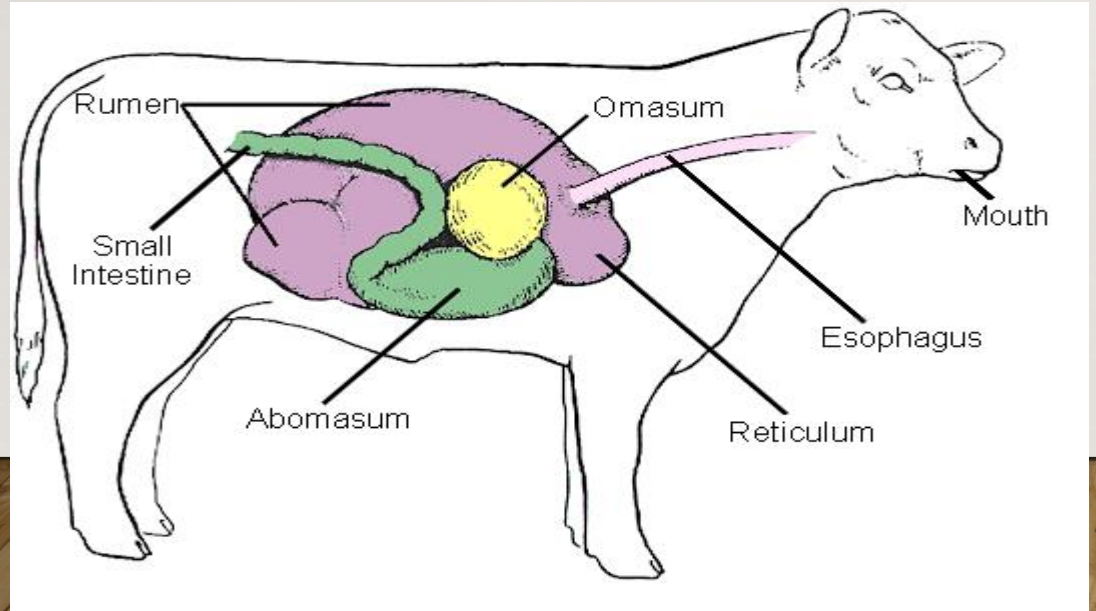
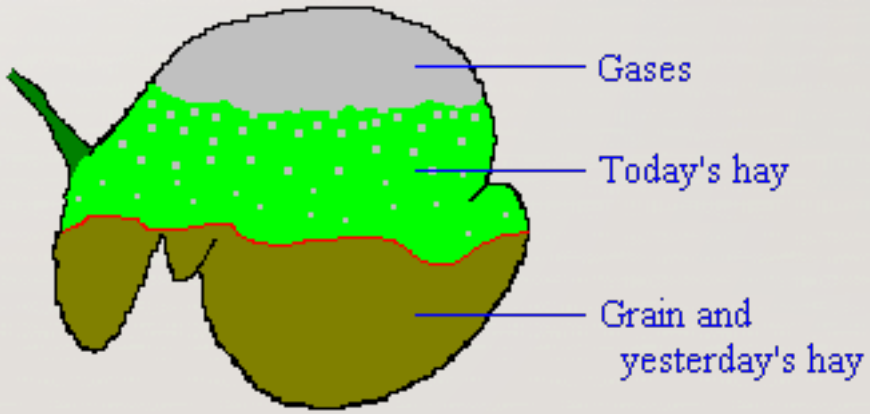
ANALYSIS OF REDUCTION METHANE RELEASE FROM RUMINANT ANIMALS

MAINLY COWS AND SHEEP IN NEW ZEALAND

PRODUCTION OF METHANE

- Ruminants stomach has four chambers: reticulum, **rumen**, omasum and abomasum
- Rumen is where the fermentation by bacteria, protozoa and fungi takes place
- Methanogens combine hydrogen and carbon dioxide to form Methane.
- 85% come out through mouth and nose by belching, rest from another end





METHANE

- Sheep produce about 30 liters of methane per day
- Cow could be up to 200

Component	Average percent
Hydrogen	0.2
Oxygen	0.5
Nitrogen	7.0
Methane	26.8
Carbon dioxide	65.5

DIETARY STRATEGY 1

- Manipulating nutrient composition of the diet
- Increase concentration of grains to reduce protozoa population, alter acetate, reducing Methane
- Shortcome: proportion of concentrates in diet may be over 50%, economic consequences (limited in many cattle production system)

DIETARY STRATEGY 11

- Selection of plants with secondary compounds
- Temperate legumes *Mediaroom coronarium*, *Lespedeza cuneata*, *Lotus corniculatus* and *L. uliginosus*) and Tropical legumes (*Calliandra calothyrsus, Flemingia macrophylla*) with secondary compounds such as condensed tannins
- CT is toxic for protozoa, fiber degrading and methanogenic archaea
- Constrained by the area sown each year in livestock production regions

DIETARY STRATEGY III

- Oil
- Reduction in methane appears to be result inhibition of microbial flora protozoa
- 27% of reduction in methane
- Not sure if the reduction is long or short term
- Effect of oil is not well defined

IONOPHORES

- Monensin are antimicrobials change bacterial species in rumen, decrease in protozoa
- Increase feed conversion efficiency and reduced amount of CH_4 produced per unit of dry matter consumed
- Reduction range are really wide from different studies
- Long-term effect is not sure

PROBIOTICS

- Microbial feed additives to improve animal productivity
- A potential technology to reduce methane
- Directly reduce CH_4 in vitro, results not consistent
- Suitable for all production
- Limited utility to reduce CH_4

ORGANIC ACIDS

- Increase propionate (VFA, carbon dioxide and hydrogen) to reduce hydrogen production
- Less is available for conversion to CH_4
- Only vitro results
- High cost

HALOGENATED COMPOUNDS

- Chemical products such as bromochloromethane to reduce CH_4
- Reduce output by 54% when fed twice daily
- Short term
- Potentially toxic to ruminants and human

ANIMAL BREEDING AND SELECTION

- Some breeds have lower CH_4 emissions per unit of intake
- Example, cow from Northern Hemisphere produced 15% CH_4/kg than cows from New Zealand

IMMUNIZATION

- Vaccine to improve animal performance by invoking an immune response in the rumen to protozoa and methanogens
- Reduction by 11-23%
- Still developing

GENETIC TRANSFORMATION OF BACTERIA

- Altering the fermentation characteristics of rumen microorganisms
- Very early stage, need more explore
- Acceptance by producer is debatable

CONCLUSION

- No simple solution
- Oil, organic acids and antibiotics-high cost and short term
- Selection of animal breeds, selection of high quality forages and forage with secondary compound(CT) are options for now
- More research needed for probiotics, genetic transformation of bacteria and vaccine in the future