

## STRUCTURE AND EVOLUTION OF POTATO AVAILABILITY AND CONSUMPTION AT NATIONAL LEVEL, IN AN INTERNATIONAL CONTEXT (2011-2013)

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### ABSTRACT

The importance of potato cultivation is highlighted by aspects that refer to the use of this product from a food, industrial, export, economic and agrotechnical point of view.

The potato can be used in food, both unprocessed and in processed form, its nutritional value being determined by the chemical composition of the tubers which differs depending on the variety and the degree of maturation.

The industrial importance of the early potato is highlighted by its use for the manufacture of alcohol, starch, glucose and dextrin.

In the case of Romania, from the point of view of the components of the balance, it is worth noting its surplus character (+25.9 thousand t), a situation different from the world and community one.

### INTRODUCTION

Potato production is of food, industrial, agrotechnical - technological, fodder, export and profit source.

The potato is highly prized due to the pleasant taste that is maintained until close to full ripening of the tubers. The early potato covers an "assortment vacuum" in late spring and early summer. At the same time, the human body metabolizes nutrients from potatoes faster than those from meat, which also has the advantage that it can be prepared easily and quickly.

Due to the high nutritional value - one hectare of potato providing 2.5-3 times more nutrients than the same area cultivated with bread cereals - the potato is a staple food for some countries, such as Germany, Poland, the Netherlands, etc., he successfully replacing bread which - in many situations - remains predominant in the diet.

In potato production, the level of profitability and economic efficiency depends on increasing the yield per hectare, improving cost management and optimizing the marketing of production.

### METHOD AND MATERIAL

The specific indicators used start from the aspects related to the total availability (production, import, stocks, export) and total consumption (feed consumption, seeds - planting material, human consumption, processed raw materials, other uses, losses) - aspects presented in natural units (t).

Based on the quantitative expression of the total availability and the total consumption, the food balance of the analyzed product is constructed.

Establishing the level of total availability - according to FAO regulations, takes into account the sum of the level of production with the level of imports and stocks, from which the volume of exports decreases. If the level of stocks is negative, it is deducted from the sum of total production and imports. As a result, the formula for establishing the total internal availability appears as follows:

$$D_t = Q_t + I \pm S - E \text{ (t, th.t), in which:}$$

-  $D_t$  – total availability (t, th.t);

- $Q_t$  – total production (t, th.t);
- $S$  – stock (t, th.t);
- $E$  – export (t, th.t).

In order to establish the total consumption, the following component elements are taken into account: feed consumption, food consumption, processed raw materials, other uses, losses. According to the FAO methodology, the determination of the total level of consumption is done by summing up the elements mentioned above. In this case, the total consumption is composed of: feed consumption, human consumption, other uses and losses. Consequently, the following calculation formula can be used:

$C_t = C_f + C_u + A_u + P$  (t, mii t), in which:

- $C_t$  – total consumption (t, Th.t);
- $C_f$  – feed consumption (t, Th.t);
- $C_u$  – human consumption (t, Th.t);
- $A_u$  – other uses (t, Th.t);
- $P$  – loss (t, Th.t).

The effective determination of the balance takes into account the difference between the total volume of available quantities and the total volume of consumption. As a result, the proposed calculation formula is as follows:

$B_a = D_t - C_t$  (t, th.t), in which:

- $D_t$  – total available quantities (t, Th.t);
- $C_t$  – Total consumption (t, Th.t).

Depending on the values of total consumption and total availability, the balance may be surplus, deficit or a situation of equilibrium may be encountered between the two constituent elements.

The indicators are presented for three reference levels - global general, European Union and Romania (period 2011-2013), so as to build an image of our country's global and regional level.

## RESULTS AND DISCUSSIONS

Table 1 shows the components of the world potato balance sheet.

In 2011, total availability was 370.884.2 thousand t, which was as follows: 372,252.5 thousand t total production (100.37%), 29,293.7 thousand t import (0.79%), -2,340.2 thousand t stocks (-0.63%), 28,321.8 thousand t exports (-7.63%).

For total consumption a level of 370,950.2 thousand t was reached, to which they contributed: feed consumption by 46,045.9 thousand t (12.41%), planting material with 32,467.8 thousand t (8.75%), human consumption with 235,210.7 thousand t (63.41%), processed raw materials with 13,110.4 thousand t (3.53%), other uses with 10,628.7 thousand t (2.87%), losses by 33,486.7 t (9.03%).

As a result of these aspects, it can be concluded that for that year the balance was deficient: -66.0 thousand t.

For 2012, the product balance was deficient (-74.1 thousand t), which is based on a total available of 372,977.9 thousand t and a total consumption of 373,052.0 thousand t.

The creation of the total available is based on the following components: 98.78% production – 368.425.0 thousand t, 8.25% imports – 30,766.7 thousand t, 0.68% stocks – 2,554.7 thousand t, - 7.71% exports – 28,768.5 thousand t. In terms of total consumption, the component parts were as follows: 64.49% human consumption – 240,563.1 thousand t, 11.93% forage consumption – 44,515.2 thousand t, 8.85% plant material – 33,010.0 thousand t, 8.51% losses – 31,748.8 thousand t, 3.51% processed raw materials – 13,086.7 thousand t, 2.71% other uses – 10,128.2 thousand t.

If we consider the situation of 2013, we can see a level of 377,504.5 thousand t for total availability, 377,593.6 thousand t for total consumption and a balance deficit of 89.1 thousand t. The creation of total available is based on: 374,219.7 thousand t total production

(99.13%), 31,602.0 thousand t imports (0.25%), 29,261.0 thousand t exports (-8.37%), 948.3 thousand t stocks 7.75%).

Table 1.

**World balance (thousand t) - structure (2011 – 2013)**

No.	Specification	YEAR						Period average**	
		2011		2012		2013		Effective	Str. (%)
		Effective*	Str. (%)**	Effective*	Str. (%)**	Effective*	Str. (%)**		
1	Production	372,252.5	100.37	368,425.0	98.78	374,219.7	99.13	371,632.4	99.42
2	Import	29,293.7	0.79	30,766.7	8.25	31,602.0	8.37	30,554.1	8.17
3	Stocks	-2,340.2	-0.63	2,554.7	0.68	943.8	0.25	386.2	0.11
4	Export	28,321.8	-7.63	28,768.5	-7.71	29,261.0	-7.75	28,783.8	-7.70
5	Total Availability	370,884.2	100	372,977.9	100	377,504.5	100	373,788.9	100
6	Feeding consumption	46,045.9	12.41	44,515.2	11.93	47,270.5	12.52	45,943.8	12.29
7	Planting material	32,467.8	8.75	33,010.0	8.85	32,200.2	8.53	32,559.2	8.71
8	Human consumption	235,210.7	63.41	240,563.1	64.49	239,074.6	63.31	238,282.7	63.73
9	Processed raw materials	13,110.4	3.53	13,086.7	3.51	12,936.9	3.43	13,044.6	3.49
10	Other uses	10,628.7	2.87	10,128.2	2.71	10,656.3	2.82	10,471.6	2.80
11	Loses	33,486.7	9.03	31,748.8	8.51	35,455.1	9.39	33,563.4	8.98
12	Total consumption	370,950.2	100	373,052.0	100	377,593.6	100	373,865.3	100
13	Balance	-66.0	-	-74.10	-	-89.10	-	-76.40	-

<http://www.fao.org/faostat/fr/#data/BC> (22.02.2020)

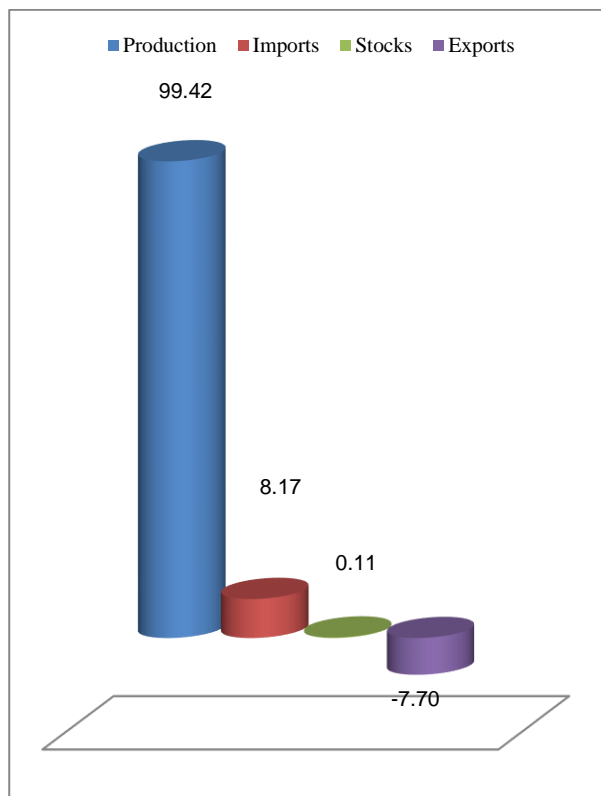
\*\*own calculation

At the level of total consumption, the components were: 10,656.3 thousand t other uses (2.82%), 12,936.9 thousand t processed raw materials (3.43%), 32,200.2 thousand t planter material (8.53%), 35,455.1 thousand t losses (9.39%), 47,270.5 thousand t forage consumption (12.52%), 23,9074.6 thousand t human consumption (63.31%).

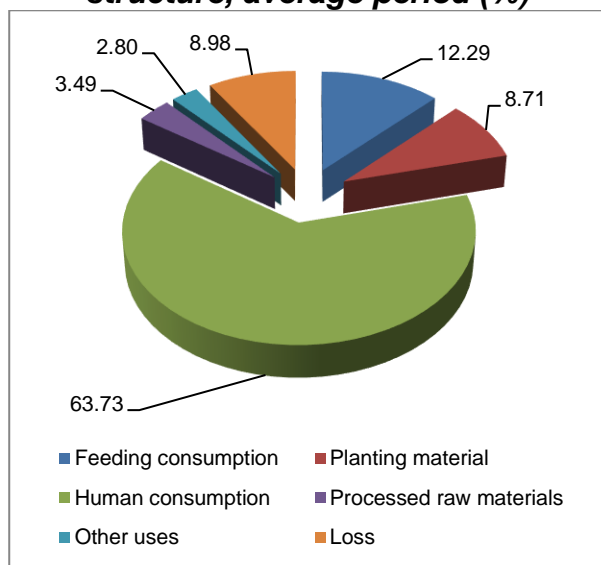
Based on the sequential values, specific to the years of the dynamic series, the average of the period was determined. At the average level, the total availability was 373,788.9 thousand t, presenting the following structure (fig. 1): 99.42% total production (371,632.4 thousand t); 8.17% import (30,554.1 thousand t); 0.11% stocks (386.2 thousand t); -7.70% export (28,783.8 thousand t).

For total consumption, a share of 373,865.3 thousand t was reached, which is based on percentage contributions, as

follows (fig. 2): 2.80% other uses (10,471.6 thousand t); 3.49% processed raw materials (13,044.6 thousand t); 8.71% planter (32,559.2 thousand t); 8.98% losses (33,563.4 thousand t); 12.29% feed consumption (45,943.8 thousand t); 63.73% human consumption (238,282.7 thousand t).

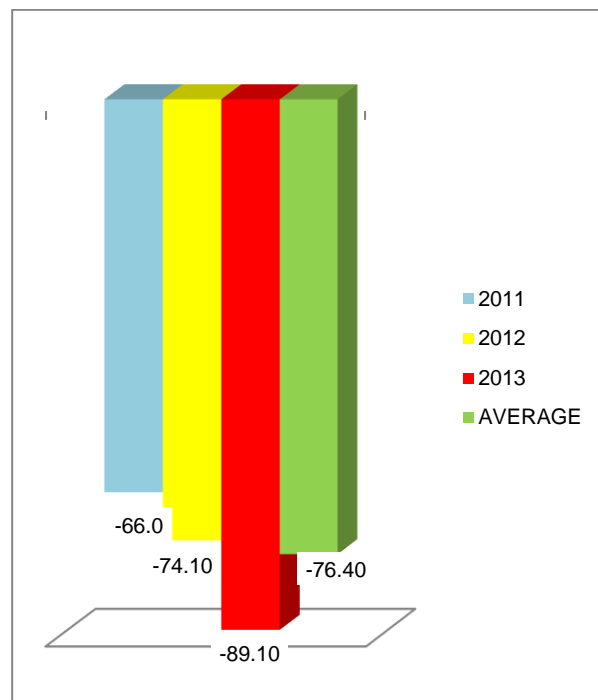


**Fig. 1. Total world availability – structure, average period (%)**



**Fig. 2. Total world consumption - structure, average for the period (%)**

Under these conditions, the balance of the product was deficient: - 76.40 thousand t (fig. 3).



**Fig. 3. World balance (Th.t)**

The information on the regional potato balance is presented in Table 2.

In 2011, the total quantity available was 57,842.6 thousand t, at which level the following factors contributed differentiated: 107.80% production – 62,354.6 thousand t, 26.69% imports – 15,439.6 thousand t, -2.65% stocks – 1,532.0 thousand t, -31.84% exports – 18,419.6 thousand t. Total consumption was 57,842.8 thousand t, level based on the following contributions: 36,469.2 thousand t human consumption – 63.05%, 5,438.0 thousand t forage consumption – 9.40%, 4,702.1 thousand t planter material – 8.13%, 4,579.9 thousand t other uses – 7.92%, 4,545.7 thousand t losses – 7.86%, 2,107.9 thousand t processed raw materials – 3.64%.

For 2012 a level of 54,403.2 thousand t of total available production can be found, level which has as its component parts the following quantities: 19,974.7 thousand t exports – -37.62%, 2,866.5 thousand t stocks – 5.27%, 16,703.1 thousand t imports – 30.71%, 54,808.3 thousand t production – 100.74%. Total consumption reached 54,403.3 thousand t, quota based on the

following components: 35,918.4 thousand t human consumption – 66.02%, 4,466.3 thousand t forage consumption – 8.22%, 4,308.8 thousand t planter material – 7.92%, 4,118.3 thousand t losses – 7.57%, 3,586.6 thousand t other uses – 6.59%, 2,004.9 thousand t processed raw materials – 3.68%.

At the level of 2013, the Community market is characterised by a total available of 53,361.4 thousand t and a total consumption of 53,361.7 thousand t. The components of total availability were: production – 54,748.8 thousand t (102.60%), import – 17,038.3 thousand t (31.93%), stocks – 1,145.8 thousand t

(2.15%), export – 19,571.5 thousand t (-36.68%). For total consumption, the components were: processed raw materials – 1,993.7 thousand t (3.74%), other uses – 3,926.5 thousand t (7.36%), planter material – 3,948.5 thousand t (7.40%), losses – 3,984.4 thousand t (7.47%), feed consumption – 4,019.6 thousand t (7.53%), and human consumption – 35,489.0 thousand t (66.50%).

The average period is characterized by a total available of 55,202.4 thousand t, the structure of which (fig.4) is the following:

Table 2.

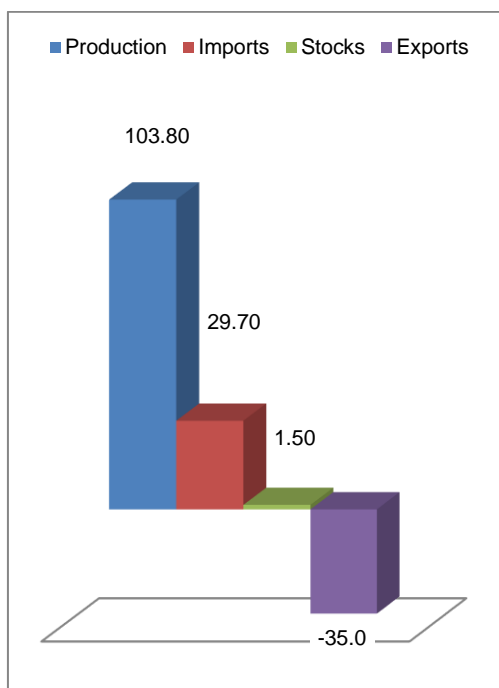
**European Union. Product balance (thousand t) - structure (2011 – 2013)**

No.	Specification	YEAR						Period average**	
		2011		2012		2013		Effective	Str. (%)
		Effective*	Str. (%)**	Effective*	Str. (%)**	Effective*	Str. (%)**		
1	Production	62,354.6	107.80	54,808.3	100.74	54,748.8	102.60	57,303.9	103.80
2	Import	15,439.6	26.69	16,703.1	30.71	17,038.3	31.93	16,393.7	29.70
3	Stocks	-1,532.0	-2.65	2,866.5	5.27	1,145.8	2.15	826.7	1.50
4	Export	18,419.6	-31.84	19,974.7	-36.72	19,571.5	-36.68	19,321.9	-35.00
5	Total Availability	57,842.6	100	54,403.2	100	53,361.4	100	55,202.4	100
6	Feeding consumption	5,438.0	9.40	4,466.3	8.22	4,019.6	7.53	4,641.3	8.42
7	Planting material	4,702.1	8.13	4,308.8	7.92	3,948.5	7.40	4,319.8	7.82
8	Human consumption	36,469.2	63.05	35,918.4	66.02	35,489.0	66.50	35,958.9	65.13
9	Processed raw materials	2,107.9	3.64	2,004.9	3.68	1,993.7	3.74	2,035.5	3.69
10	Other uses	4,579.9	7.92	3,586.6	6.59	3,926.5	7.36	4,031.0	7.30
11	Losses	4,545.7	7.86	4,118.3	7.57	3,984.4	7.47	4,216.1	7.64
12	Total consumption	57,842.8	100	54,403.3	100	53,361.7	100	55,202.6	100
13	Balance	-0.2	-	-0.1	-	-0.3	-	-0.2	-

<http://www.fao.org/faostat/fr/#data/BC> (22.02.2020)

\*\*own calculation

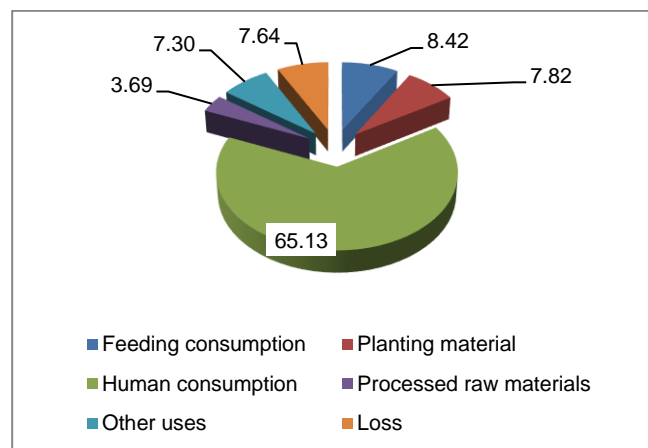
103.80% production (57,303.9 thousand t); 29.70% import (16,393.7 thousand t); 1.50% stocks (826.7 thousand t); -35.0% export (19,321.9 thousand t).



**Fig. 4. Structure of total Community availability – average of the period (%)**

From the point of view of total consumption – 55,202.6 thousand t, the following component parts are found (fig. 5): 3.69% processed raw materials (2,035.5 thousand t); 7.30% other uses (4,031.0 thousand t); 7.64% losses (4,216.1 thousand t); 7.82% planter (4,319.8 thousand t); 8.42% feed

consumption (4,641.3 thousand t); 65.13% human consumption (35,958.9 thousand t).



**Fig. 5. Structure of total Community consumption – average of the period (%)**

In these conditions the product balance was poor for the entire period analyzed.

Table 3 shows the components of the national potato balance. It can be found that the components of total consumption are missing processed raw materials.

Table 3.

**Romania. Product balance (thousand t) - structure (2011 – 2013)**

No.	Specification	ANUL						Period average**	
		2011		2012		2013		Effective	Str. (%)
		Effective*	Str. (%)**	Effective*	Str. (%)**	Effective*	Str. (%)**		
1	Production	4,076.6	108.72	2,465.2	78.51	3,289.7	102.12	3,277.2	97.23
2	Import	189.8	5.06	197.0	6.27	255.1	7.92	213.9	6.35
3	Stocks	-500.0	-13.33	487.0	15.51	-308.9	-9.59	-107.3	-3.18
4	Export	16.9	-0.45	9.2	-0.29	14.5	-0.45	13.5	-0.40
5	Total Availability	3,749.5	100	3,140.0	100	3,221.4	100	3,370.3	100
6	Feeding consumption	452.9	12.33	158.9	5.06	215.5	6.69	275.9	8.26
7	Planting material	993.4	27.05	694.5	22.12	729.6	22.65	805.8	24.10
8	Human consumption	2,165.6	58.98	2,192.6	69.83	2,159.2	67.03	2,172.5	64.96
9	Other uses	77.5	2.11	54.0	1.72	67.1	2.08	66.2	1.98
10	Loses	60.0	1.63	40.0	1.27	50.0	1.55	50.0	1.50
11	Total consumption	3,671.9	100	3,140.0	100	3,221.4	100	3,344.4	100
12	Balance	+77.6	-	-	-	-	-	+25.9	-

<http://www.fao.org/faostat/fr/#data/BC> (22.02.2020)

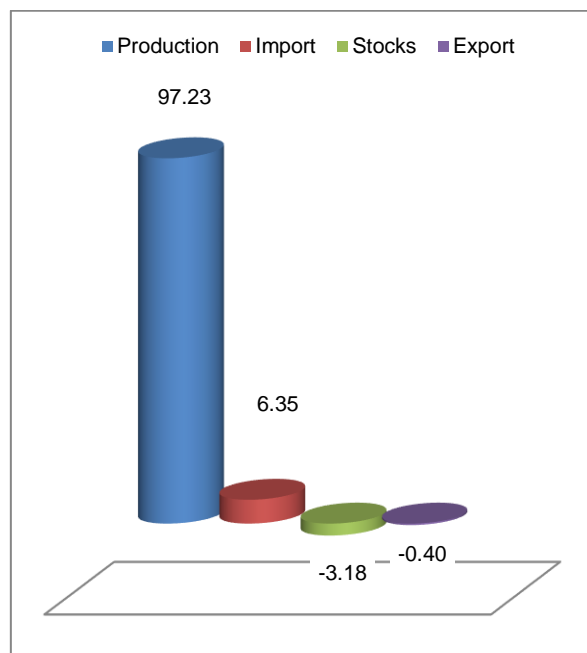
\*\*own calculation

For 2011, it can be seen that the balance was an over-surplus one (+77.6 thousand t). The total availability (3,749.5 thousand t) is based on the following components: 4,076.6 thousand t production (108.72%), 189.8 thousand t imports (5.06%), -500.0 thousand t stocks (-13.33%), 16.9 thousand t exports (-0.45%). The creation of total consumption (3,671.9 thousand t) contributed: human consumption – 2,165.6 thousand t (58.98%), planting material – 993.4 thousand t (27.05%), feed consumption – 452.9 thousand t (12.33%), other uses – 77.5 thousand t (2.11%) and losses – 60.0 thousand t (1.63%).

At the level of 2012, the total availability was 3,140.0 thousand t, at which level the components had the following percentage participation rates: 78,51% production (2,465.2 thousand t), 6.27% imports (197.0 thousand t), 15,51% stocks (487.0 thousand t), -0.29% exports (9.2 thousand t). Total consumption was equal to the existing available quantities, which had as components the following elements: human consumption – 69.83% (2,192.6 thousand t), planter material – 22.12% (694.5 thousand t), feed consumption – 5.06% (158.9 thousand t), other uses – 1.72% (54.0 thousand t) and losses – 1.27% (40.0 thousand t).

In the case of 2013, a balance between availability and consumption occurs, with each indicator reaching the level of 3,221.4 thousand t. To establish the total domestic availability acted: production – 3,289.7 thousand t (102.12%), import – 255.1 thousand t (7.92%), stocks – -308.9 thousand t (-9.59%) and exports – 14.5 thousand t (-0.45%). The formation of total consumption is based on variable quantities of product used as follows: 50.0 thousand t losses (1.55%), 67.1 thousand t other uses (2.08%), 215.5 thousand t forage consumption (6.69%), 726.6 thousand t planter material (22.65%) and 2,159.2 thousand t human consumption (67.03%).

By determining the average of the period analysed, an excess balance (+25.9 thousand t) is observed. This situation starts from a total available of 3,370.37 thousand t, which had the following structure (fig. 6): 97.23% production (3,277.2 thousand t); 6.35% imports (213.9 thousand t); -3.18% stocks (-107.3 thousand t); -0.40% exports (13.5 thousand t).



**Fig. 6. Total national availability – structure, average period (%)**

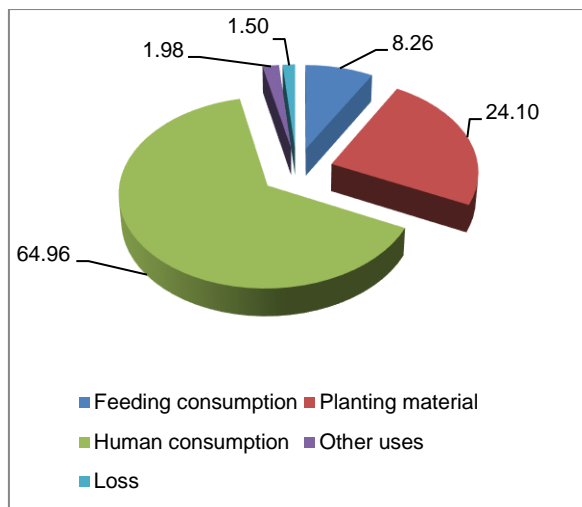
Total consumption reached 3,344.4 thousand t, its structure thus presenting itself (fig. 7): 1.50% losses (50.0 thousand t); 1.98% other uses (66.2 thousand t); 8.26% feed consumption (275.9 thousand t); 24.10% planter (805.8 thousand t); 64.96% human consumption (2,172.5 thousand t).

## CONCLUSIONS

At national level, there are a number of issues, such as:

- from the point of view of the components of the balance, it is worth noting the excess nature of the balance (+25.9 thousand t), a situation different from that of the world and the Community respectively. Production (97.23%) predominates within the available market,

imports far exceed exports – a less convenient situation in terms of trade balance;



**Fig. 7. Total national consumption – structure, average of the period (%)**

- total consumption is predominant, as in the case of the global and regional situation, by the elements related to use in human nutrition (the largest share – 64.96%), after which the material of the plant is 24.10%. It is worth noting the low weights of the rest of the elements – less favorable aspect at least in terms of forage consumption;

- the vast majority of the elements of the balance have a fluctuating evolution, except for the import which has growth trends – less favorable aspect;

- national total availability represents 0.90% of the global level of the indicator and 6.11% of the Community level. For total consumption the weights were 0.89 and 6.06% respectively compared to the comparison levels;

- for Romania, it would be worth noting the need to make better use of the existing potential for potato cultivation, while improving technological, managerial and financial support measures.

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