expenditure however fall within acceptable limits. To assist in clarifying the above issue, data from DLW studies had been interrogated to produce regression equations.
21. The Chair invited a general discussion on the approach to deriving the DRV for energy. He stressed that the Working Group has to first decide what is desirable, and then decide if what is observed fits with this.
22. A Member commented that it was difficult to derive predictive equations for total energy expenditure (TEE) using the DLW method based on body weight. For example, it was questioned whether by using body weight it would explain more of the variance in TEE than physical activity level (PAL). If it did not, then the

use of body weight was not appropriate. It was noted that for the adult data the regression of weight on TEE was only apparent because of the increased TEE in the obese subjects and if the obese subjects were to be removed from the dataset, weight would probably not prove to be a significant predictor of TEE, whereas PAL would.

23. It was noted that if the equations were derived based on the DLW published literature, the populations studied in the DLW studies serve as the reference population and it was therefore important that the characteristics of the subjects in the database were representative of the UK population.
24. A Member raised the point that the basis behind using predictive equations to predict TEE compared to the factorial approach arose from studies that had raised doubt on PAL. Paragraph 46 in the draft report was referred to, where the BMR multiple approach to calculate energy requirements is assumed to compensate for differences in body weight between individuals; however, energy expenditure in programmed work activities had shown to be influenced by body weight and body fatness, suggesting that the assumed constancy of BMR multiples across wide range of body weights might not be valid. The two references quoted in this paragraph were Haggarty et al., 1997 and Rosetta et al., 2005. However, Members noted that it was unlikely that PAL values varied with body weight.
25. Members noted that it was important to get a better understanding of the lifestyle and activity patterns in terms of PAL values of the subjects within the DLW dataset. A range of PAL values could then be identified representative of certain activity patterns i.e. light, moderate and heavy activity. Recommendations and guidance could then be set for the UK population relating levels of activity with an energy requirement within a range, by using the factorial approach.
26. The Working Group agreed that the fundamental question was whether the factorial approach should be adopted to derive energy requirements for adults, instead of using predictive equations derived from the DLW dataset.
27. Members noted that DLW studies of obese and overweight subjects had been included in the dataset questioning the suitability of this model for producing a desirable energy requirement for the UK population.
28. Members discussed the number of insecurities associated with using the Schofield equation to derive BMR and those used when measuring PAL. However, it was agreed that the DLW dataset included a number of studies that had measured BMR, which would produce a reliably measured PAL value which could be used in place of a predicted BMR.
29. Members noted that the dataset had a high TEE and PAL value, which would not be representative of the UK population, for example to achieve a PAL value of 1.78 an individual would have to be very physically active.
30. The Chair outlined the key decisions agreed by the Working Group :
 - I. For adults, the factorial approach using measured BMR would be adopted.

- II. The factors involved in predicting BMR if not measured directly would need to be identified
 - III. The different patterns of TEE found in different groups, areas of the world, and according to different lifestyle factors would need to be considered. A statement capturing the factors contributing to the variability in TEE and how these are identified, and how representative the dataset was of the UK population would be required in the report.
 - IV. The question of whether there is a particular level of PAL- quantitatively /qualitatively associated with a benefit to health would need to be addressed.
 - V. Comments on how the Working Group dealt with unusually underweight or overweight and those who were ill in their analysis would need to be included.
31. Members noted that so far the Working Group had explored the idea of producing regression equations to predict energy requirements from DLW data (as explained in chapter 3), however it had not lead to the desired outcome. The Working Group had explored in some detail the relationship between BMR and TEE to give a PAL value. However, further investigation was required into the variation in PAL values of the studies, including identifying the characteristics of the study populations and in particular the characteristics of the populations that had a PAL of 1.7, 1.8 and 1.9. This could then be related to the UK population and used to characterise an individual into a PAL category. It was noted that generally a population has a PAL value of less than 1.7, therefore a statement would be required in the report stating that the UK population PAL value may be around 1.6, noting that this was associated with some uncertainty.
32. The Working Group agreed to accept PAL as a reasonable way of capturing TEE, while recognising the limitations, for example, the number of subjects in the literature was small and the studies may not have been carried out in populations that are representative of the UK population. It was agreed that the evidence needed further investigation as to whether to accept it as representative. PAL values should be used to evaluate the worth of the study, for example a study with a PAL of 1.2 should be discounted.
33. It was agreed that for adults the factorial approach should be adopted and PAL values and lifestyle information, including type of physical activity measured i.e. leisure activity, work activity, should be further investigated and presented at the next Working Group meeting.

Action: Secretariat

34. Members noted that the Working Group had discussed the complexities of the current method of using DLW data to produce regression equations to predict TEE and that it was agreed that the Working Group should go for an approach that was simple. Following on from investigating the subjects characteristics it was noted that a decision would have to be made regarding whether it was justified to make a recommendation to change the DRV at this time or to specify what further information was required to come to this decision.

Action: Secretariat

35. Members noted that in Table 28 of the draft report it was important to include gender breakdowns as the nature of gender differences was unknown. Members were made aware that the children's data demonstrated that at age 13 years girls were less physically active than boys and that this could continue into adulthood.
36. Members agreed that the previous discussions were entirely related to adults and that the issues relating to infants, pregnancy and lactation should be discussed.
37. Members were informed that energy requirements for infants, and pregnant and lactating women, were based on the FAO/WHO/UNU Energy Requirements report.
38. Members requested that the accuracy of table.11 on page 28 and the text surrounding it was checked.

Action: Secretariat

39. Members discussed the energy requirements for pregnancy and lactation, noting that the recommendation could be different depending on the weight of the pregnant women at the beginning of pregnancy i.e. whether they were normal weight or overweight. There was also the important issue of considering the difference between teenage and mature pregnancies, as there is a high percentage of teenage pregnancies in the UK.
40. Members discussed the energy requirements for breast fed and formula fed infants. Members agreed to add a statement on the perceived relative value of breast milk versus breast milk substitutes.
41. The Chair invited detailed comments on appendix 6 and chapter 2 – introduction. Members were asked to leave their copies of the draft report and any comments they had made on the chapters with the Secretariat.

Appendix 6

42. Members noted that a quadratic term had been adopted, as previously a linear fit was used for children 2-18years, however when adding children of 1 year it was suitable to use a quadratic fit. It was noted that an updated version of table. 5 in the report had been tabled at the meeting.
43. Members agreed that if the Working Group adopted the factorial approach for adults, this chapter would need to be presented in a different way, explaining why the Working Group had gone through the other approach using data from DLW studies to produce regression equations, including information on the problem with PAL.
44. A point was raised regarding the mean PAL values used in the report; it was noted that there was a large difference in taking the mean of PAL and then the mean of the ratio. It was agreed that this would be checked by the Secretariat.

Action: Secretariat

45. It was noted that in paragraph 511 the DLW technique was not a direct measure of total energy expenditure and should be corrected in the draft report.

Action: Secretariat

Chapter 2 - Introduction

46. Throughout the introduction and report the terms DRV and EAR are used interchangeably. Members agreed that the term EAR should be used.

47. Members discussed the third bullet point in the Terms of Reference, as the Working Group would need to be able to categorise the population into different levels of physical activity. It was noted that this point related back to the earlier discussions on physical activity.

48. Members queried whether the 4th bullet point of the Terms of Reference was still an objective. It was noted that the first 3 Terms of Reference should be focussed on and the 4th point was only an issue if the Working Group recommended a decreased energy requirement.

49. Members noted that there were different definitions of resting metabolic rate (RMR). This was also relevant for BMR, which had been used inconsistently throughout the draft report. It was agreed that the definitions should be included with reference support in the glossary of the report, stating which definition was preferred by the Working Group.

50. A paragraph on infants should be added to the growth section clarifying the distinction between energy expelled from tissue deposition.

51. The following specific points were raised:

- Paragraph 1, 1st line replace 'benchmark' with the word 'reference'.
- Figure 1 requires some description in the text.
- Paragraph 12, 1st line replace 'cytoplasmic glycolysis and mitochondrial respiration' with 'cellular functions'.
- Paragraph 13, the definition of a joule was not correct, as it does not have to be 1kg.
- Paragraph 14 should be reworded, as alcohol is not a macronutrient.
- Table 1, alcohol should be put in brackets.
- Paragraph 18, 20 and 21 require editing down.
- Paragraph 28 was missing the last part of the paragraph.
- Paragraph 29, in the first sentence the word transport should be added.
- Paragraph 40, the deuterated measure should be included as an important measure of breast milk.
- Paragraph 41, replace 'physiological' with 'mechanical' in the penultimate line.
- Paragraph 42, lines 2, 3 and 4 require clarification.

- Paragraph 42, the statement in bold requires further information on the problems associated with DLW data.
- Paragraph 50 implies that predictive equations were used for adults in the FAO/WHO/UNU report, which is incorrect and should be redrafted.
- Paragraph 53 requires redrafting.
- Paragraph 59 onwards there is only accurate data for England and Scotland.
- Paragraph 60, the reference should be 'SIGN 2003' instead of 'NICE 2006'.
- Table 4, change the health outcome title.
- Paragraph 71, change 'body weight' to 'body fat' in the 1st sentence.
- Paragraph 75, add 'there is a lack of evidence to show it' into the last sentence.

Action: Secretariat

Next Steps

52. The Working Group noted that the report required further work before going to the main SACN committee and out for consultation. The Secretariat would arrange two further Working Group meetings in November/December and January in order to prepare the report to go to the main committee at their February meeting.

Action: Secretariat

53. Members agreed that there were two issues that needed to be considered before the draft report could be finalised: the relevance of the DLW dataset and the averaging of the PAL values.

54. Members noted that the Secretariat was trawling for a suitable date in November for the next meeting.

55. The Chair closed the meeting and thanked the Secretariat and Members for the work on the report.