

## HELICULTURE – PERSPECTIVE BUSINESS IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT OF RURAL AREAS

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### Abstract

*The article was focused on determining the economic efficiency and arguing the economic calculations connected with the economic efficiency of the snails breeding within the agricultural farms of the Republic of Moldova. In order to make an analysis, the author proposed the idea of creating a model farm breeding snails in an area of 2,000 sqm to 10,000 sqm, the one that can be implemented and managed within a family farm. The economic calculations connected with snails breeding have been done taking into consideration the following aspects: assessment of the necessary investments, planning the annual revenues from sales, calculation of the annual consumptions and calculation of the final economic results. As a result of practicing the entrepreneurship activity within this farm designed for snails breeding, we determined that it is possible to obtain an annual sufficient profit for the further development of the mentioned business.*

**Keywords:** heliciculture, snail, production costs, sales income, cost, profitability.

### INTRODUCTION

In the last years, it have been put into practice various measures to halt the decline of the livestock sector and its dynamic development. One of these, is to promote intensively and providing the necessary support to start various businesses in rural areas.

Some businesses are found both traditional promoted business, well known by local entrepreneurs, as well as some non-traditional, drawn from international business.

Small entrepreneurs, now, have at hand the latest business ideas, which only needs to add enthusiasm and desire to make money, such as: increasing pheasant, quail growth, increasing ostriches, sturgeon growth, increasing chinchilla, snail farming, increasing vipers etc.

Some of them are quite attractive especially because of their economic efficiency or ratio between effort and effect.

Thus, entrepreneurs can start a business of snails or chinchilla growth, that it will provide them a market in the countries with “claims”. Foreigners have always appreciated the luxury and edible snails which are prepared in restaurants as well as luxury clothing chinchilla fur are products which are greatly appreciated by Italians, French, Spanish and many others.

### MATERIAL AND METHOD

In the present article we will focus on the determination and argumentation of the economic calculations regarding the economic efficiency of snails breeding. The author proposed the idea of creating models of farm breeding snails in an area of 2,000 sqm to 10,000 sqm, that can be implemented and managed within a family farm. The necessary investments to set up these farms and to purchase the means production can be done using personal sources or the ones obtained from another financing source.

### RESULTS AND DISCUSSIONS

Since ancient times, people have used in their diet, among many components and water or terrestrial mollusks. The discovery of snail shells during archaeological excavations merely confirm that the snails were used in the human diet since prehistoric times. Snail meat, like fish meat (Table 1), is very low in fat (0.5 to 0.8%) and relatively low in calories (60-80 cal/100 g), but has a biological high value of protein (12-16%) and minerals (1.5%), respectively, in nitrogen (2.5%). [1]

Table 1. The chemical composition of snail meat (Bud I., 1998)

Specification	Dry matter (%)	Water (%)	Proteins (%)	Non-nitrogen extractives (%)	Fats (%)	Mineral salts (%)
<i>Helix pomatia</i>	20.65	79.35	16.10	1.97	1.08	1.5
<i>Helix lucorum</i>	20.30	79.70	15.95	1.45	1.20	1.7
<i>Helix aspersa</i>	20.15	79.85	16.33	1.37	1.15	1.3

There are many species of snails, the majority of them edible, some poisonous and even harmful, especially in market gardens, other species scattered widely throughout Europe, North Africa, America and Asia Minor. The most popular species of snails, especially

the species which entering among the preoccupations of growth and human nutrition, are *Helix Pomatia* and *Helix Aspersa*. But there are also and other edible species: *Helix lucorum*, *Achatina fulica*, *Helix Lactea*, *Helix hortensis* etc. (Table 2). [1]

Table 2. Main edible species of snails on the market

The species	The main morphophysiological characteristics			
	Height (mm)	Width (mm)	Color	Weight (g)
<i>Helix pomatia</i> Orchard snail	38-40	38-80	White-brown to yellow-brown, longitudinal bands 4-5.	25-35
<i>Helix aspersa aspersa</i> Little gray	25-40	20-35	Gray or yellowish, with 4 brown bands.	15-20
<i>Helix aspersa maxima</i> The great gray (Algerian snail)	30-42	30-40	Gray or dirty yellow, with dark bands.	20-28
<i>Helix lucorum</i> Forest snail	30-35	50-70	White with brown-red bands.	15-22
<i>Achatina fulica</i> Giant snail	85-90	50-100	White-yellowish-brown.	up to 300 g
<i>Helix lactea</i> Milk snail (Spanish vine snail)	26-35	25-30	White, with stripes spiral streaked with red-purple.	16-22
<i>Helix hortensis</i> French garden snail	14-20	10-17	Very varied color, trimmed with a white border.	8-12
<i>Helix lutescens</i> Spool snail	30-35	30-40	White-yellow, with brown bands.	10-15
<i>Helix vulgaris</i> Striped snail	27-30	30-36	White with brown narrow bands.	10-12

Snails are delicacy certified as a traditional product in several countries in Western Europe, America and Southeast Asia. Snail meat and eggs are not only taste great, but, given the large amount of digestible protein, vitamins and trace elements are extremely useful to have a stimulating effect on the body. Moreover, snail serves as raw material for production of various medicinal products, which contribute to the activation of vital processes and body rejuvenation.

In Europe, the annual consumption of snails exceeds 100,000 tones and the demand outstrips supply for them and, according to marketing research of Western Europe spe-

cialists, it is satisfied in 60-70%. Collecting snails in the western countries was almost suspended: practically all land is cultivated and the natural populations of mollusks is not very large. Market needs are satisfied mainly on imports of living mollusks from Eastern Europe and Southwest Asia countries, as well as for artificial reproduction.

Snails breeding or heliciculture is a relatively new field of agricultural production. Rapid development in the last 20 years shows that the minimum capital investment of farming in this area can rapidly provide a large economic effect [3].

Each snail brings its descendants. Once a year in the spring, they submitted about 40-60 eggs. Brood growth fast enough and in the artificial conditions reach marketable weight in about half of year (cycle “spring-autumn-spring”).

“Marketable” is considered the weight of 20-25 grams and a size of about 5 cm. Even if some of the new generation will not survive anyway, each snail bring in the designated period up to 1 kg of brood. And consumption per 1 kg of delicacy is 2 kg of feed. Thus, 100 kg of snails may get several tons of brood. Is not really a business? But, like any other business, snail farming requires professionalism, competence and patience.

A business with snail farming has many advantages:

- minimum initial investment;
- the invested amount is recovered from the first year;
- to an investment of 5,000 EUR, the profit will be 10,000 up to 15,000 EUR;
- price per kg of live snail can vary between 3.5 and 5 EUR, and the meat of snail (escargot) can reach up to 30 EUR;
- outlet is provided by restaurants around the world;
- snail farm is developing low-cost;
- snails can be grown using the italian method (they are grown on a free land with the almost full use of low-cost food plant).

Below is presented a starting model of a business in heliciculture. This is for the people with limited financial resources, which have the necessary area for snail farming, but can not afford to invest a considerable amount for the start.

Given farm type is considered to be the most economically profitable because it requires less work and minor expenses (only water, electric power which remain work sprinkler and minimal employees work). This method of growing snails is most used in Italy. The disadvantages of this type of firm is the obtaining of a single harvest per year.

Where the money from these investments are concentrated: [1, 2]

- a quite large land, preferably more than 2,000 square meters (minimum profitability), which will be unshaded and slightly inclined to the

north (a slope not greater than 10%, ie 10 m height difference at a land of 100 m) to prevent puddles during rainy. In practice, the snails would not drown if the land is submerged in 5 cm of water more than 20 minutes.

-optionally, a chemical analysis of the soil and thermal indices of air and soil in 15 years for any changes. The used soil will be of average quality, not too sandy and without a high content of clay. Snails can not dig if the soil is too hard. Sandy soil must not contain enough water. A good soil is one that contains 20-40% of organic matter. The soil should be similar to that of a garden where leaves and vegetation are abundant. If the soil is too acid it must be neutralized with calcium and brought to a value close to pH 7. Besides soil pH, calcium must be available, both in soil and in other sources, to be taken by the snail, considering that a snail shell contains 97-98% of calcium carbonate.

-a solid fence that surrounds land to protect snails of terrestrial predators (foxes, hedgehogs, frogs, ferrets etc.). Gate should be placed in the middle of the longest side for convenience and should be approximately 2 m length.

-the land is divided in length into lots, which will have a widths of 3-5 m and a lengths of 30-50 m. Among these lots it will be leave strips of 1 m wide, without vegetation, for the passage of workers. The lots are surrounded by walls of wood, plastic, fiber or sheet steel about 60-70 cm height and are buried 10-15 cm in the ground as, that the snails to not dig under the walls. In order to support the walls will be needed some poles (most simple would be wooden) size 1.25cm×5cm×5 m located at a distance of 2.5 m. Parcels should be oriented east-west because during the day, this position offers to snails more shade from the walls. To avoid the exit of snails is wrapped the top of wall with a copper strip about 7 cm wide (some farmers claim inefficiency of this method). Note that wooden wall does not protect farm of pests such as earwig, centipedes, etc. Another way to keep the snails in the round is the method of bending the top of the fence inside, if

possible, in a sharp V with an angle of 20 degrees. The snail shell will reach with the back the paravane before they crawl to the inclined side and thus they will not be able to advance. Among outer fence and parcels will be leave 2-3 m for various works.

Parcels of land may be surrounded with Helitex (special mesh patented in Italy and guaranteed for 20 years) of about 1 m high, which will be attached every two meters by a wood pillar.

-in the land parcels it will be grown the favorite plants of snails (mixture of rape, kale, fodder beet, clover, sunflower). The biennial plants are preferred by snails species that reach maturity in two years. Besides the plants growing in fences is also given and dry food (cereal flours supplemented with calcium).

-to pillars, it will be cling colored strips of raffia to remove predatory birds.

-optionally: the basis of fence will be galvanized so that the snails not to be attracted by the smell of native plants.

-a sprinkler irrigation system it will be set up for wetting land in hot days. When sprinklers will work, water must reach the entire territory where snails are. Do not let uncovered places without sprinkler because those sides will be avoided of snails or snails that are already in that place will not increase so there will be no economy on putting less irrigation. The finest sprinklers are purchased because the snails prefer a humidity band type. Irrigation will be done every 2-3 days for 10-12 minutes in the evening only in dry months. Ensure that sprinklers are not too strong so as not to make puddles and drown snails. Also can be used and mobile sprinklers.

-if is not access to another water tank is needed a fountain. For convenience the well should be placed in the middle of the farm, but this decision should be made by specialists who build the well and who seek the source.

-in case of heavy rain will be build small drains.

-for the snails of the species *Aspersa*: it will be bought a very thin plastic called tesuto non tesuto used for covering parcels of land for the winter hibernation of snails. These snails need this plastic to withstand winter fever. For

cold winters it is recommended to locate snails in closed rooms for hibernation.

-optionally: among the snails territory can be installed leaking tube cut across which will serve as hiding. Leaking tube must not be of copper or cement.

-dishes for drinking water to be placed. Dishes must be plate so that the snails do not drown and to be wide enough in order to have access to them all snails.

-in addition to these arrangements it should be also a "Maternity".

The following considerations were taken into account in the development of the model:

- ✓ snail farming will be a family business and will not need additional staffing;
- ✓ snails collection will be done in the months of April-May;
- ✓ harvest is expected to gain at least 2.2 kg of snails per square meter;
- ✓ retail price of a kilogram of snails will be on average 3.5 EUR;
- ✓ the period of exploitation of the machine is 10 years;
- ✓ the depreciation is calculated using the linear method.

Therefore, for the increasing of snails in an area of 2,000 square meters, at the initial stage will be required to purchase a minimum necessary equipment and the total investment will be 146,137.25 MDL (about 9,400 EUR), the annual depreciation will be 34,476.35 MDL (Table 3).

Snail farming can generate more income sources. The main source is of course marketing of live snails - the preferred form for export sales. Additional income can be obtained from the sale of shells and snail eggs.

Thus, if the mass of a snail will be 20 grams, then 218,295 of snails ( $13,475 \times 18-10\%$ ) will weigh 4,365.9 kg (Table 4). Trade of live snails will be on average at a price of 54.25 MDL/kg, that allows to obtain revenues from sales by 236,850.08 MDL (about 15,300 EUR).

All calculations may vary according to obtained product quality, by the price negotiated with buyers, by the type of purchased equipment, by number of reached maturity snails, etc.

Table 3. Investment planning for increasing snails on an area of 2,000 sqm

Specification	Unit	Quantity	Unit cost, MDL	Total, MDL	The period of use, years	Annual depreciation, MDL
Exterior fence used for enclosure 2,000 sqm of the land, including:						
- wire mesh (1.8m)	m	210	65.20	13,692.00		
- galvanized plates (1m×2m)	piece	104	144.00	14,976.00		
- wooden poles (2m×15cm×15cm)	m3	2.5	2,650.00	6,625.00		
- barbed wire	m	220	2.86	629.20		
- galvanized wire	m	420	1.04	436.80		
- rivers	piece	550	0.21	115.50		
- screws	piece	500	0.12	60.00		
- nails	kg	2	20.00	40.00		
Subtotal	×	×	×	36,574.50	10	3,657.45
The fence used inside for separating layers, including:						
- Helitex place for 10 layers (1 m)	m	800	37.20	29,760.00		
- wooden poles (1.25m×5cm×5cm)	m3	1.25	2,650.00	3,312.50		
- galvanized wire	m	800	1.04	832.00		
- screws	piece	1,100	0.12	132.00		
- nails	kg	2	20.00	40.00		
Subtotal	×	×	×	34,076.50	10	3,407.65
Snails for breeding (Helix pomatia):						
- chosen snails from 18-24 months (612.5 sqm breeding layers × 22 copies per 1 sqm × price per piece)	piece	13,475	1.55	20,886.25	1	20,886.25
Oak plank (1m×20cm×1.5cm)	m3	3	4,500.00	11,250.00	10	1,125.00
Tiller and related equipment	piece	1	23,250.00	23,250.00	10	2,325.00
Disinfector	piece	1	1,350.00	1,350.00	5	270.00
Installation of "fog" spray irrigation	piece	1	9,300.00	9,300.00	5	1,860.00
Brushcutter	piece	1	1,700.00	1,700.00	10	170.00
Grid connections	piece	1	7,750.00	7,750.00	10	775.00
<b>TOTAL</b>	×	×	×	<b>146,137.25</b>	×	<b>34,476.35</b>

Table 4. Planning of annual economic results about snail farming on area of 2,000 sqm

Specification	Unit	Quantity	Unit cost, MDL	Total, MDL
<b>I. Sales income</b>	<b>MDL</b>	×	×	<b>236,850.08</b>
Live snails (harvesting: April-May) 20 g/snail	kg	4,366	54.25	236,850.08
<b>II. Annual variable consumptions</b>	<b>MDL</b>	×	×	<b>10,476.88</b>
Analysis of land	piece	1	1,550.00	1,550.00
Land cultivation (plowing, milling machining, execution of canals for irrigation, execution of system for irrigation)	sqm	2,000	0.85	1,700.00
The first disinsectisation for combating raptors located on the land (malathion - 5%)	kg	30	54.25	1,627.50
Application of inorganic nitrogen fertilizers 12/12/12 (15/15/15) or other similar to those which are used for maize and wheat	kg	50	3.10	155.00
Seeds for the first five layers (to use during the first year of production)				4,359.38
- brassica napus-crocifere (0.65 kg/strat)	kg	3.25	620.00	2,015.00
- beta vulgaris (0.50 kg/layer)	kg	2.50	310.00	775.00
- mixed salad (0.55 kg/layer)	kg	2.75	387.50	1,065.63
- clover (0.25 kg/layer)	kg	1.25	310.00	387.50
- sunflower (0.25 kg/layer)	kg	1.25	93.00	116.25
The second disinsectisation for combating raptors located on the land (malathion - 5%)	kg	20	54.25	1,085.00
<b>III. Gross profit (I-II)</b>	<b>MDL</b>	×	×	<b>226,373.20</b>
<b>IV. Fixed annual consumption</b>	<b>MDL</b>	×	×	<b>38,253.99</b>
Specialized consulting services	unit	2	75.00	150.00
Services and veterinary consulting	unit	2	75.00	150.00
Depreciation of fixed assets	MDL	×	×	34,476.35
Other expenses (10%)	MDL	×	×	3,477.64
<b>V. Net profit before taxation (III-IV)</b>	<b>MDL</b>	×	×	<b>188,119.22</b>

As a result of practicing business growth snails, an entrepreneur can get a net profit of 188,119.22 MDL (about 12,130 EUR), which can be a significant source of income for the potential entrepreneur only with a correct management of the business.

With increasing surface intended for farming snails will increase of course sales and revenue. Thus, if the surface for snail growth will be 10,000 sqm, the net profit before tax will increase 4-5 times.

## CONCLUSIONS

This article is an overview about the snail farming business based in Moldova. It shows the starting steps for a strong development in business.

While Republic of Moldova is not an outlet for the snails, due to cleaner natural factors, the production of Moldovan snails can be very much appreciated in countries like Italy, France or Spain.

Snail farming on a large scale requires a considerable investment of time, equipment and resources. In the future, snails breeders should consider these factors, especially if the goal is to provide large quantities for the commercial businesses. Everyone wants to grow snails must experience several methods until you find what works best in his situation, should be better documented in some publications, which are found in abundance on the market.

Although it is difficult to estimate construction costs of the farm/sqm however it can have some conclusions [4]:

-investment value decreases as farm area is higher (from 3.5 to 4.5 EUR/sqm for a farm of 2,000 sqm to 3-3.5 EUR/sqm on a farm over 1 ha).

-in the same context a farm on a highest surface can more easily absorb fluctuations in production due to unfavorable environmental conditions and possible loss of purchase price.

-if a farm on small area (2,000 m) can be regarded as a collateral activity, ensuring, after the return on investment, the snails adapting to the new environment and

gaining the experience in this area, an additional income by 4,000-8,000 EUR/year, a farm on an area of 1 ha can be regarded under normal conditions, as a business providing under the specified conditions a profit by 20,000-30,000 EUR/year.

However, whereas this activity is in the pioneering stage in our country, is absolutely necessary to be regarded as a business itself and not as an overnight enrichment and therefore taken seriously. Moreover when such initiatives start the person must take into account its financial and do not hazard to access loans, whose value exceeds the possibilities of financial. The most recommended is starting the business with moderation by accessing grants or low interest loans, so that the person should not go into default.

At the present, heliciculture as a branch of animal husbandry, can experience a true development and sustainable economic growth only in the market economy and European context. Also to be noted that the main consumers live mainly in Western Europe.

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