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ENABLE INSECTS AS FOOD AND THE IMPORTANCE OF THEIR USAGE

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ANNOTATION

Insect-based protein products are one of the most important and competitive alternative sources of animal protein substitutes, their consumption of food with very low water requirements, can be fed in organic residue products of any composition, and their inclusion in the category of cold-blooded animals allows them to organize their reproduction indefinitely.

Keywords: Livestock, poultry, food insects, macrophytes, Tenebrio molitor

АННОТАЦИИ

Белковые продукты на основе насекомых - один из наиболее важных и конкурентоспособных альтернативных источников заменителей животного белка, их потребление пищи с очень низким потреблением воды, может подаваться в органических остатках продуктов любого состава а включение их в категорию хладнокровных животных позволяет им неограниченно организовывать свое воспроизводство.

Ключевые слова: Животноводство, птица, пищевые насекомые, макрофиты, Tenebrio molitor.

INTRODUCTION

After gaining independence, great attention was paid to the development of agriculture, which is the main link in the agro-industry. Significant results have been achieved in the implementation of program measures in this direction, including the development of measures for further development of the feed base of the livestock and fisheries sectors.

At the same time, there are problems in providing the poultry and fisheries sectors with a complete food base. As a result, in order to strengthen the food base of the rapidly developing livestock and fisheries sector in recent years, additional land areas for the cultivation of grain products and 64,600 tons of grain per year from state resources. causes the separation of.

Therefore, the issue of production of non-traditional food products, which are convenient to produce, low cost and rich in all necessary ingredients, is one of the most pressing issues.

By 2050, the world will have 9.1 billion. the problem of providing more than a dozen people with food will arise. In 2015, the number of people without adequate food was 777 million. increased to 815 million by 2016.[1]. According to the FAO, by 2050, compared to 2010, the demand for meat products will increase by 58% and dairy products by 70%.

Livestock is one of the most productive sectors in the world, accounting for 35% of all production and 75% of agricultural production. In particular, grain crops, which are the main food products for livestock, poultry and fisheries, are used. This is in addition to the need of people to grow cereals, they require a very large amount of reserve resources, including the production of feed based on them. In particular, given the need to increase global meat production from 200 million tons to 470 million tons. At present, 2.1 billion tons of wheat are grown, this figure will need to be increased by at least 3.0 billion tons per year.

The study of economic and ecological aspects of food insects allows for their widespread use. In particular, the high protein storage of insects and the fact that they consume less food than other sources allow them to be considered as an economically sustainable alternative source.

The production of protein products based on food insects is explained by the high economic profitability of the production of protein products based on livestock and poultry[2]. In order to grow one kilogram of beef, at least 20 kg of corn and soybeans, if necessary, feed on insects, for example, to get one kilogram of protein product from locusts, you need 2 kg of feed[3].

At the same time, it is very important that food insects consume less water than livestock. In order to enrich their feed composition to obtain products based on cattle, fish products, bone meal, sunflower, cotton and soybean-based protein substances, and even animal blood are added to feed products. This leads to an increase in the cost of these feed products and a sharp decline in their economic profitability.

In the cultivation of protein products based on food insects, it is possible to organize a process of their environmentally friendly production at a higher level than in cattle, pigs and poultry[4]. The relatively low levels of greenhouse gases, including methane, nitrogen oxides, and carbon dioxide, in feed insects relative to livestock play an important role in maintaining environmental sustainability [5]. There is also a very high chance of breeding insects under controlled conditions and setting up a small business without attracting large sums of money. Also, the organization of production on farms, obtaining high-protein products and making their cost lower.

The high protein storage of food insects and the presence of all the necessary amino acids in them determine the nutritional value of the food products on which they are based.

For example, one such food insect is the flour beetle (Tenebrio molitor), which has a high protein content and amino acid content, including lysine and methionine, which are important for their high retention of essential amino acids.

According to scientific sources, this nutritious insect contains 40-75 g / 100 g of protein, 7-77 g/100 g of fat and 3-8 g/100g of minerals. Some scientific sources have found that Tenebrio molitor contains 51% protein, 32% fat and up to 5% minerals compared to dry matter.

In addition, the composition of many food insects is rich in lipids (up to 27.4%), based on which the enrichment of various products with lipids, to obtain lipid-based medicinal products, or to be used as a source in the production of alternative sources, including biodiesel.

In research, the composition of flour for food production, it was noted that the lipid content increased from 0.9% to 5.4% when Tenebrio molitor was added to it in an amount of 20%. The composition of edible insects is also rich in fatty acids.

Although retinol is very rare in food insects compared to other sources, riboflavin, which determines the nutritional value, is very rich in vitamins such as pantothenic acid and biotin. Some studies have also reported high levels of folic acid [6].

Истиқболли озуқабоп ҳашаротлар сифатида Schistocercagregaria турида қуруқ моддага нисбатан оқсил 76% гача, Gryllodessi gillatus тропик чигирткала 70% гача оқсил сақлаши билан ажралиб туради. Бу кўрсаткичларни зардобидаги (~87%) ва товуқ тухумидаги оқсилга (~82,1%) қиёсласак, уларнинг жуда муҳим аҳамият касб этишини кўриш мумкин [7].

In Uzbekistan, food products based on edible insects and the production and use of supplements has not yet been implemented. However, in 2019, the economic growth rate in the world market based on food insects will reach 112 million ion dollars, it is projected to increase by another 47% in 2019-2026.

Table 1.1.

1.1-Table. Widely studied insect species as food insects

Insect species	Protein (%)	Amino acid (%)	Raw fiber (%)	FOND (%) (Fiber obtained in a neutral detergent)	FOAD (%) (fiber obtained in an alkaline detergent)	Minerals (%)	Scientific sources
Lepidoptera							
Achroia grisella (L)	33.97	60.0	na	19.5	8.19	1.4	Finke, 2002
Bombyx mori (L)	53.75	8.09	na	6.36	6.36	6.36	Finke, 2002; Frye et al., 1989
Chilecomadia moorei (L)	38.94	73.86	na	6.53	3.52	2.01	Finke, 2012
Hyalophora cecropia (L)	54.7	10.2	14.7	na	na	5.9	Landry et al., 1986
Collosamia promethean (L)	49.4	10.0	10.8	na	na	6.9	Landry et al., 1986
Manduca sexta (L)	58.1	20.7	9.4	na	na	7.4	Landry et al., 1986
Spodoptera frugiperda (L)	57.8	20.2	6.7	na	na	5.6	Landry et al., 1986
Pseudaletia unipuncta (L)	54.4	14.9	5.0	na	na	6.9	Landry et al., 1986
Spodoptera eridania (L)	54.7	13.9	7.1	na	na	9.8	Landry et al., 1986
Samia ricinii (PP)	54.2	26.20	3.26	na	na	3.80	Longvah et al., 2011
Samia racinii (P)	54.6	26.20	3.45	na	na	3.80	Longvah et al., 2011
Cirina forda	20.0	12.5	8.7	na	na	NA	Osasona & Olaofe, 2010
Antheraea pernyi	71.9	20.1	na	na	na	4.0	Zhou & Han, 2006
Z. morio (A)	68.05	14.25	na	50.14	32.06	6.16	Oonincx & Dierenfeld, 2012
Z. morio	46.79	42.04	na	9.26	6.41	2.38	Finke, 2002

T. molitor	49.08	35.17	na	14.96	6.56	2.36	Finke, 2002
Cotinis nitida	51.75	5.41	19.3	na	na	12.34	Rakashantong et al., 2010
Hymenoptera							
Oecophylla smaragdina	53.46	13.46	15.38	na	na	6.55	Rakashantong et al., 2010
Orthoptera							
Acheta domesticus	66.56	22.08	na	22.08	10.39	3.57	Finke, 2002; Bernard et al., 1997
Microcentrum rhombifolium (A)	77.80	9.00	na	41.14	19.39	9.10	Oonincx & Dierenfeld, 2012
Anurogryllus arboreus	48.69	20.60	11.61	na	na	9.36	Rakashantong et al., 2010
Diptera							
H. illucens	45.10	36.08	na	9.79	7.73	9.02	Finke, 2012
Musca domestica (L)	78.17	7.5	na	14.29	11.51	6.75	Finke, 2012
D. melanogaster (A)	68.00	19.00	na	17.66	10.14	7.20	Oonincx & Dierenfeld, 2012; Barker et al., 1998
Blattodea							
Blatta Lateralis	61.5	32.4	na	9.06	7.12	3.9	Finke, 2012
B. lateralis (S)	76.05	14.45	na	11.41	10.87	7.88	Oonincx & Dierenfeld, 2012
B. Lateralis (M)	62.85	26.50	na	12.76	12.75	6.89	Oonincx & Dierenfeld, 2012
Eublaberus distanti	52.1	43.1	na	na	na	2.98	Oonincx & Dierenfeld, 2012
Gromphadorhina portentosa	63.35	20.30	na	36.54	13.12	8.49	Oonincx & Dierenfeld, 2012
Periplaneta americana	53.9	28.4	na	na	9.4	3.3	Bernard et al., 1997
Abbreviations: A-beetles, M-nutrient medium, S-juveniles, L-larvae, P-fungus, PP-front of fungus, na-unidentified							

It has been reported that the amount of methionine and cysteine amino acids in locusts is equal to the daily intake of humans. Minerals in foraging insects are also reported to be ~ 6 mg / 100 g in beef, compared to other objects, and 8 mg / 100 g in chickpeas. While the fat content in dried milk is around 26%, in the flour beetle this figure is around 25%.

At the end of 2019, the economic indicator in the general market of food insects amounted to 24.18 million dollars. The share of European countries amounted to 10.34 million dollars. This indicates that there is competition for the further development of stable economic performance in the food insect market.

Therefore, one of the most promising areas in Uzbekistan is the cultivation of food insects under controlled conditions, the introduction of practices based on their use in livestock, poultry and fisheries. Tenebrio molitor - Coleoptera: It belongs to the family Tenebrionidae and belongs to the family of hard-winged beetles. Its developmental stage includes 4 stages such as eggs, larvae, fungi and beetles.

Their diet is very broad, with organic products, natural moldy leaves, can feed on organic products of all kinds in nature or their residual products in general.

They lay up to 400-500 eggs, depending on lifestyle, nutrient environment and conditions. The developmental period of the egg also depends on the conditions,
including depending on the temperature, lasts 4 days at 26-30°C and up to 34 days at 15°C. Scientific sources have shown that their total lifespan lasts from 57 days to 629 days under controlled conditions, and 112-203 days in nature.
It was noted that the study of viability and productivity of T. molitor beetle was carried out under controlled conditions, the most productive life cycle of which lasted from 75 to 90 days. While the larval stage produces a minimum of 9, and a maximum of 23 larval layers, the average number of these layers is usually 11-19.
The practice of obtaining protein products from edible insects and their use in the poultry and fisheries industries is not yet widespread in the Republic of Uzbekistan. There are several reasons for this:
First - as in world practice, it is difficult to learn new food sources and apply them in daily practice;

Second - the ethnic mentality of the local population is sharply affected;

Thirdly - the staff of consumer farms is not provided with sufficient information about the food insects of the local population, their importance, nutritional value, ease of production and guidelines for their use in religious beliefs;

Fourthly - the production sectors have so far been provided with sufficient sources of production, and so on.
Therefore, the development of the fishing industry in the local context, one of the most important tasks is to create an uninterrupted food base of this network with nutritious and high nutritional value. It is known that many food products are used in the cultivation of edible insect species. These include products such as soy flour, corn flour and bran, wheat bran, or grain products flour and bran, depending on the conditions of the region in different countries.
In summary, since products are mainly food products for human consumption, finding and researching alternative sources to replace them is an important task. One such protein source is macrophytes, whose protein content is several times greater than the protein content of most plant-derived grains.

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