

Flipfarm System

The Flipfarm system was developed in New Zealand and is designed for sub tidal sites using longline technology adapted from New Zealand's Greenshell mussel industry. The system is semi-automated and the requirement to physically shake and turn baskets is eliminated. The oysters grow and feed in the nutrient rich surface waters and are periodically exposed to air by flipping the baskets onto the purpose-built floats secured to one side. This serves to control growth rates, harden the shells and minimise fouling. While grading can be done on the boat or back on land, the baskets remain on the line thus reducing the need for large storage areas.

25L Hexcyl Pro baskets are threaded onto a headrope or "backbone". The baskets have blow moulded floats, ranging in volume from 13 to 25L, secured on one side and the axle on the other side. The axle allows them to be flipped using the helicat, helix guide rails mounted within a catamaran, which is tied alongside the vessel (Figure 1). Numerous videos demonstrating the system are available on <https://www.flipfarm.co.nz/>.



Figure 1: Flipfarm service boat flipping baskets with the aid of the helicat, helix guiderails mounted on an aluminium catamaran structure.

In good conditions it is reported the boat can turn 5,000 baskets per hour with one skipper and one other crew member.

Materials & Structural Specification

Lines can be any length but are usually between 100 and 220m with roughly 3 baskets per metre. As an example, a 105m x 24mm polypropylene headrope or backbone will stock 270 baskets, a stopper rope at each end to keep the baskets in place followed by an 8m empty section for coming along side. The baskets are 25 litres in volume and come in a range of mesh sizes. They have an axle mounting plate which is reported to add significant strength at the point where the Flipfarm axle is attached. The axle allows the basket to rotate freely around the backbone.

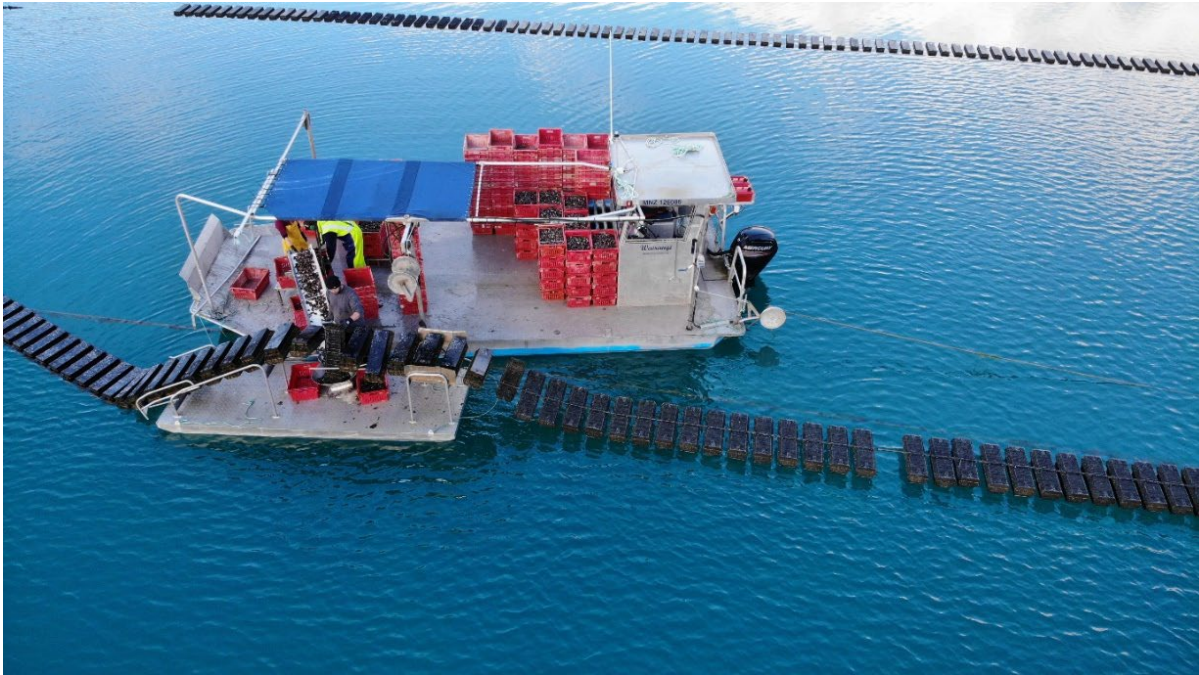


Figure 2: Oysters being harvested from a Flipfarm longline using a purpose-built harvesting platform or “shuttle hull”.

There are a number of different floats available, all of which are suited to the filling, emptying and flipping machinery. All of the floats are blow moulded, one made in China with a 12 litre volume and four in Australia (Figure 3) ranging from 13 litres up to 25 litres float. The “Easyflip” floats (17l and 20l) have more floatation at one end to facilitate the flipping and make sure the baskets stay in position. All bolts, screws and spacers are supplied for fitting the float to the basket.

		FLIPFARM 2023 COMPONENT OPTIONS			
13L STANDARD FLOAT 	17L EASYFLIP FLOAT 	20L EASYFLIP FLOAT 	25L HI VOLUME FLOAT 		
FLOAT SCREWS 	ALL COMPONENTS NOW AUSTRALIAN MADE 		AXLE TUBE WITH STAINLESS STEEL BACKERS AND RIVETS 		
www.flipfarm.co.nz					

Figure 3: Range of floats available.

Table 1: Materials required for the Flip farm system in New Zealand:

The prices below serve as a guideline only and are subject to change based on fluctuation in currency, material costs, and quantity.

Materials	Indicative Cost € Subject to currency fluctuation and raw material supplies
Baskets <ul style="list-style-type: none"> • 25l Hexcyl Pro Series basket 12.00 • 13l blow moulded float 11.43 • Plastic float attachment screws x 2 @ 0.28 0.56 • Plastic axle 3.20 • Axle backers (x2 @ 0.42) and axle screws (x4 @ 0.18) 1.56 Assembly tools <ul style="list-style-type: none"> • Assembly jig • Battery drills • Right angle battery wrench (for fitting Australian floats) • Battery drill bits • Bundle boards Price per basket unassembled*	28.75
Backbone or longline <ul style="list-style-type: none"> • 24mm polypropylene high abrasion backbone or headrope 162.04 • 14mm polypropylene hauling rope with plastic coated lead strands 193.33 • Concrete anchors OR • Wood anchoring poles where maximum site depth is 4m at Mean High Water Spring Tide • Plastic pole rings which allow the line to rise and fall during the tidal cycle 	
Cost per 1kg of 50g oysters stocked**	€5.02
Helicat with flipper***	5,242.52

* This price is pre-shipping, VAT & Duty. Baskets, floats and axles need to be assembled by the farmer.

** This does not include the vessel cost, the mooring systems required to allow for prevailing environmental conditions and tidal range, the harvesting gear or the cost of shipping and duty.

*** Flipfarm are currently looking into the possibility of leasing handling equipment including the helicat, stocking and harvesting platforms.

Variations from the main spec.

The axle for the baskets, floats and the helix are all key to the operation of the Flipfarm system. Both are patented so there are currently no variations on this system available on the market.

Reported lifespan

The FlipFarm system was officially launched in 2019 although it has been in operation continuously for 6 years on Marlborough Oysters site in the Marlborough Sounds. Since its launch certain components have been adapted to improve its degree of robustness under different environmental conditions but there is not enough information on its performance collected to date to comment on the systems lifespan.

However, Hexcyl baskets, which represent a significant percentage of the capital outlay, come with a 5-year guarantee and a reported life expectancy of 15 to 20 years and have been on the market considerably longer.

Site Specifications

A sheltered bay with good water exchange is essential.

Oysters stocked in the FlipFarm system in deepwater sites remain in the surface waters where the wave energy is highest throughout the tidal cycle. This means they are continuously tumbled, even when they are flipped for drying. A very sheltered site where the surface remains relatively flat in prevailing weather conditions will provide enough energy to produce the desired shape and meat content without the risk of stunting oyster growth.

In Ireland the tidal range varies from between 0.6m on parts of the southeast coast up to 4.5m on the west coast and can increase in range in sheltered bays and estuaries where most licensed oyster farms and longline culture farms are currently located. Even in the most sheltered bays sites will differ in depth, tidal range, current speeds and substrate type and all of these will need to be considered to ensure the correct anchoring system is used.

Recommended Method of Deployment

Numerous YouTube videos are provided on the FlipFarm website to guide the user in the assembly of the baskets and deployment of the line. <https://www.flipfarm.co.nz/>.

To assemble the baskets, a simple jig must first be constructed so that accurate positioning of the basket's axle and float is achieved. Once the baskets are assembled, they are fed onto the backbone.

The headrope or backbone can be between 50m and 200m in length and a further 8m is required at each end between the last basket and the anchor line float to allow space for the flipper or heli-cat to get onto the line.

The mooring system is site specific and will need to take into account depth, average wind and current speeds in the bay and substrate type. Concrete blocks with mooring rope attached directly to the block is the preferred option in New Zealand. In this case, it is recommended that anchor ropes are at least 24mm in diameter and that the length to depth ratio is 4:1 at high tide in sites with a tidal range above 1m. For the purposes of a trial it may be more appropriate to use steel anchors and chain for ease of retrieval at the end of the trial period.

Lines should be at least 5m apart to facilitate manoeuvring a workboat between them.

Recommended Stocking Densities

- G6 at 600 - 1000 per 5mm mesh basket
- 35g oysters at 120 - 150 oysters per 10mm mesh basket
- 50g oysters at 60 – 100 oysters per 15 – 20mm mesh basket.

Potential yield per hectare

This is a guideline only. Every site is different. Line length will depend on the shape, depth and bottom type of your licenced site. The distance between lines and the stocking density per basket may vary depending on the productivity and energy of the site. These factors will only be determined following a comprehensive analysis of the site AND growth trials.

A number of assumptions have been made in estimating the potential yield per hectare:

- the area is 200m x 50m.
- mean depth at high spring tide is 10m therefore anchor lines must be 40m in length.
- each line is 105m long and holds 270 baskets.
- the lines are 5m apart.
- An acceptable mortality rate of 20% over one growing season may occur.

Table 2: Potential return per hectare

Growth	# Baskets/Ha	Stocking Density/bag	Normal mortality rate for one growing season	Potential Return after one season
35g to 50g	2,700	150	20%	16 tonnes
50g to 85g	2,700	100	20%	18 tonnes

By comparison, in the case of a typical inter-tidal 6 bag trestle farm, one hectare laid out in double rows with 5m tractor corridors between them will potentially return 28 tonnes of 50g oysters or 31 tonnes of 85g oysters because of the greater underwater footprint required for a longline to allow for moorings.

Environmental Considerations

The baskets remain on site, threaded onto the headrope, for their lifetime or the lifetime of the operation. This eliminates the requirement for clips and rubber bands or cable ties, all of which present a high risk to the environment as marine litter.

The lines and baskets are continuously visible with 130mm above the waterline when empty, reducing by approximately 5mm for every kilo of oysters in the basket. The visual impact is not significant but will need to be considered in environmentally sensitive areas.

<p>STRENGTHS</p> <ul style="list-style-type: none"> • Optimises the shape and meat content potential from a given site. • Labour costs are significantly reduced. • Work is considerably less strenuous which widens the available labour market. • Oysters are continuously feeding in optimal conditions within the top metre of the water column. • Baskets remain on the line so there is no need for large storage areas on land. • The baskets are tried and tested and the result of over 25 years of innovation. • The requirement for rubber bands, cable ties and hooks which are a major source of marine litter is eliminated. • You tube videos of each stage of husbandry are provided. 	<p>WEAKNESSES</p> <ul style="list-style-type: none"> • High capital investment required. • Equipment must be shipped from Australia or New Zealand thus incurring additional duty and shipping costs. • There is limited documented evidence of success because it has not been fully tested in areas where the same tidal ranges are experienced. • Assembly of the farm infrastructure is technical and time-consuming. • Operating from a vessel requires a different skill set to operating from a tractor and additional costs in order to comply with marine safety standards.
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • The system offers potential to develop new sites for farming oysters. • New markets for farmers may open based on the potential to increase meat yield and improve oyster shape. • The system is continuously being finetuned and modified by the owners of Flip farm to suit a wider range of sites and environmental conditions. • There is scope for further mechanising husbandry and reducing cost of production 	<p>THREATS</p> <ul style="list-style-type: none"> • The system is not yet proven for Irish conditions. • Oysters are grown in the top layer of the water column which will increase the risk of biofouling. • The degree of agitation of oysters due to wave action in the surface waters may result in additional stress and stunt growth. • Prolonged poor weather conditions may result in baskets not being flipped often enough to control fouling and maintain quality.