

## EDITORIAL

### Design models

Recently I have been preparing a presentation for a Symposium to mark the 25th Anniversary of the founding of the Department of Human Nutrition at the Landbouwniversiteit in Wageningen. As the basis for this presentation I have been analysing some of the major changes that have taken place in the Nutritional Sciences over the 25 years from the viewpoint of the Chairman of the Editorial Board of the *British Journal of Nutrition*, using the papers published in the Journal as my sources of evidence.

One of the more obvious changes in the papers published lies in the shift from studies of large animal nutrition, especially of cattle, towards human nutritional studies. Studies with small experimental animals and pigs have also shown a shift of focus towards testing hypotheses that relate to human health and disease.

At a detailed level the statistical analyses in the papers have become more sophisticated with considerable reliance on some of the major commercial statistical packages.

We also see the welcome development of sophisticated modelling of experimental data, led by those concerned with ruminant nutrition but which also has much to contribute to wider aspects of the development of nutritional concepts.

There is, however, another area where the greater use of modelling approaches would benefit the development of nutrition and this lies in the early use of modelling at the design phase of studies.

Experimental design is one of the most common reasons for rejecting papers submitted to the Journal and I find it very disturbing that often quite extensive studies have proved to have flawed designs. In many cases the study effectively needs to be re-designed and repeated, and yet one knows that for many authors this option does not exist because the funding has run out or the team has been dispersed and moved on. The authors and the editorial reviewers are then faced with the decision whether to make the best of the flawed design which has not achieved its planned objective, or to assign the paper to a file similar to the one I keep of 'lost causes', papers that will probably never appear in print for one reason or another.

It has, of course, always been possible for the authors, when planning a piece of experimental work, to go through all the possible likely outcomes and test whether the design will resolve or address the questions adequately. Estimating the statistical power of a study is one formal way of doing this analysis. However, the option now exists to carry out more detailed and sophisticated simulations of an experiment to test whether or not the design will adequately test the research hypothesis.

Such approaches have a number of benefits. First, and most importantly, they impose on the experimenters the discipline of defining the hypothesis that it is intended to test. Too many authors seem to regard the notion that their papers are testing hypotheses as a strange one. They often seem to plan their experimental work along the lines of 'let's do this and see what happens'. Then, as David Kritchevsky says, they 'torture the data with statistics until they confess' to see what their study shows. As I have said before, choosing the variables to measure in a study in itself involves some implicit hypothesis.

Second, such modelling also tackles the related statistical issue of whether the study will have sufficient power to test the hypothesis and also fulfil the statisticians' ideal of being

in at the start of the experimental work rather than being asked to resurrect the study once complete.

Third, it is a more efficient way of conducting research and using research resources. This facet has become increasingly important over the last few years as more institutions have had to shift to contract research work, where the research has to deliver at a certain time-point. In this respect modelling experimental designs will, I believe, become critically important in drafting proposals since it will then be possible to estimate more precisely how long a piece of work will take, so that research proposals can be more realistic.

Above all I think that such approaches represent the proper use of the techniques now available to nutritional scientists and provide another example of the value of importing techniques from other disciplines for the resolution of nutritional questions.

Finally, I must congratulate the Department of Human Nutrition on 25 years during which they have made substantial contributions to the nutritional sciences, many of which we have been privileged to publish.

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