AN ARTIFICIAL DIET FOR THE AMERICAN LOBSTER (Homarus americanus)

DEVELOPMENT

A pelleted diet to meet the nutritional needs of the American lobster (Homarus americanus) is now available commercially. This first, and at present, only commercial lobster feed is meant to supplement, not replace the diet of fish cuttings traditionally used. Ten pounds of this feed is equivalent to about one bushel of fish cuttings in dry matter food value.

A group of faculty and students in the Department of Animal and Veterinary Sciences at the University of Maine at Orono began in the mid-1970's to develop a balanced artificial diet suitable for pound feeding of the American lobster which would be comparable in price to herring but not present the problems of quality and availability often associated with herring.

With support from the University of Maine/University of New Hampshire Sea Grant College Program, studies were conducted beginning with nutritional analysis of the contents of lobster stomachs. From a base study (Leavitt, 1977) of the natural dietary intake of adult lobsters, sample diets were formulated using commercially available feed ingredients. With additional funding from the Maine Agricultural Experiment Station, field testing of the synthetic diet has continued over a number of years.

The diet can be fed to American lobsters held in storage facilities such as lobster pounds and tank systems. Feeding of the pelleted diet to American lobsters stored in live cars is not recommended due to the current design of the live cars.

Historically, the feeding of lobsters held in high-density confinement has been considered a sound investment because it reduces cannibalism, maintains weight, and hardens the shell of new soft shell lobsters.

The results of a recent study comparing the weight gain and meat flavor of lobster fed the pelleted diet versus a diet of herring are explained below. The effect of diet on meat flavor is always a concern, e.g., too much fish meat in a broiler diet yields fishy-tasting chicken meat.

EFFECT OF FEEDING A SYNTHETIC DIET ON WEIGHT GAIN AND MEAT FLAVOR IN LOBSTERS

The objective of this study was to compare weight gain and meat flavor of lobsters fed synthetic diet versus a diet of herring. Salted herring scrap is the conventional ration fed to lobsters held in high density confinement in lobster pounds. The formulated synthetic diet was composed of fish meal (30%), brewer's yeast (10%), alfalfa meal (10%), kelp meal (3%) and wheat flour (42%).

Before the feeding trial began and after 40 days on the diet, the lobsters were weighed both suspended in water (SW) and in air (AW). The mean changes in wet weight were 16.0g (SW), 22.4 (AW), and 6.8 (SW), 11.7g (AW), for lobsters fed the formulated diet and the herring diet respectively. The mean change in weight for lobsters fed the formulated diet was significantly (p<.01) greater for both weight values.

For evaluation of flavor, live lobsters were cooked for 15 minutes in a steam-jacketed kettle containing boiling 3% sodium chloride brine which was freshly prepared for each of four replications. Four lobsters from each of the groups which had been fed on herring scraps or on the synthetic diet and eight lobsters harvested from their natural habitat, were cooked at a time. The meats from the tail sections were cut into pieces, coded, and presented in a randomized complete block design, with four replications, to a sensory panel of 17 members. The panelists, who were experienced in assessing flavor qualities of foods, were asked to compare the flavor of each sample with that of a labeled, freshly-harvested reference standard which also was included as a coded control sample.

Scores of +3 (better than standard, large difference) to a -3 (poorer than standard, large difference) were assigned to the 7-point rating scale. The data were analyzed by the variance method using the treatment x judge interaction for the error term to test for a significant treatment F ratio. The test for least significance was used to examine differences between the means of the two groups of fed lobsters and the coded control. The flavor of lobsters which were fed the synthetic diet (mean = -0.10) was rated equal to that of the coded control sample (mean = -0.06). Meat from lobsters which had received a diet of herring scraps, however, was judged slightly poorer in flavor (mean = -0.65) than both the freshly harvested control and the synthetic diet fed lobsters. These differences were significant at the 1% level of detection.

R.C. Bayer, I.K. Good, R.H. True, T.M. Work, University of Maine at Orono; and M.L. Gallagher, East Carolina University. (From Proceedings of the Second International Conference on Aquaculture Nutrition)

These results show there is a statistically significant difference in flavor of the lobster fed the synthetic diet as opposed to those fed the conventional diet. From this, it is safe to infer that flavor of the lobster is not adversely affected when fed the pelleted diet.
ADVANTAGES OF THE PELLETED DIET

Because the feed is in dry pellet form, it requires little storage area. It is approximately equal in cost on a dry matter basis to herring which is 85% water. Its long shelf life eliminates waste due to spoilage. It is especially convenient at the end of the pound cycle when it is impractical to keep large quantities of herring. In the rare case of overfeeding, it will not rot on the bottom but wash out of the system. It is easy to use as a feed with no odor or mess. Tests using divers confirm that lobsters readily eat the food when offered.

The most important advantage, perhaps, is the consistent availability of the synthetic diet.

RECOMMENDED FEEDING PROCEDURES

1. Feed at the end of the working day.
2. Distribute feed as evenly as possible over the entire area.

PRECAUTIONS

1. Because lobsters feed at different rates due to oxygen content and water temperature, care should be taken not to overfeed. A suggested amount is one pound of feed per 500 lbs. of NEW shell lobsters; and one pound of feed per 1000 lbs of OLD shell lobsters in closed, recirculating lobster tanks; or 2-3 pounds per 1000 lbs in open systems; 3-5 pounds per 1000 lbs. in lobster pounds. Essentially, be careful not to overfeed.
2. Overfeeding in closed saltwater systems may sour the water if filters are not cleaned regularly in the closed system.
3. Store feed in a dry area away from any contaminants such as gas, oil, herbicides, pesticides, etc.

THE PELLETED DIET IS REGISTERED WITH THE MAINE DEPARTMENT OF AGRICULTURE.

ANALYSIS

<table>
<thead>
<tr>
<th>Component</th>
<th>Content</th>
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<td>Crude protein, min.</td>
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<tr>
<td>Crude fat, min.</td>
<td>3.5%</td>
</tr>
<tr>
<td>Crude fiber, max.</td>
<td>3.0%</td>
</tr>
<tr>
<td>Inert matter, max.</td>
<td>3.0%</td>
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</tbody>
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FOR FURTHER READING


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