



## TRIPLOIDS VS DIPLOIDS

- In simple terms, a triploid fish is merely a fish that is sterile. Triploidy occurs naturally in wild populations due to environmental changes (usually water temperature fluctuations).
- The production reason for using triploids in aquaculture is that they are sterile and loss of fish performance due to early maturation can be minimised (i.e., we don't want the fish to mature when they are too small for harvest).
- Across the Tasmanian salmonid industry, triploids are used to bridge the harvest gap between year classes to ensure continuous supply to the market.
- Triploid fish have three sets of chromosomes, compared to the more usual diploid fish with two sets of chromosomes.
- Triploidy isn't limited to salmon, trout, or even to fish. Bananas, a fruit we eat without seeds, are triploids.
- Triploid fish (and other triploid animals) are not genetically-modified organisms (GMOs) as no genetic material has been altered; at Huon, pressure treatment is used at a certain point in the fertilisation process.

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### WHAT ARE TRIPLOIDS & WHY USED?

The production reason for using triploids in aquaculture is that they are sterile and loss of fish performance due to early maturation can be minimised (i.e., we don't want the fish to mature when they are too small for harvest).

Since the 1990's across the Tasmanian salmon and trout industry, triploids have been used to bridge the harvest gap between year classes to ensure continuous supply of the desired fish size to the market all year round.

Triploid fish have three sets of chromosomes, compared to the more usual two set fish, called diploids. Having three sets of chromosomes instead of the two renders these fish infertile. Visually, triploid fish are identical to diploid fish.

Triploidy isn't limited to salmonid production, or even to fish. Bananas, a fruit we eat without seeds, are triploids. Triploidy is also used across other aquaculture industries including oyster and tilapia farmers. Triploidy does occur naturally in wild populations (of fish, animals, vegetables and fruit) due to environmental changes (usually water temperature fluctuations).

Triploid fish (and other triploid animals) are not genetically-modified organisms (GMOs); rather they are hybrid fish. In GMOs, genetic material has actually been altered, often by introducing desired traits from other organisms' DNA. In the case of triploids, no genetic material has been engineered. There is simply an extra set of the existing genetic material, causing infertility.



Triploid salmonids are more susceptible to amoebic gill disease found in full strength seawater, so we only farm triploids (both salmon and trout) in Macquarie Harbour (which has a surface layer of freshwater that keeps the amoeba away).

The triploidy process causes an egg to retain a chromosome it would normally expel. In normal fertilization, after an egg and sperm combine, one chromosome is kicked out, leaving either XX (female) or XY (male) chromosomes behind. If the extra chromosome is retained, the offspring will either be XXX (triploid female) or XXY (triploid male).

There are several ways to cause a chromosome to be retained. Two of the most common ways are heat or pressure treatment. Generally, for salmonids, pressure treatment is more reliable, where the fertilised egg is given enough time to produce the polar body with the third chromosome, ready to be expelled. Before it can separate out, the egg is subjected to pressure that causes the polar body to remain (generally 5 minutes' pressure exposure, 30 minutes after egg fertilisation).

