

## Evaluation of the impact of weaning diets and weaning period on growth, feed utilization, digestive system development, survival, and efficiency of European sea bass

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### ABSTRACT

An applied study was conducted on European Sea bass larvae with two different diets as part of a weaning process. The first diet was a micro-diet (MD) containing fish meal, powdered milk, and poultry egg and had a crude protein content of 51.5%. The second diet was a commercial diet (CD) (INVE® Company) with a protein content of 56%. The two diets were administered at two different weaning stages: 42- and 55-day post-hatching (DPH). The experiment was conducted in twelve separate 6300-liter fiberglass tanks filled with saltwater at a salinity level of 35 ppt. Newly hatched larvae (16 DPH) were stocked at a density of 4 post-larvae per liter, with each treatment conducted in three separate tanks. The larvae were fed eight times daily between 7:00 a.m. and 11:00 p.m., with one meal every two hours. The experiment lasted 70 DPH with 42 and 55 DPH weaning periods. Based on the study, there was no significant effect on the survival rate when considering the weaning diets ( $P \geq 0.05$ ). However, it was found that larvae weaned at 55 DPH using the standard protocol had a significantly higher survival rate ( $P \leq 0.05$ ). The weaning diets did not significantly impact growth performance indices such as SGR, ADG, FBW, FTL, and K. However, the results indicated that early weaning at 42 DPH significantly improved the abovementioned indices ( $P < 0.05$ ). There were no significant differences in FCR due to testing weaning diets and weaning periods in feed utilization. During the weaning period, there was a significant improvement in the histological development of the esophagus and stomach. The length ( $\mu\text{m}$ ), width ( $\mu\text{m}$ ), count of Villi, and Goblet cell count were all significantly better with 55 DPH and CD weaning diet ( $P < 0.01$ ).

### INTRODUCTION

The European sea bass (*Dicentrarchus labrax*) is a common target for inshore fishing and aquaculture. It is farmed in various coastal watercourses, estuaries, and lagoons across the Mediterranean region and can adapt to various temperatures and salinities (FAO, 2022). In the past, sea bass farming relied on wild brood fish, but now hatcheries use feeding protocols that involve internal and external methods, as stated by (People Le Ruyet et al., 1993). The breeding of sea bass is advantageous for the aquaculture industry, but early breeding poses various challenges, such as high feeding expenses, skeletal deformities, and breeding conditions (Cerqueira et al., 1991). During the early feeding stages, providing live food for E. Sea bass larvae is crucial, and live food production plays a significant role in hatcheries. On day 40 post-hatch, weaning of sea bass on micro diets starts (Giebichenstein et al., 2022), a significant challenge in aquaculture. It is crucial to optimize dietary strategies during this bottleneck, considering the larval digestive system (El-Dahhar, A., 2016; Laczynska et al., 2020; Lipscomb et al., 2020). Although weaning marine fish larvae from live feed to

commercial diets usually begins at the end of the larval period, this method has been used during the larval stages since 1980.

The weaning process has several objectives to achieve. These include determining the extent of larval acceptance, digesting, and tolerating the provided diet to replace live prey completely, enabling the larval gut to identify specific compounds, and eventually implementing weaning to decrease the larval dependence on live feed (Conceição et al., 2010; El-Dahhar, A., 2016). Different related rations have validated numerous marketable micro diets that include live prey such as rotifers and *Artemia*. These studies were conducted by (El-Dahhar et al. 2022; Engrola et al., 2010; Fletcher Jr et al., 2007).

According to research by (Lipscomb et al., 2020), live feeds are a more profitable and acceptable alternative to prepared microparticulate diets. Early co-feeding can help train and improve the gut to receive and metabolize inert diets, resulting in better growth performance and earlier weaning than weaning at the larval stage's end. Recent studies by (El-Dahhar A., 2016, 2017) and a more recent study by (El-Dahhar et al., 2021) demonstrate the effectiveness of using a minimal amount of feed and live bait for feeding finfish larvae. This

تقييم تأثير نظام الفطام وفترة الفطام على النمو، واستخدام العلف، وتطوير الجهاز الهضمي، والبقاء على قيد الحياة، وكفاءة سمك القاروص الأوروبي

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في دراسته الحاليه تم فطام يرقات القاروص الاوروبى باستخدام نظامين غذائيين يحتويان على جسيمات دقيقه (اعلاف صغيره الحجم) نظام غذائى محضر محليا يحتوى على نسبة بروتين ٥١,٥% ونظام غذائى تجارى متحصل عليه من شركه (INVE) ويحتوى على نسبة بروتين ٥٦% فى فترتى الفطام (٢ و ٥) يوما بعد الفقس وتم استخدام ثلاث مكرارات لكل معامله تم تجهيز ١٢ حوض دائرى من الفيبر جلاس سعه كل منها ٦٣٠٠ لتر من المياه المالحة باليرقات حديثه الفقس وبكتافه ٤ يرقات لكل لتر .

وكانت الملوحة فى المياه ٣٥ جزء فى المليون وتمت تغذيه اليرقات بمعدل وجبه كل ساعتين واستمره التجربه ٥٥ يوما

اجريت التجربه ٢ و ٥ يوما بعد الفقس

اظهرت النتائج ان التغذيه الفطام لم يكن لها تاثير معنوى عند مستوى معنويه (٠,٠٥) على الاعاشه الا ان فتره الفطام لها تاثير معنوى (٠,٠٥) على الاعاشه وكانت افضل على نتيجته على عمر ٥٥ يوما بعد الفقس

تغذيه الفطام لم يكن لها تاثير كبير على (اداء النمو وزياده الوزن) الا ان فتره الفطام كان لها تاثير كبير على اداء النمو وزياده الوزن

حيث اظهر الفطام المبكر عند ٢ يوم بعد الفقس تحسنا ملحوظا

لم تكن هناك فروق معنويه فى معدل تحويل العلف نتيجة اختبار علف الفطام وفترة الفطام فى استخدام نوعى العلف

واظهر ان العلف المحلى (MD) خلال فترات الفطام المختلفه الى تحسين النمو والاعاشه

وفى تحليل الهستولوجى لوحظ تحسين كبير فى المرئ والمعدى فى طول الخمائل وعرضها وعددها وعدد خلايا (Gobelt) على فتره فطام ٥٥ يوما بعد الفقس على اعلاف لتفى المستورده