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EFFECT OF FEEDING DIFFERENT DIETS ON THE CRUDE PROTEIN CONTENT AND FREE AMINO ACIDS IN THE HAEMOLYMPH OF LARVAE OF *PARASARCOPHAGA ARGYROSTOMA* (ROBIEAU-DESVOIDY) (DIPTERA-SARCOPHAGIDAE)

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SUMMARY

Larvae of the flesh fly *Parasarcophaga argyrostoma* were fed bovine meat, fish and bovine liver. The content of crude protein in haemolymph of larvae fed on three different diets, showed higher concentration in larvae fed on liver than of those fed on meat and fish. Concentration of Free amino acid content in haemolymph of larvae fed on bovine meat showed much higher concentration percentage than in larvae fed on fish and liver.

INTRODUCTION

Generally all insects require diets containing a nitrogen source, vitamins, an energy source (most often a carbohydrate) and some mineral salts. Insects like animals appear to have a general pattern of nutritional needs (Karowa and Martin, 1989; Horie and Watnabe, 1983; Zucoloto, 1987).

Although many studies have been devoted to the determination of essential nutrients, many investigations are concerned with studying the feeding habits of food preferences of insects (Busse and Barth, 1985).

The larvae of the flesh fly *Parasarcophaga argyrostoma* feed predominantly on meat or a rich protein diet. The nutritional quality of protein is a function of its amino acid composition. The critical importance of the amino acid composition of the diet to growth and reproduction in insects has been documented in studies of several aphids (Carter and Cole, 1977), adult mosquitoes (Briegel, 1985) and larvae of the commercial moth *Bombyx mori* (Horie and Inokuchi, 1978; Horie and Watnabe, 1983).

The present work was undertaken to determine the effects of different kinds of protein diets (bovine liver) of the content of crude protein and free amino acids in the haemolymph of the last larval instar of *Parasarcophaga argyrostoma*.

MATERIAL AND METHODS

The strain of *Parasarcophaga argyrostoma* was obtained from a stock colony which has been maintained in the Department of Entomology, Cairo University, since 1990. Adults were reared in cages (30 x 30 x 40 cm) and fed on sugar, milk and water.

For experimental purpose, adults were allowed to lay larvae on test diet. Each diet (bovine meat, fish and bovine liver) weighed 200 gm. Groups of larvae were reared for 5-6 days at 25°C and then sacrified before prepupation just at the begining of the last larval stage.

Preparation of crude protein

The haemolymph samples were withdrawn by capillary tube from an incision made into the

cuticle of the last larval instar. An equal volume of 10% sulphosalicylic acid was added to the serum, the protein precipitated was removed by centrifugation at 3500g for 10 minutes.

Estimation of protein was carried out by KJel-TEC. apparatus, Model 16210 using automatic macro-Kjeldahal methods of 6 steps according to A.O.A.C. (1980).

Amino acid determination was performed according to the method of Moore et al., (1958).

RESULTS

Table (1) shows that the total crude protein content in the last larval instar of *Parasarcophaga argyrostoma* fed on bovine liver diet showed much higher values, (17.8%), than in case of meat and fish which were more or less similar, 7.06% and 7.4% respectively.

Table (1): Crude Protein content in Haemolymph of larvae of *Parasarcophaga argyrostoma*.

Diet	Crude Protein (%/mg haemolymph weigh)
Bovine meat	7.06
Fish	7.40
Bovine liver	17.80

Results are mean of two duplicate experiments.

Table (2) shows a different pattern of amino acid content in the haemolymph. Larvae fed on bovine meat showed a much higher content in all amino acids detected, than in the case of larvae fed on fish and bovine liver. Amino acid content in haemolymph of larvae fed on fish was slightly higher in all amino acid analysed than in case of larvae fed bovine liver which showed the least percentage of amino acids content. The amino acids Methionine and Cysteine were absent in all cases, Isoleucine was in larvae fed on fish and liver, but was detected in larvae fed on bovine meat.

Table (2): Free Amino Acid Content in the Haemolymph of Larvae fed on Bovine Meat, Fish and Bovine Liver.

Amino Acid	% Amino Acid in haemolymph of larvae fed on different diets.		
	Bovine Meat	Fish	Bovine Liver
Aspartic Acid	0.07	0.01	0.004
Threonine	0.03	0.005	0.003
Serine	0.02	0.01	0.01
Glutamic Acid	0.19	0.04	0.02
Proline	0.04	0.01	0.004
Glycine	0.03	0.01	0.004
Alanine	0.07	0.02	0.02
Cysteine	----	----	----
Valine	0.04	0.01	0.004
Methionine	----	----	----
Isoleucine	0.02	0.005	----
Leucine	0.02	0.01	0.002
Tyrosine	0.05	0.1	0.01
Pheny Lalanine	0.02	0.004	0.002
Histidine	0.08	0.02	0.005
Lysine	0.09	0.01	0.003
Arginine	0.07	----	----

DISCUSSION

Proteins are the principal components of all animal tissues. From a nutritional standpoint the requirement for protein is a requirement for the individual amino acids that comprise them, because proteins are complex nitrogen compounds composed of chains of amino acids. Sometimes the proteins used most often in insect diets (albumin, casein, etc...) lack certain amino acids, making it necessary to fortify the proteins. Flesh flies *Parasarcophaga argyrostoma* feed predominantly on meat diet especially during the larval stage which is the most activly feeding period in the flies life cycle. Protein content in haemolymph of larvae fed on liver showed a much higher concentration than in case of larvae fed on fish diet or bovine meat diet. However, the results of amino acid concentration showed much higher values in all amino acids detected in haemolymph of larvae fed of bovine meat than in those fed on fish or liver diets. It is generally believed that free amino acids in insect haemolymph are probably derived to a great extent directly from the proteins in the food. This depends to a great extent on the presence of proteolytic enzymes found in insect midgut. Some free amino acids, however, are produced as a result of metabolic synthesis in the individual, since they may appear in the blood of insects that have been fed on diets deficient in free amino acids. It has also been suggested that high amino acid concentration in the blood or haemolymph of insects represents the storage of nitrogenous materials that can be drawn on, according to the needs of the tissues, or it may indicate an excess of amino acids are produced from the diet and that the amino acids are stored in the blood until they are eliminated by normal excretion, (Patton, 1963).

Inokuchi (1971) has shown that the composition of free amino acids in the haemolymph varied according to the kinds of diet. It has also been reported in the silk worm that elevation of dietary proteins results in acceleration of growth and silk production and the degree of its effect was dependent on the kinds of dietary protein used, (Ito and Tanaka, 1962; Kamioka et al., 1971 and Horie et al., 1971).

In the present study, most of the essential amino acids, arginine, lysine, leucine, isoleucine, histidine, phenylalanine, valine and threonine were present in high concentration in the haemolymph of larvae fed on bovine meat diet. Arginine was absent in larvae fed on fish and liver diet, isoleucine was absent inlarvae fed on liver diet only, but methionine was not present in case of all three different deits.

Further studies will be carried out to determine the effect of eliminating or increasing some of the essential amino acids in the diet of the fleshy fly. Also further studies on the effect of dietary proteins on the level of proteolysis and rate of growth will be carried out.

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