The goal of this document is to provide explanation about the choices that were made for the implementation of SwissFarmingSimulation:

The emission

What are the types of emission we are gonna focus on, and how they are produced

- Methane (Ch4)
  - Mainly produced by animal digestion (dairy cows). The **enteric fermentation**
- Ammonia (NH3)
  - Produced by animal dejection

Thus for the moment we model:

- The methane as a function of the number of cows. Consider each cow produces approximatly 300g of Methane everyday Source: https://www.reflexions.uliege.be/cms/c_344493/fr/plein-gaz-sur-les-bovins?part=1 + https://www.agrireseau.net/agroenvironnement/documents/chouinard.pdf + https://fr.wikipedia.org/wiki/Fermentation_ent%C3%A9rique#Emissions_selon_les_esp%C3%A8ces (mean of the 3)

https://reporterre.net/Climat-l-agriculture-est-la-source#:~:text=L'agriculture%20%C3%A9met%20deux%20pri
Shows the origin of emissions of methane, the **enteric fermentation** is the main one that's why we only focus on this one for the moment. But other sources should be included in next milestones.

- The ammonia as a function of the number of cows. Consider each cow produces approximatly 18k of NH3 per year = 5g everyday https://fr.wikipedia.org/wiki/Ammoniac#:~:text=ont%20estim%C3%A9%20que%20dans%20les,%C3%A0

Assumptions

We have made assumptions to simplify the model for a first milestone. These assumptions are points that could be implemented in the futurs milestones if the data needed to implement them is available:
- Enteric fermentation is the main sources
- The methane produces by each cow depends on other parameters, like diet of cows, medication injections
- The methane and ammonia production may not be constant (more production in winter or whatever), but at the moment we assumed constant production
- All farms uses the same fertilizer, pesticides
- Ammonia is also produced by spreading of nitrogen fertilizer, but data about how many per ha is missing right now. https://www.ademe.fr/sites/default/files/assets/documents/Etude_Particules_ could be worth a look
- The nitrous oxide (N2O) should be taken into account (big part of pollution emitted in agricultur). But didn't find any data on how many is produced per tons of fertilizer/ha spreaded so unusable at the moment.

- Mainly procuded by spreading of livestock manure (animal dejection) and nitrogen fertiliser on crops