

## Plain English summary

The Sydney Rock Oyster (SRO) Breeding Program is an important tool to safeguard the future of the oyster industry and help realise its full potential. The program has already shown that breeding can produce oysters that grow faster and survive better under a disease challenge. However, our technical review found that the program is not yet delivering its full potential to SRO farmers.

With appropriate change, the program can become a powerful partnership that provides farmers with reliable and high-performing spat, builds industry resilience to new challenges, and supports growth and profitability.

### How does breeding work?

In the lab, breeders select the 'best' oysters from previous generations or take new oysters from the wild. Pairs of male and female oysters are mated together to produce many families where all the oysters in a family are brothers or sisters.

Once the families have been reared through their challenging larval (swimming) phase, they are transferred as spat to farms where they grow under commercial conditions. The spat are measured and their survival is monitored, and the best-performing families are selected as the next breeding generation. The new and 'improved' generation is used as hatchery broodstock for commercial spat production.

What traits or attributes determine the best family? Breeders generally target traits that are economically valuable and heritable – more nature (genetic) than nurture (environment). For example, a trait like eye colour is heritable (and breedable). Traits may be genetically correlated and 'work together' like shell size and meat weight – if you breed for one, you get the other for 'free'. When traits are negatively correlated, like shell growth and meat condition, breeders have to be careful not to breed for one at the expense of the other.

### Why the program matters

- Oyster farmers face tough conditions. QX disease, low-salinity events, pollution and climate change all threaten oyster production.
- Selective breeding works. The program has proven it can lift oyster growth and survival. There are long-term, year-on-year, cumulative benefits to productivity.
- Program benefits must meet the needs of farmers and be visible. Farmers can only receive value from the program if improved stock reliably reaches hatcheries and farms. Currently, industry engagement and an effective supply chain are lacking.

## Key problems limiting the program

- Family production is unreliable. Too many families are lost in the hatchery, which makes it difficult to breed the best families. This limits the options for commercial supply and creates extra work.
- Objectives need refreshing. The old targets (70% QX survival, 30% faster growth, no loss of condition) don't reflect the needs of all the farmers in the different regions. Resilience across multiple challenges is becoming more relevant.
- Breeding program researchers are overburdened. The researchers face too much on-farm work, which stretches resources and misses an opportunity for industry engagement.
- Deployment is uneven. Not all farmers or hatcheries get access to improved stock when they need it. There is little traceability from broodstock to farm, so it's hard to know if spat are performing well because of their genetics or for other reasons.
- Governance is fragmented. The NSW DPIRD is seen as responsible for everything, leading to blame when things go wrong, stretched resources and limited buy-in from industry.

## What needs to change

- Modernise family production. Evaluate improved hatchery systems (e.g. flow-through larval tanks) to lift reliability and ensure all families are available for deployment. This change will also free up resources.
- Refresh breeding goals. Move beyond simple resistance to embrace resilience – survival + growth + condition under real farm conditions. The program direction should be reviewed every year and the changes recorded.
- Shift the workload to industry. Farmers and hatcheries should take greater responsibility for running trials and managing broodstock, with NSW DPIRD providing training, data systems and oversight. NSW DPIRD can then focus on the science, and industry can experience family performance for themselves.
- Build a reliable deployment supply chain and create traceability. Ensure broodstock and spat are supplied in time and with a clear indication of genetic merit. A certification system would help end-users link genetic value to on-farm performance and establish their own value proposition.
- Build true partnership. Establish a co-leadership model between NSW DPIRD and industry (including hatcheries). Shared responsibility, transparency and co-investment are the foundation for long-term success.

## The choice ahead

- If nothing changes, funding, capability and trust will erode, with the risk that industry loses a vital tool for securing its future.
- With transformation, the 'lab-to-farm' program will deliver reliable genetic gain, empower farmers and hatcheries, attract new investment and provide insurance against future shocks.

The message is clear: the breeding program must shift from being 'DPI's program' to being everyone's program. Shared ownership and responsibility are the only way to unlock its full potential and secure the future of the SRO industry.