

附件四、技術說明表



鰻魚高成長浮性膏狀飼料

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研究領域： 鰻魚資源生態與管理、鰻魚繁殖、鰻魚保健食品開發

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市場及需求：

日本鰻 (*Anguilla japonica*) 為東亞地區重要之高經濟水產養殖物種。飼料及鰻苗是鰻魚養殖業佔比最大之兩個成本，養殖戶常以絲蚯蚓或鰻粉當做鰻苗開口飼料，但前者易帶入病原菌而後者水中散失性極高容易污染水質，皆導致鰻苗大量折損。而浮性顆粒飼料相較前兩種沉性飼料，雖然易於觀察進食狀況及方便撈除殘餌，但最小粒徑仍大於鰻苗可攝食大小。故日本在 1984 年即開始以沉性膏狀飼料作為鰻苗餌料，目前則完全以沉性膏狀飼料取代絲蚯蚓。臺灣數年前有業者自日本進口沉性膏狀飼料，但售價極高 (1200 元/公斤)，並不符合養殖成本。儘管水試所已經有研發出本土沉性膏狀飼料但其誘食性及水中穩定性仍尚待改良，目前並無法走出實驗室規模進入實際養殖。因此，開發兼具沉性膏狀飼料之高穩定性與適口性，以及浮性顆粒飼料之易觀察性之新型浮性膏狀飼料，具有市場利基，極匹配近年政府推廣之漁電共生循環水養殖系統。可以提升鰻苗育成率，且也符合目前魚電共生循環水系統之發展趨勢。

技術摘要(含成果)：

目前本研究團隊已經開發出一種以魚肉、頭足類及節肢動物作為主原料，輔以魚粉及營養添加劑，並透過特殊交聯劑及低溫播潰製程，研製完成一對鰻魚具有強烈誘食性且水中穩定性高之浮性膏狀飼料。並經過分析檢驗無攜帶任何病原菌。另外其預定售價僅僅為日本製沉性膏狀飼料之 1/4 且原料可以穩定取得，易於標準化大量生產供應，極具市場競爭力。本研究團隊亦已在室內循環水養殖系統養殖池中對鰻苗及成鰻實際測試過本飼料之適用性，其並不會如鰻粉飼料易滋生生物絮團，導致堵塞系統之過濾器，並且相對於傳統沉性膏狀飼料更易於觀察與清除。最後餵食本飼料之鰻魚體內皆未驗出外來病原菌且進食成長表現比傳統飼料組更為良好。

優勢：

本飼料在成本 (100-200 元/kg) 上與傳統絲蚯蚓 (180-200 元/kg) 相比差異不大，並且明顯便宜於日本製膏狀飼料。本浮性膏狀飼料可大量製造，供貨穩定且易於低溫長期儲存，而絲蚯蚓需仰賴人工採捕活體且僅能保存數天，本飼料更檢測不出病原菌，將有助於大幅提升養殖育成率。比起浮性顆粒飼料，本飼料更可以隨著養殖不同階段，可以彈性添加如益生菌等添加劑，更易於鰻苗攝取。而近年政策推廣漁電共生，與其搭配之室內循環水系統為一封閉式系統，若有外來病原菌容易造成整廠崩潰，並且傳統鰻粉的高散失性容易滋生生物絮團導致循環水系統之物理過濾器超載。而本浮性膏狀飼料經實測，並無兩者之問題，足以顯見其能完美搭配未來之養殖趨勢。另外相比水試所及日本之沉性膏狀飼料，本飼料經過特殊製程改良使之成為浮性飼料，相較於傳統沉性膏狀飼料，本浮性膏狀飼料更易於觀察與清除，並更有利於未來自動化監測及餵食系統的開發，且可以更廣泛適用於除鰻魚外之不同養殖物種。

競爭產品：

日本製沉性膏狀飼料、鰻粉、絲蚯蚓

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High growth rate float-type eel paste feed

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Experience:

Eel population structure and biogeography; Eel resource dynamics and conservation; Eel artificial propagation; Eel aquaculture; Recirculating aquaculture system

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Market Needs:

Japanese eel (*Anguilla japonica*) is an important high-economic aquaculture species in East Asia. Feed and elver are the two largest costs in the eel aquaculture industry. Farmers often use bloodworms or eel powder as feed for elvers, but the former is easy to carry pathogenic bacteria and parasites, and the latter is easily dissipated in water and pollutes the water quality. Compared with the previous two sink-type feeds, the floating pellets is easier to observe the feeding status of the fish and easier to remove the residual, but its minimal size is still too large to be eaten by elvers and cannot be flexibly added with additives. In 1984, Japan began to use sink-type paste feed as elver bait, and currently it completely replaces the bloodworm. As for Taiwan, farmers also imported paste feed from Japan, but the price was extremely high (1200 NTD/kg). Although the fisheries research institute of Taiwan has developed a sink-type paste feed, its attractivity and water stability still need to be improved. In addition, the high stability and easy observation of the float-type paste feed are also in line with the fish-electricity symbiosis circulating aquaculture system promoted by the government in recent years. Therefore, it is extremely important to develop a suitable new type paste feed to increase the breeding rate of glass eel, which can also conform to the current trend of the fish-electricity symbiosis circulating water system.

Our Technology:

At present, our team has developed a float-type eel paste feed which composed of fish meat, cephalopods and arthropods as the main raw materials, supplemented by fish meal and nutritional additives, a special combiner, and go through low-temperature mixing process. Our float-type paste feed show high stability in water and strong attractive for eel. Also, after analysis it does not carry any pathogen. In addition, its predetermined price is only 1/4 of the Japan paste feed, and the raw materials could be obtained stably, which is easy for mass production. Our team has also tested the applicability of this feed on glass eel in the indoor recirculating aquaculture system (RAS), and found that there was no bio-floc observed, which will block the filter of the RAS when feeding with eel powder. Moreover, no foreign pathogen have been detected in all eels with good growth performance and feeding behaviors.

Strength:

The cost of our paste feed (100-200 NTD/kg) is not much different from the bloodworm (180-200 NTD/kg), and it is significantly cheaper than the Japanese paste feed. Moreover, its supply is stable and easy to store for long time. Our paste feed detects no pathogen, which can help improve the survival rate of eel. Besides, the indoor RAS is fit to the symbiosis of fishery and electricity. If there are foreign pathogens, it is easy to cause the collapse of the whole system. The high loss rate of eel powder would easily produce the bio-floc in water, which may lead to block the physical filter of RAS. In addition, compared to the sink-type paste feed of the Fisheries Research Institute, our paste feed has been modified by a special process to make it a float-type feed. Compared with sink-type, it is easier to observe the behavior of fish eating, and is easier to remove the feed residues. Also, it can also be used for different aquaculture species. At last, our float-type paste feed have high palatability and stability, which would perfectly match the future aquaculture trend.

Competing Products: Japanese paste feed, Eel meal, Bloodworm, Floating pellets

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