ERT response to Annex 1 of letter to Marco Keiner dated 8 September 2015

Compiled by the 2015 Adjustment ERT for Finland, Agriculture.
e-mailed by Chris Dore (Lead Adjustment Reviewer)

Dear Marco,
Thank-you for your detailed paper regarding the ERT's recommendation to reject Finland's adjustment application for NH3 from agriculture. We have given your paper careful consideration, and provide some comments below.

Introduction

As you know the adjustment review is a technical review, undertaken by a technical experts. We recognise that some of the points that follow are somewhat associated with compliance (or legal) issues, but we have done our best to provide comments on the technical matters rather than the legal ones, which is our area of expertise.

The ERT included the expert who took the lead in developing the mass flow approach to estimate national NH_3 emissions from livestock production, and therefore has a particularly thorough understanding of the logic behind the approach. The following sections are derived from the principles underlying the mass flow approach.

The Mass-flow Approach

When using the mass flow approach the concept is that the EF is the proportion of TAN in excreta that is lost as NH_3. The TAN content of livestock excreta is regarded as providing the potential for NH_3 emission during manure management. The EF acts upon the mass of TAN in N excreta to calculate the actual emission. Hence N excretion is Activity Data. The exact analogy is that EFs expressed as a % of TAN act on reported N excretion in exactly the same way that EFs expressed as kg per animal place act on the numbers of animal places. Since we do not consider the numbers of animal places (or livestock numbers or livestock units) as EFs then nor should we consider N excretion values to be EFs.

When EFs were expressed as an emission per animal place or livestock unit it was always accepted that, even though EFs were unchanged, total emissions could vary as a result of increases or decreases in livestock numbers since, if livestock numbers change then it follows that emissions will change. And so it is with N excretion. If livestock are put onto a greater plane of nitrogen nutrition to increase production efficiency, then emissions will go up as N excretion has increased. Of course if greater production efficiency means fewer animals then this change will, to some extent, balance the increase from greater N excretion.

The reason why the mass flow approach has been so widely accepted is that it provides a sounder basis to estimate changes arising from changed production efficiency than can be obtained by using animal numbers or animal places alone. For pigs and poultry changes to diet to increase production efficiency have generally decreased N excretion and hence the mass flow approach has been able to translate this decrease in N excretion into reduced NH_3 emissions. In the case of cattle

production in Finland, the greater N excretion per cow has not been balanced by an equivalent decrease in cattle numbers leading to an increase in N excretion and NH_3 emissions.

Therefore it is the view of the ERT that the mass flow calculation of NH_3 emissions from agriculture in Finland is properly reflecting changes in NH_3 emissions arising from agricultural production. There is no reason to think that NH_3 emissions in 1990 were underestimated and hence there are no grounds for allowing an adjustment.

Specific comments with respect to the communication from Finland dated 8 September 2015

We recognise that N excretion may be considered to be a component of an EF that is expressed as g NH_3 per animal place. Indeed the lower, Tier 1 EFs, will be an average emission based on the integration of a number of component activities, including not only N excretion but also the ratio between housing and grazing (for cattle and sheep) and manure management system. However, such Tier 1 EFs give a poor representation of national emissions and in particular the crucial impact that changes in livestock production can have on NH_3 emissions. For this reason the Guidebook has always recommended that Parties, as far as possible, move away from these simple Tier 1 EFs to higher Tier methodologies that take account of differences in N excretion, housing system etc. With respect to N excretion a prime advantage of the mass flow approach is that this particular activity data is separated from the EF so that changes in this activity, along with other changes in activity such as slurry- or litter-based manure management, can be transparently accounted for when estimating NH_3 emissions. While this may appear to suggest that the Guidebook methodology has changed, it primarily reflects the different approaches needed for Tier 1 and Tier 2&3 EFs.

Bullet point 1.1

My understanding is that NH_3 emissions from livestock production in Finland are calculated using the mass flow model described by Grönroos *et al.* (2009).

Bullet point 1.2

The statement 1.2 (first bullet point) is entirely consistent with the explanation given above. In common with the length of the grazing period, N excretion is considered to be activity data.

The statement in 1.1 appears to contradict the report of Grönroos *et al.* (2009) in which the methodology adopted by Finland to calculate NH_3 emissions is explained. On page 9 line 3 of the 'Aims of the study' is written: 'nitrogen excretion rates *and* emission factors' (our italics). This indicates that nitrogen excretion rates and emission factors are considered to be separate and different in nature (otherwise the authors would have written nitrogen excretion rates and *other* emission factors).

The authors explain (page 10) that 'The calculation is based on the mass flow approach, where the starting point is the amount of excreted nitrogen calculated from animal numbers and animal specific nitrogen excretion rates. The fate of the excreted nitrogen is then followed during the manure management chain. Ammonia and nitrous oxide emissions into the atmosphere are calculated in each phase of the chain.' This is

consistent with our view that EFs in the mass flow approach are proportions of TAN or N excretion lost as NH_3.
On page 10 the authors also explain that the reported EF per animal place is a *back-calculation* in which the total emission for the livestock sector is divided by the number of animals in this livestock sector. Such back-calculated EFs are referred to as 'implied EFs, and are used as one means of expressing annual trends. **However, these implied EFs per animal place are not the basis of the calculation of total NH_3 emissions but are a result**, as demonstrated in Table 15 (Grönroos *et al*., 2009).

Point 1.3
Nitrogen excretion rates are calculated, but based on statistics collected on amounts and types of feedstuffs provided to livestock.

Point 1.4
Section 10.5.1 of the 2006 IPCC Guidelines states that 'The Tier 1 method entails multiplying the total amount of N excretion (from all livestock species/categories) in each type of manure management system by an emission factor'. Which indicates that IPCC regard N excretion as activity data.

We do not agree that just because N excretion data are discussed under the general heading of 'Choice of emission factors' that this implies that N excretion is therefore an emission factor. Section 10.5.2 provides guidance on the use of Tier 1, Tier 2 and Tier 3 EFs together with guidance on which types of supporting data are most appropriate for each Tier. For example, section 10.5.2 explains that 'it may be appropriate to use excretion rates developed by other countries that have livestock with similar characteristics' with Tier 1 EFs.

We acknowledge that section 10.5.5 is headed 'emission factors – nitrogen excretion rates'.
However, in section 10.5.6 it is written that 'In most countries, the other two *activity data* sets required for this source category (i.e., *N excretion rates* and manure management system usage data)' (our italics).
Hence, it is clear that IPCC is not consistent in how it classifies N excretion and therefore cannot be cited in favour of regarding N excretion as anything other than activity data.

Conclusions and Recommendations

The ERT have considered the information recently provided by Finland in some detail. However the ERT have not changed their conclusions, or their recommendation that this adjustment application be rejected.

Best regards,

The 2015 Adjustment ERT for Finland, Agriculture.

Reference
Grönroos J, Mattila P, Regina K, Nousiainen J, Perälä P, Saarinen K, Mikkola-Pusa J. 2009. Development of the ammonia emission inventory in Finland. Revised model for agriculture. The Finnish Environment 8, Helsinki 2009.