

GONADAL GROWTH OF POST-SPAWNED SEA URCHINS (*Paracentrotus lividus*) FED ON EXTRUDED DIET

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INTRODUCTION

The sea urchin industry is based on the production of marketable gonads. Hence, control of sea urchin reproduction is essential to the timely marketing of this valuable seafood product. One method of addressing the discordance between gonadal cycles and market demand is to enhance artificially roe using artificial or natural diets. Sea urchin gonads can be enhanced over longer periods prior to spawning, when roe are naturally increasing, but it is not clear whether the gonad of immediately post-spawned urchins can be enhanced in short time frames. The objective of this study was to test the effectiveness of an extruded diet in producing a large gonad biomass in post-spawned *Paracentrotus lividus*.

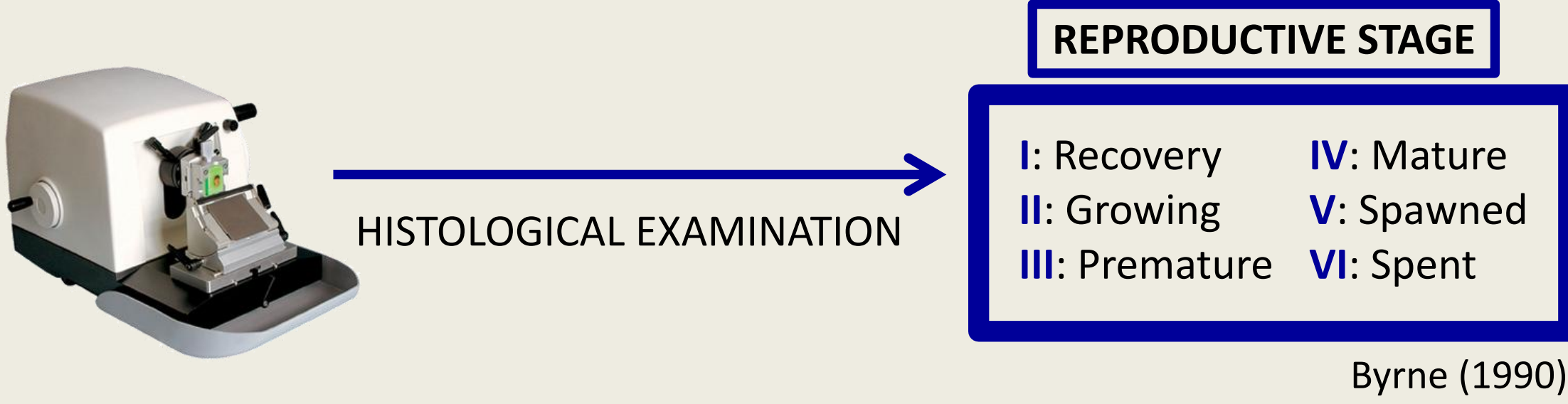
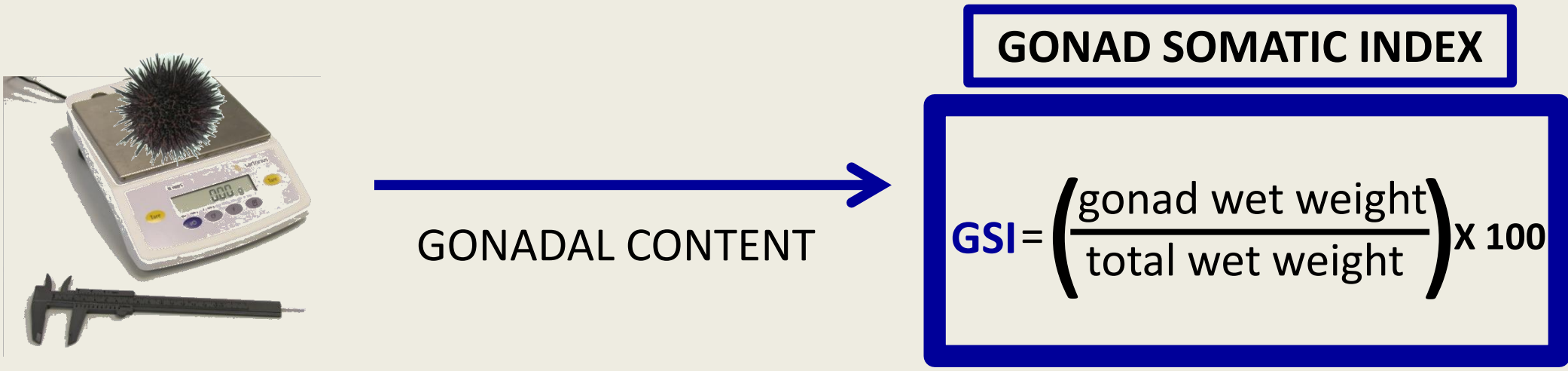
MATERIALS AND METHODS

Adult sea urchins, *P. lividus*, were collected from a subtidal population on the west coast of Asturias (Spain) and starved for two weeks. Then, they were measured and weighed before being introduced into three replicate tanks (10 individuals per tank) and the urchins were fed on an extruded diet prepared by IMIDA. The proximate organic composition of the extruded diet was 37.6% carbohydrates, 33.7% proteins and 7.9% lipid in dry weight. Food was provided at 4% of the wet sea urchins biomass per aquarium every 3 days (Shpigel et al., 2004).

Feeding trial lasted 8 weeks. Test diameter, wet weight and gonad index were calculated after 4 weeks and at the end of the experiment. Sea urchin roe content was assessed using the Gonad Somatic Index (GSI).

Ten gonads were collected each sampling date and preserved in Davidson fluid for histological examination of the reproductive state. The reproductive state of the urchins was then assessed following the descriptions of Byrne (1990). For a high quality product, sea urchin gonads should have a firm texture and contain few or no gametes. The reproductive states that meet these properties are recovery, growing and premature stage (Spirlet et al., 2000).

In this experiment, the control was the wild population from which an initial and final sample of 25 sea urchins was taken and assessed the GSI and the reproductive state. Whole weight, test diameter and gonad index were compared using one-way ANOVA. Histological analysis was discussed qualitatively.



RESULTS

The sea urchins accepted the extruded diet and could be seen feeding on the pellets. Survival was 100% for all tanks during the eight-week experiment. Total weight and test diameter of sea urchins fed on extruded diet were not significantly different (ANOVA $p > 0.05$) between the sampling dates. There were differences in the GSI over time in the experimental treatment in the laboratory (from 1.7 to 14.4%), but no change in GSI in the wild population between the initial and final samples collected (from 6.1 to 5.7%) (Figure 1).

Histological analysis showed that after only two weeks of starvation, the gonads progressed from spawned stage (80%) to spent stage (90%) devoid of contents. There were slight changes in gonad reproductive condition during the first 4-week feeding, although the gonads were filled with reserve material, represented by a heavy network of nutritive phagocytes. At the end of the experiment, sea urchins fed on the extruded diet were in recovery (70%) or growing (30%) stage, whereas the wild population was still in the spent stage (80%) (Figure 1).

WILD POPULATION

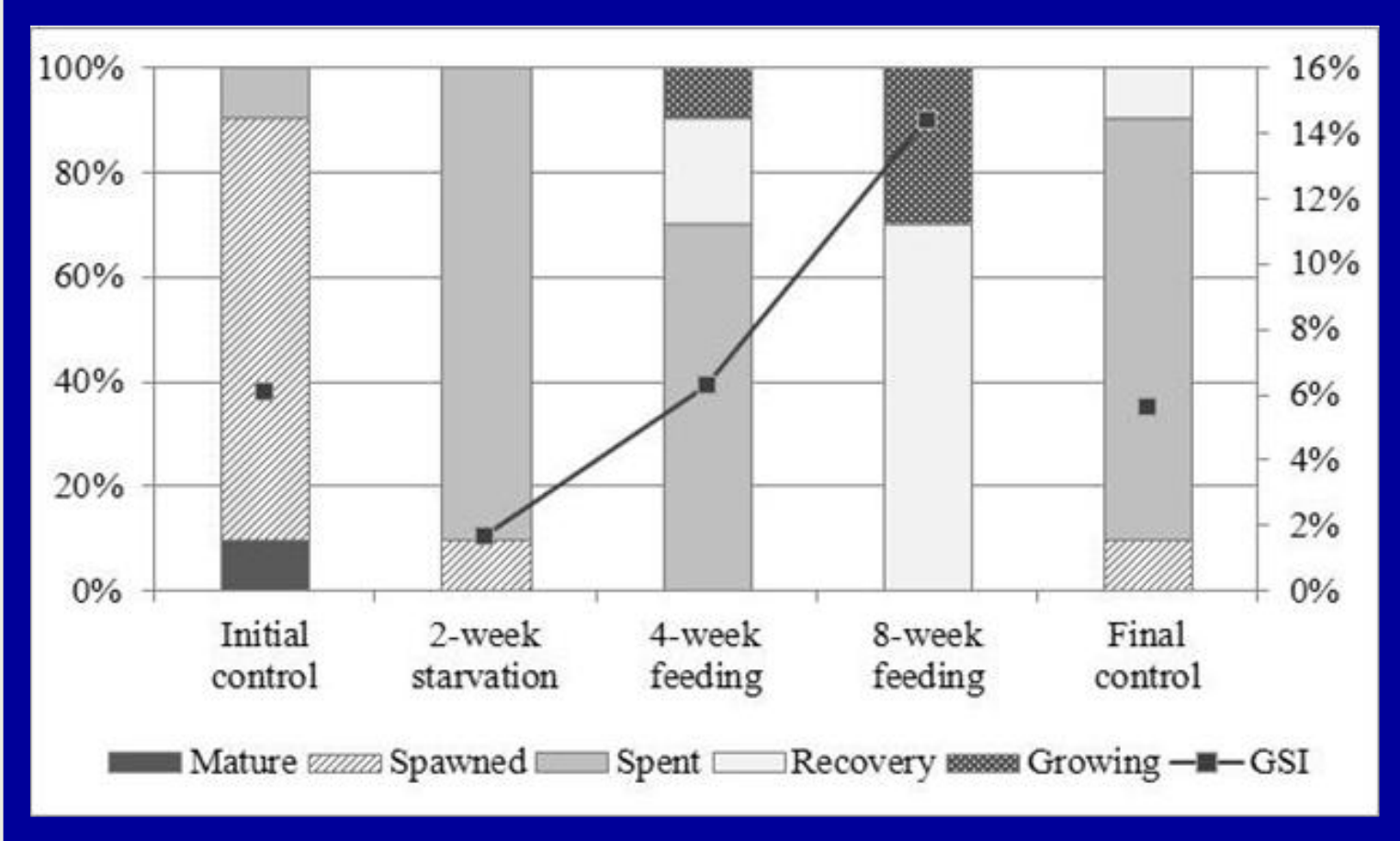
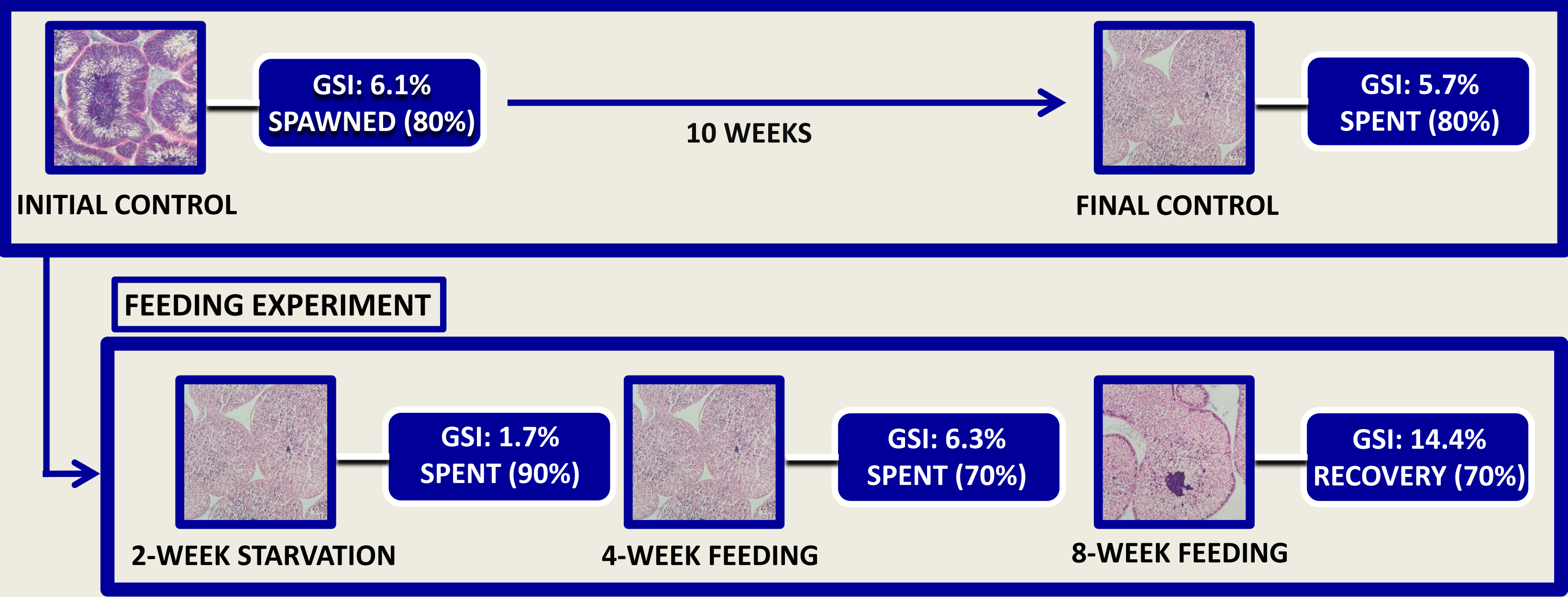


Figure 1. Reproductive condition (%) and Gonad Somatic Index (GSI) of the initial and final sample of the wild population (control) and sea urchins fed on extruded diet during 8 weeks.

CONCLUSIONS

- The two-week starvation induced the consumption of the gonad content of post-spawned sea urchins and the restarting of the cycle.
- The extruded diet provided an increase in the GSI of 1.1% per week in the first month and 2.0% per week in the second month. Therefore, the mean growth rate of the gonad over the experimental treatment was 1.6% per week.
- After conditioning the adult sea urchins for 8 weeks with the prepared diet, all gonads were at the initial stages of the reproductive cycle, recovery and growing stages, required for marketing.
- The tested extruded diet was effective in increasing gonad mass and in reaching a desired reproductive stage.

References

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