Fertigation FAQs

- **How does fertigation/liquid fertiliser work in the Regenerative Agriculture space? Impact on soil structure etc**

  Fine particle nutrients are often used in conjunction with humates in 'regen' agriculture. There is a lot of research which outlines that nutrient applied via fine particle or slurry (tow and fert) will have the same pasture production when applied at the same rate as a solid fertilsier. Therefore the application of nutrients on the soil when/as required for plant production would be considered the same for both chemical and non-chemical nutrients.

What is the difference between Foliar Fertiliser and Fertigation?

- **Considering: growth rates, plant nutrient uptake, macro, and micro nutrients and when/why each method could be utilised.**

Foliar Fertiliser

- Product is applied directly to the leaf of the plant, and uptake is via the microscopic pores (stomata) on the underside of the leaf. It has the potential to reduce nitrogen loses when compared to soil-based application.
- Foliar application can be absorbed very rapidly; studies show that 30-40% of the nitrogen applied can be found in the plant within a few hours on ryegrass.
- Application rates of nitrogen are typically low 1-2% N content to avoid the risk of leaf scorch while meeting the immediate deficiencies of the plant.
- For other Macro and micro nutrients there are products on the market currently that have water soluble forms of macronutrients and chelated trace elements. They are often used in high value agriculture crops such as fruit orchards, seed crops, flowers, and high value grain crops.
- They are designed to address deficiencies within the crop's life cycle that either have not been supplied (pre-application to the soil via solid fertiliser) or unable to be uptake from the soil (pH can impact the uptake of some nutrients) or are required at certain points such as fruiting in specific levels where foliar application can ensure needs are met then and now.

- Due to both the cost and potential harm foliar application is typical done alongside foliar/leaf nutrient level testing.

	Granular N	Fine particle N	Liquid N
Soluble solid N (e.g. urea)...	...in its original form	...finely ground into particles and suspended in water	...fully dissolved in water
Application	Spread (ground or aerial)	Sprayed (ground or aerial)	Sprayed (ground or aerial) Fertigation (applied with irrigation water)
Claimed to...	...produce a similar pasture response to other N application methods	...increase pasture response (compared to granular N) by: • distributing nutrients (N) more evenly • increasing leaf uptake • reducing losses via leaching and volatilisation	
Claims backed by science?	✓[1]	✗[1]	✓[1] and ✗[1]
	A 2018 review of all know available research comparing fine particle and granular N found insufficient experimental evidence to show any agronomic advantage of fine particle over a granular fertiliser product[1]		✓ Distributes N more evenly ✗ Does not increase pasture nitrogen efficiency[1] A 2018 review found liquid N had no significant pasture response efficiency gains compared to granular N[1]
Science says pasture response is...	-	similar to granular N[2] ≈	similar to granular N[1] ≈
Other pros (+)	Can apply other nutrients alongside N	Can apply other additives or multiple nutrients	Convenience of applying with irrigation Can be applied with gibberellic acid Fertigation distributes nutrients evenly
Other cons (−)	Possible compatibility issues if mixing with incompatible products	Application costs may be higher May take longer to apply	If high N concentration or applied in heat of day, can scorch leaves and reduce yield

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Fertigation

- Product is typically applied via irrigation, so the product is not specifically targeted at landing on the foliage of the plant.
- Soil application of liquid nitrogen can have a higher percentage of N when compared to foliar, but still has a risk of volatilisation if not enough water/rain is applied post fertigation.
- There can still be a risk of leaf scorch depending on the % of nitrogen and if the environment conditions are too hot/humid.

- Other macro and micro nutrients other than nitrogen can be utilised for pastoral fertigation, but they are often at a higher cost and lower rate so currently would not replace pre-sowing fertilisers that are designed to correct soil tests such as lifting Olsen P, potassium, and sulphur levels.
- Fertigation is typically used for a single nutrient (e.g. Nitrogen) within a mixed farming or pastoral system where the rate can be altered as required via the spray mechanism.

Plant uptake

- The plant can take up urea, ammonium, and nitrate. Once in the soil both urea and ammonium are converted to nitrate by soil bacteria, and for foliage urea is more rapidly taken up due to its negatively charged ions, but both ammonium and nitrate can enter via the leaf stomata.

- **How does fertigation work for other enterprises that are not solely pasture based? Forage crops and arable situations.**

- Like mentioned above often higher value crops have smaller tolerances for nutrient deficiencies which can include some arable crops. Often arable and forage crops are receiving insecticides or herbicides during their growth cycle, so there Is an increased opportunity to add water soluble nutrients to these tank mixes if the method of spray and tank chemical make up allows for it and the timing will help to correct deficiencies.
- Care would need to be taken to ensure any nutrients applied within a mixed farming situation are not detrimental to a crop that the pivot would go over next, and that the pivot is flushed if this is the case. Some crops are sensitive to forms of fertiliser such as chlorides for example with potatoes and some seed crops.
- Do your homework. Boron is a key nutrient required for bulb formation in bulb forage crops and research has shown that application earlier in crop growth is more beneficial rather than corrective once a deficiency has been found.