What does Kami suggest?

Kami suggests:

1. Use number of juveniles instead of juvenile proportion when testing for the effect of any variable on the age ratio of a flock.
2. The size of the flock should be assumed to be the strongest predictor of the number of juveniles in a flock, since flock sizes can increase by the addition of juveniles.
3. Following from above, use flock size as a fixed effect in any model, with the residual variance over and above that explained by the size of the flock left to be explained by the other variables.
4. Use smooth terms only for variables where the relationship cannot be tested using the data, for example with coordinates, and to smooth over as few variables as possible.
5. Use the lemming index as a categorical variable.
6. Use trend surface analysis to account for spatial auto-correlation in the data, since flocks could be found in the same position as in a previous observation.
7. Build a sequence of propositions and tests that use the full available data rather than thinning the data to a common minimum.

Hypotheses

There are five related hypotheses.

- Hypothesis 1: Families with more juveniles are found in the west.
- Hypothesis 2: Families with more juveniles are found in smaller flocks.

- Hypothesis 3: Family size decreases over the winter.
- Hypothesis 4: Flock sizes are lower in the west.
- Hypothesis 5: Larger flocks have more families.
- Hypothesis 6: The numbers of juveniles in flocks are higher later in winter.

Data to test

1. Hypothesis 1:

   - Family size data from Kees: 51,000 families with coordinates.
   - Individual level data from geese.org: 12,500 marked individuals with coordinates and family sizes, family identity as a random effect possible.

2. Hypothesis 2:

   - Family size data from Kees: above.

3. Hypothesis 3:

   - Family size data from Kees: above.
   - Individual data from geese.org: above.
   - Movebank data: 13 families.

4. Hypothesis 4:

   - Flock size data from Kees: 7,000 flocks with coordinates.

5. Hypothesis 5:

   - Flock size data with family counts from Kees: 1,800 flocks with families counted.

Testable prediction

If hypotheses 1 and 5 are true, and if hypothesis 2 is false, then:

The numbers of juveniles in a flock – after accounting for the size of the flock, the time since the start of winter, and the level of summer predation – should be

larger in the west. This would form part of the test of hypothesis 6, and the flock size data would be used.