嘉南藥理科技大學專題研究計畫成果報告

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計畫名稱：延長崩散型魚飼料研發

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The effect of disintegration rate of feed on the survival rate of ornament fishes.

Introduction

Leisure activity is more and more pursued as the economy grows. It reflects in many aspects and pet-raising is one of them. Raising ornament fishes in many parts of the world is getting popular due to its relatively low cost. The beautiful colors of many ornamental fishes also attract people to raise them to increase the beauty of their living environment. (A).

There are several types of ornamental aquarium fish feed (B). One class is live fresh feed including shrimp, worm. It is very tasty for the fishes but it is not recommended for use as the problem of hidden parasites and nutritional unbalance for a constant fixed live feed. The other class is artificial feed. There are mainly two kinds of artificial feed. The first one is in the type of thin disk or tablet. It can soften in water and stick the aquarium wall or not. It is suitable for the small-sized fishes. However, the residues disperse in the bottom of the fishbowl, being not easy to clean, often pollute the water quality. The second one is in the form of granules or pellets. It can be designed to float or sink in the water depending on the fishes' eating habit. It can have different sizes suitable for the mouths of the fish. It usually swells in the water and don't disintegrate for certain time period. Therefore, it pollutes the least of the water quality. The feeding machine can also dispense it. At present it is the most-welcomed feed.

When fish feeds are fed to the fishes, it is commonly observed that many feeds are disintegrated and wasted before they are consumed by the fishes. The wasted feeds are not only a waste to the cost but also a kind of pollution to the water quality.

The relationships between the disintegration rate of feeds and fish survival rate have not been well studied. The purpose of this study is to investigate the effect of disintegration rate of feed on the water quality and survival rate of fishes.

Material and methods

Acetic acid (ACA) (Merck Co.，Germany), Alcohol (Taiwan Tobacco and Liquor Co.，95 ％，Taiwan), Chitosan (Low molecular weight，Fluka Co.，Switzerland), Ethyl cellulose (Sigma Co., USA), Eudragit E100 (Rohm Co., Germany), Polyvinyl alcohol (Acros Organics Co., USA), Sodium Hydroxide (Merck Co., Germany), Mercury (II) iodide (Merck Co., Germany), Potassium iodide (Merck Co., Germany), Quick Grow Koi Food, Taiwan),

Fish-raising system

The fishes are raised in a length 0.6 m, width 0.4 m, and height 0.5 m glass tank which is filled with about 50 liters water. The water used for raising the fishes is exposed to the outside environment for a week first. Air pump is connected to the water to provide fresh air to the water, and water temperature was maintained in 30℃. During the fish-raising period, 20 to 25% of water was replaced every week. Suitable amount of feeds were thrown into the

water one time per day for a period of 2 hours. After 2 hours, the feeds were taken out.

Turbidity measurement

Turbidity is measured by nephelometric method (Turbidimeter, Hach 2100 AN, USA)

Results and Discussion

Polymer solution screening

This study first screened the polymers. The polymer solution was coated on the feeds and floatability and disintegration rate of the feeds were monitored. 1% (w/v) chitosan in 1% (V/V) acetic acid solution, 12.5% (w/v) Eudragit Type E 100 in 95% alcohol solution, 1% (w/v) ethylcellulose in 95% alcohol solution, and 5% (w/v) polyvinyl alcohol in 95 % alcohol solution were prepared.

The fish feed pill was dipped into the above polymer solution, taken out and dried for three times respectively. The coated pills were put into the flask of a dissolution tester, and the turbidity was measured as shown in Fig. 1. The floatability was also observed. It shows the 1% (w/v) chitosan in 1% (V/V) acetic acid solution has the best effect in making the pills less disintegrating. It also has the good floatability. In addition, its origin is natural, and it might attract the eating of fishes than other material, so it was chosen for further study. 1 % ethyl cellulose solution was chosen for the coating of the feeds in this study for the comparison※.

Toxicity of chitosan

Chitosan and the feed were fed to the fishes, and their living was observed. There was no difference in their living observed and their survival rate was the same too. Therefore, chitosan appears not to be toxic to the Dimidiochromis fuscotaeniatus as shown in Fig. 2

Survival rate of fishes

It seems that 1 % chitosan coating is effective in prolonging the life span of Copadichromis trimaculatus (Red), and is not effective in Dimidiochromis fuscotaeniatus. On the contrary, 1 % ethyl cellulose coating is effective in prolonging the life span of Dimidiochromis fuscotaeniatus, and is not effective in Copadichromis trimaculatus (Red) as shown in Fig 3 and 4.

Conclusion

At present, it is found the coating on the feeds positively affect the survival rate of fishes. More kinds and numbers of fish should be conducted in the future experiments in order to obtain more meaningful statistic results. The effect of coating on the dissolved oxygen, biochemical oxygen demand, total suspended solids, ammonium form nitrogen, pH values, turbidity, and survival rate of the fishes will also be monitored.

Key words: fish feeds, turbidity, survival rate

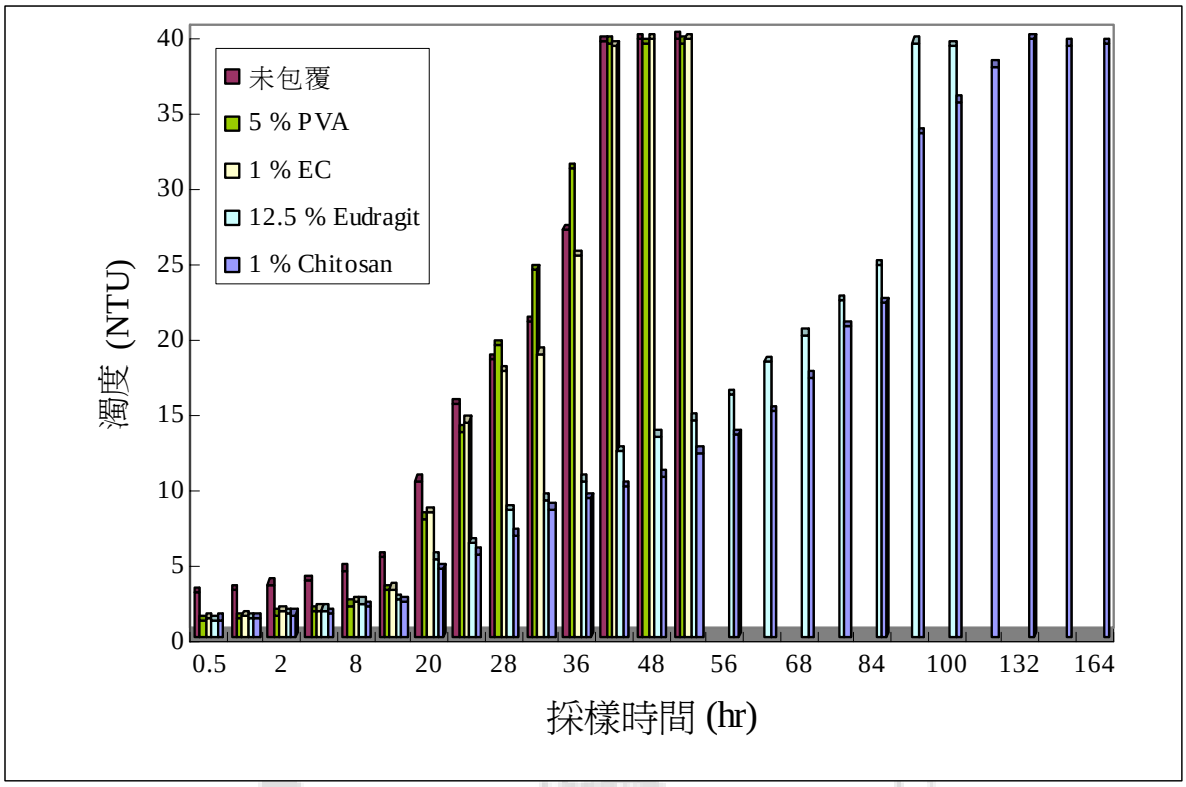

Fig. 1　海豐牌血鸚鵡飼料以手工包覆各種不同的膜衣液三層與否在去離子水中濁度變化比較圖

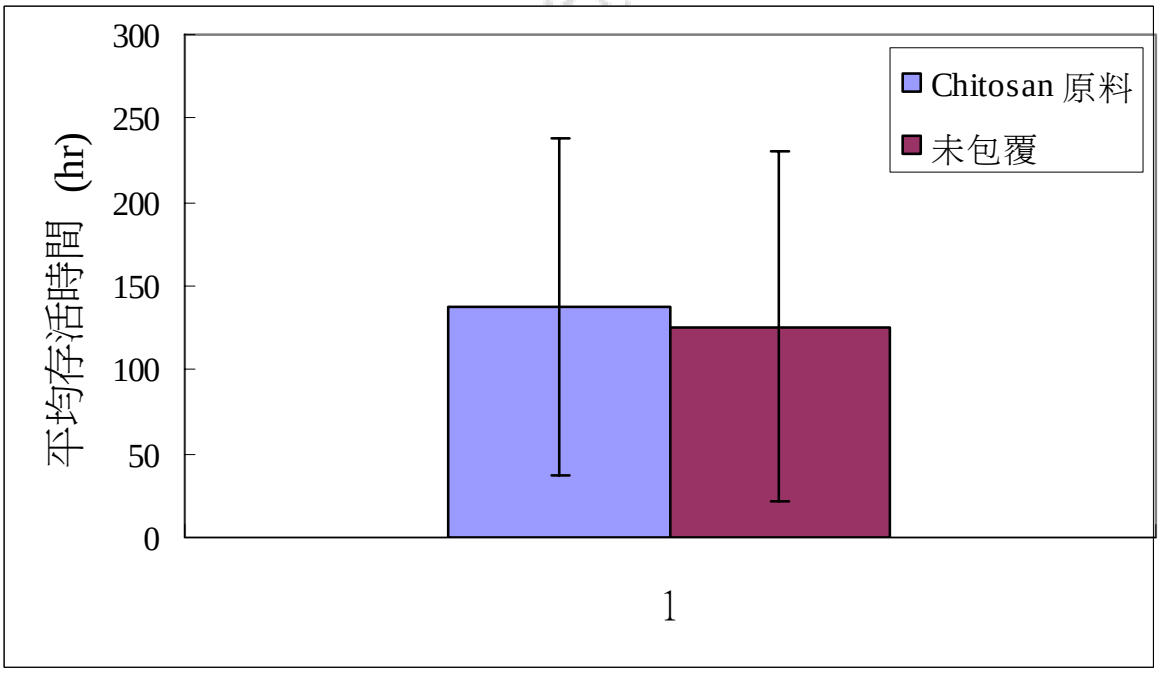

Fig. 2 餵養紅馬面平均存活時間比較圖

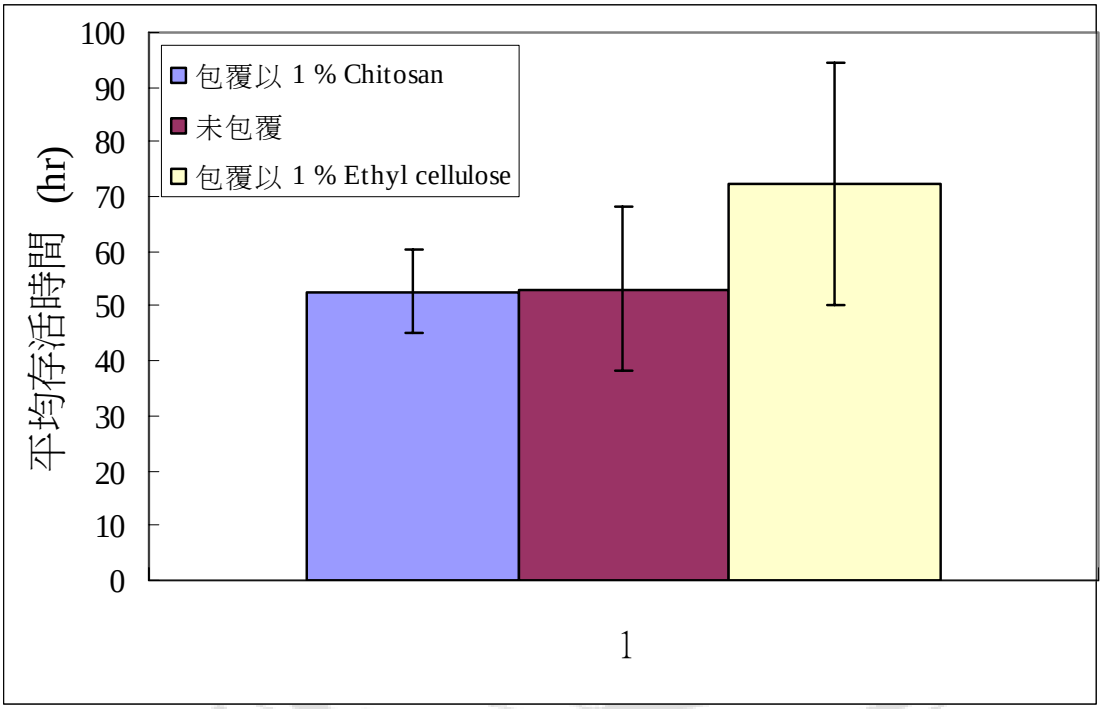

Fig. 3 餵養紅馬面平均存活時間比較圖

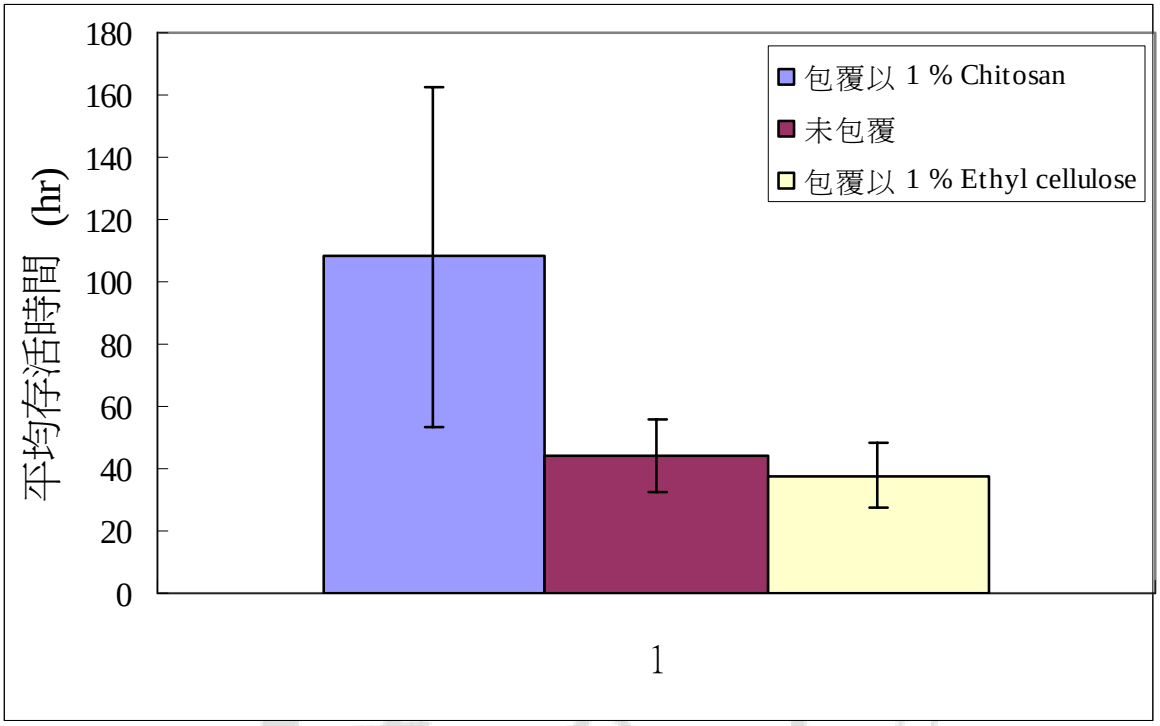

Fig.4 餵養血艷紅平均存活時間比較圖