

Adjustable Longline System

The adjustable long-line system was developed in Australia where it has become the dominant intertidal oyster farming system in the major growing areas. It has seen a lot of success enabling farmers to become more efficient and produce consistently higher quality oysters for domestic and international markets. In Ireland, the first adjustable longline system, supplied by BST Oyster Supplies, was trialled around 2003. Since then, other Australian manufacturers have come on the market, including SEAPA, Hexcyl and Zapco each of whom has European distributors. NodusFactory Aquaculture based in France also offers a range of swinging baskets and other components for use on adjustable longline systems.

For the purposes of this report the material and structural specifications, reported life span, recommended stocking densities and estimated yield per hectare provided refer to Hexcyl technology. This is because much of the information was sourced from an Irish site where Hexcyl components had been used to set up an inter-tidal adjustable longline farm.

Below you will also find images of other baskets, floats and clips along with links to each company website for further information.



Figure 1: Hexcyl adjustable longline farm, Australia (image courtesy of Hexcyl Pty)



Figure 2: Section of adjustable longline unit on a site in Ireland

Materials and structural specifications

Table 1: Materials required for adjustable longline system

Materials and Specifications	Cost € Guideline only
<p>Longline:</p> <ul style="list-style-type: none"> • Wooden strainer posts: 4 x 2.5m x 22.5cm diameter driven into the seabed at an angle • Plastic or pressure treated pine posts: 34 x 2.5m x 10cm diameter per line driven into the seabed at 3m intervals • Hexcyl Pro Post riser clip: 68 per line (34 if you don't plan to adjust the height of your line during the growth cycle) • Stainless steel screws: 136 per line (68 if you don't plan on adjusting the height of your line during the growth cycle) • Vexcyl line: 5.5mm diameter x 110m (3% tensioned) per line • Hexcyl UV resistant LDPE Protective tube: 10.8mm diameter x 100m per line 	<p style="text-align: right;">20.00</p> <p style="text-align: right;">16.00</p> <p style="text-align: center;">-</p> <p style="text-align: center;">-</p> <p style="text-align: right;">250.00</p> <p style="text-align: center;">-</p>
<p>Baskets and accessories per basket:</p> <ul style="list-style-type: none"> • Hexcyl baskets 25L volume: 73.2cm long x 27cm wide x 14cm deep x 99 per line. Made from "Ultra high impact Resistant", UV stable, food grade, virgin plastic • Hexcyl Pro Universal suspension clips: 198 per line. These are made from the same material as the baskets. 	<p style="text-align: right;">17.00</p> <p style="text-align: center;">-</p>
<p>Material costs per kilo of 50g oysters stocked</p>	<p style="text-align: right;">€8.61</p>

Hexcyl baskets are produced in a range of mesh sizes from 3mm to 20mm. The 15mm basket comes in 2 different volumes: 20L and 31L. There are 4 different clips available: one to fit the standard Hexcyl spec as above, three to suit other brand baskets and other brand lines.



Figure 3: Hexcyl basket clipped onto tensioned line

BST, Seapa, Zapco Aquaculture and NodusFactory all manufacture and supply their own ranges of baskets, clips, floats and lines.



Figure 4: Seapa Basket clipped onto modified trestle www.seapa.com.au



Figure 5: Zapco basket suspended using stainless steel hooks from a tensioned line www.zapcoaquaculture.com



Figure 6: BST oyster basket and clip suspended on Bayco wire www.bstoysters.com

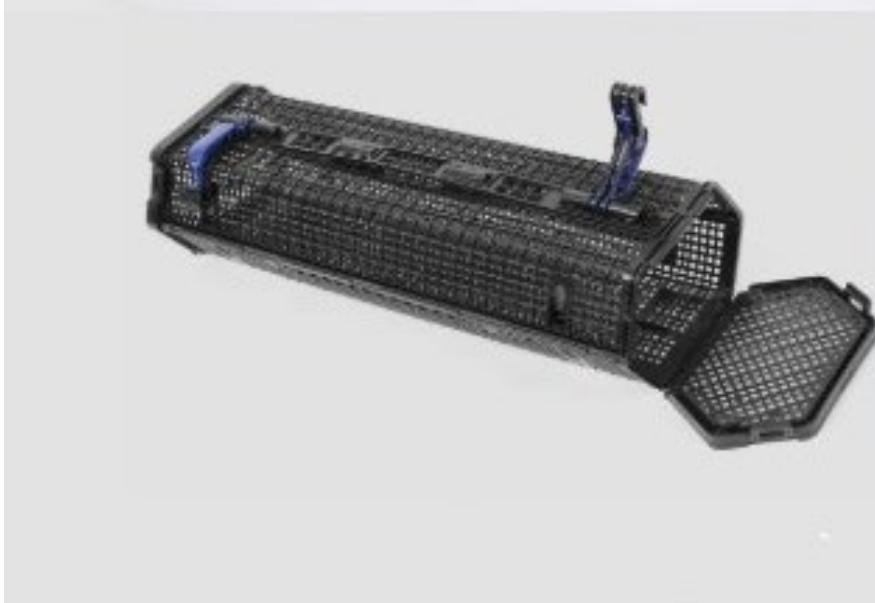


Figure 7: Aquapurse basket and clip www.nodusfactory-ostrea.com

Through trial and error it has become clear that the addition of a float to each basket system is essential to be guaranteed the oysters receive enough tumbling for optimal shape and meat quality. Purpose designed floats are provided by all the manufacturers listed in this report. Generic cylindrical HDPE floats are also widely available from shellfish farming equipment suppliers and can be attached to any basket using cable ties. The 2 most common and widely available HDPE floats come in either 81.3cm or 60cm in length, 8.9cm or 8.8cm in diameter and both with a 3mm thick wall.



Figure 8: Zapco basket with modular floats, one at either end of the basket



Figure 9: cylindrical HDPE float cable tied to a Hexcyl basket

Recommended Method of Deployment

Longlines are generally deployed in “Quads”, blocks of 4 x 100m lines, supported every 3m by a riser post with each pair of lines tensioned at either end by a wooden strainer post. They must be deployed perpendicular to the prevailing wind or tide, whichever is the strongest, to maximise the movement of the baskets and the impact of current and wave action.

There are numerous You Tube videos from Hexcyl, Seapa and BST on how to deploy the adjustable longline. Instructional videos on basket assembly are also provided on all the manufacturers websites.

https://www.youtube.com/watch?v=Mpg_RjWivg

https://www.youtube.com/watch?v=wJF_9XXSOYk

Site Specifications

The site should have flat sandy ground suitable for driving posts into. Although the adjustable longline system has evolved considerably over the last 20 to 30 years to develop more robust clips, baskets and fence risers and stronger lines with protective covers, a sheltered shoreline is recommended.

Reported lifespan

Hexcyl offers a 5 year warranty on its baskets which are reported to have a serviceable life of 15 to 20 years

Recommended Stocking Densities

Although baskets are fixed volume they are smaller than traditional oyster mesh bags and therefore stocking densities need to be reduced to ensure the oysters have enough space to get the full tumbling effect.

- G2 seed at 1,000 – 3,000 per 3mm mesh basket lined with a 1mm sock
- G6 at 300 – 500 per 5mm mesh basket
- 35g oysters at a maximum of 120 oysters per 10mm mesh basket
- 50g oysters at a maximum of 60 oysters per 15 – 20mm mesh basket.



Figure 9: oysters inside a Hexcyl basket

It is advisable to discuss stocking densities with the different manufacturers and also take into account the degree of exposure of your site.

Potential yield per hectare

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

- The area is 100m x 100m
- The lines are laid out in quads, 2.1m in total width and total length is 100m
- Each line is 90m long and holds 90 baskets
- There is a 5m tractor corridor between each quad
- 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	5,040	150	20%	30 tonnes
50g to 85g	5,040	60	20%	20 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 lower stocking densities required.

Environmental considerations

There are numerous suppliers worldwide of baskets, clips and floats. Some baskets are more robust than others. The degree of exposure of a site needs to be considered carefully when choosing the equipment. Cheaper baskets and plastic clips are generally weaker and will be more susceptible to breaking resulting in equipment failure and marine littering.

Adjustable longline systems are generally visible for slightly longer periods of the tide than the standard bag and trestle system which may be an issue in some environmentally sensitive areas.

The greatly reduced labour requirements with this system means there will be less human activity on the shore and less risk of disturbance of fauna.

Finally, it is generally accepted that the replacement of physical shaking of bags to promote optimal shell shape and meat content with a gentler constant tumbling effect is less stressful on oysters and makes them more resilient against the *Vibrio* outbreaks linked with mortality events in Ireland.

<p>STRENGTHS</p> <ul style="list-style-type: none"> • Labour costs are reduced due to removal of requirement to turn and shake bags • Baskets are available in a range of mesh sizes so oysters can be farmed from seed through to market in the system • With correct stocking densities the oysters produced will have a higher meat yield and better shape than that achieved in bag and trestle. • When used in the right site following manufacturers guidelines the system can produce 85% Speciales • The oysters tend to be more robust with a longer shelf life • The system enables the farmer to set the height of his/her baskets to be more accessible to any workforce regardless of physical strength • The option to adjust the height of the line by raising or lowering it to another row of post riser hooks allows for optimisation of feeding and conditioning and control of fouling organisms • The baskets are stackable, easily retrieved, emptied, refilled and deployed. • System is supported by established innovation and use for 25 years 	<p>WEAKNESSES</p> <ul style="list-style-type: none"> • High capital investment required • Initial deployment of farm infrastructure is more technical and time consuming than bags and trestles. • Posts may not always stay in place on a site – particularly on initial deployment • The posts and baskets are more susceptible to hard fouling organisms than oyster bags and this must be monitored and controlled • The baskets take up a lot of space in storage and transport • Equipment must be imported from Australia in bulk. • Based on historical trials from early 2000's the adjustable longline system is not considered suitable for exposed inter-tidal sites.
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • The improved quality of the oysters opens markets to farmers. • Because turning and shaking is eliminated employers may find recruitment easier • The system can be deployed in deeper sites while still availing of similar exposure times due to the height of the baskets 	<p>THREATS</p> <ul style="list-style-type: none"> • Where hard fouling is a feature in a Bay, baskets, floats, clips and fence risers may become encrusted, reducing the systems efficiency • The system has not been tried on a commercial scale in Ireland • There may be an issue with visual impact in some Bays due to the height of the system.