Challenges of preparing supply balance sheet for game meat

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Abstract

Slovenia is internationally recognized as a country with a great diversity of wildlife and sustainable game management. Despite very accurate recording of game management, there is no detailed overview of the international trade in game meat and its availability on the Slovenian market. In this paper, we reviewed the available databases in the field of game meat and analysed the possibilities of calculating supply balance sheets. The Lisjak (Hunting Association of Slovenia) and OSLIS (Forestry Institute of Slovenia) data systems enable very precise tracking of game handling up to sale by 411 hunting clubs and 8 State hunting reserves. In 2024, 1,524 tons of game were placed on the market in Slovenia, of which the largest share was red deer meat (38.6%) and wild boar meat (36.2%). In 2024, 1,927 tons of game meat were imported into Slovenia, most of which came from Spain and Hungary. 1,470 tons of game meat were exported, a third of which went to Switzerland. The greatest deficiency in the availability of data for calculating supply balance sheet is evident in data on stocks and international trade in game. The data are not shown separately at the level of different types of meat and products, which would allow calculations to be made to the total equivalent of game carcasses using meat loan coefficients.

INTRODUCTION

One of the challenges of the modern world is finding a balance between ensuring food security for a rapidly growing human population and preserving natural resources for food production. Due to numerous pressures on the environment and climate change, the challenge is even more difficult. Agriculture plays a key role in providing food for the population, which is why this sector receives the most attention, including in Slovenia. However, other food sources, such as hunting, fishing and gathering, are rarely mentioned in many discussions and strategic documents. According to data from the Forest Service of the Republic of Slovenia, the amount of game meat produced in Slovenia exceeds the amount of fish and other aquatic organisms (Zeleno poročilo za leto 2023, 2024), so it would be right to pay more attention to this area as a food source.

Game meat is a food with high nutritional value. Compared to domestic animal meat, game stands out primarily for its higher protein and essential amino acid content, and its content of desirable Omega-3 and Omega-6 fatty acids is also significantly higher (Strazdina et al., 2013).

In developing countries, game meat represents a cheap source of high-quality protein (Hoffman and Cawthorn, 2012), while in the developed world it represents a prestigious commodity in many places and fetches unreasonably high prices, which discourages many consumers from consuming game meat more frequently.

Slovenia is recognized as a country with a high diversity of wild forest animals due to its high forest cover (Zeleno poročilo za leto 2023, 2024), forest conservation and diversity of habitat types (ARSO, 2001). It is also recognized as a country with a high level of sustainable management of game and other wild animals that are not considered game (LZS, 2024), where game is a species of wild mammals and birds that are hunted and have a defined hunting season (Zakon o divjadi in lovstvu, 2025).

Consumption and self-sufficiency of the main agricultural products are monitored annually within the framework of the preparation of food balances for individual products (SURS, 2023; EUROSTAT, 2009), while the calculation of supply balance sheets for non-agricultural food sources is not a common practice. The importance of game meat as a source for human food consumption and the need for balance data prompted us to review the state of the obtained game meat and analyse the possibility of preparing a supply balance sheet for game meat in Slovenia.

MATERIAL AND METHODS

The first part of the research included an overview of the collection of data on game poaching by individual game species and the subsequent handling and trade of game meat. We focused on all ungulate game living in Slovenia: red deer, roe deer, chamois, fallow deer, mouflon, alpine ibex and wild boar. We disregarded the breeding of game in pens (red deer and fallow deer), for which, despite the lack of data, we estimate that they are not a significant source of game meat quantities and have therefore been disregarded. We also disregarded the hunted quantities of small and other game (wild hare, pheasant, bear, nutria, badger, dormouse, ...), since this type of game is not traded or the quantities that enter the human food chain are very small.

For the purposes of the analysis, we focused only on data on the quantities of game hunted and sold, regardless of the type of buyer, as only these represent the entry into the human food chain.

We addressed a request to obtain data for 2024 to the Hunting Association of Slovenia (LZS), the Forest Service of the Republic of Slovenia (ZGS), and the Administration for Food Safety, Veterinary and Plant Protection (UVHVVR). The LZS has the Lisjak data system. In addition to administrative support for hunting ground managers, i.e. hunting clubs, the very extensive data portal includes data on biotechnical operations in hunting grounds, hunted game and game losses. The data recording is very detailed, at the level of age and sex structure of each species. From the

perspective of an aggregate review, Lisjak (LZS, 2011) has a drawback, as it does not include data on hunting and game losses in State hunting reserves (LPN), which are under the auspices of the ZGS.
The Forestry Institute of Slovenia (GIS) has a wider database. Their information system OSLIS (2025) combines data from the Lisjak system and LPN data. The purpose of the OSLIS system is to provide information and data support for the preparation of game management plans. OSLIS is intended for public, professional and research use. Tabular, graphic and cartographic displays of data on hunting and losses in game populations in Slovenia are available to the public. The data is presented in the form of summaries for the state and hunting management area (LUO; i.e. hunting areas of several hunting clubs) levels, which is not sufficient for our analysis, so it was necessary to obtain data at the level of reporting units.
In addition to the production, processing or otherwise obtained quantities of food, foreign trade data are also required for the calculating supply balance sheets. These are monitored and published annually by SORS at the level of the 8-digit nomenclature on the publicly accessible SiStat web portal (SURS, 2025). The tariff codes that cover game meat or other game products are: 0281090 - Meat and offal of wild hares, fresh, chilled or frozen, 02089030 - Meat and offal of wild game other than rabbits and hares, fresh, chilled or frozen, 05021000 - Bristles and hair of domestic or wild boars and waste of such bristles, for brush making and 16029031 - Meat products of wild game or domestic rabbits, other edible offal.
For the purposes of calculating supply balance sheet for game meat, data on international trade in game meat is not precise enough due to the combination of data on meat from all types of game and the different stages of meat preparation. We contacted the UVHVVR for help, but apart from records of game processing and skinning plants, they do not have any information. However, they do have information on business entities that carry out international trade in game meat, which allowed us to gain a more detailed insight into this segment of trade.
Part of the game meat is delivered to Slovenia in packaged form through retail chains, so we also asked the Chamber of Commerce of Slovenia (TZS) for more detailed data on the quantities of game meat by type of game and level of packaging.

Table 1. Average lean meat percentages (%) of game at different processing stages (Ficko, 2007)

Type of game	Skinning	Meat section	Deboning	Cutting
Red deer	89,4	82,3	64,2	61,8
Roe deer	84,7	78,2	57,4	54,9
Chamois	92,2	84,7	57,9	57,1
Moufflon	91,6	86,0	59,2	58,0
Wild boar	79,2	75,4	53,0	51,5

Data for game meat in the Lisjak and OSLIS data and information systems refer to game carcasses with skin (without head and hooves, in the case of wild boar also with head), while trade in game meat takes place in the form of carcasses with skin, meat with bones and packaged meat without bones. To calculate the supply balance sheet for game meat, calculations of individual stages of meat processing into a common equivalent are required, and for this, meat leans coefficients (Ficko, 2007) are required at several levels of processing of carcasses and game meat; skinning, meat section, boning and cutting of meat.

Results and discussion

Analysis of data from the OSLIS information system showed that hunting clubs and State hunting reserves sold 1,524.3 tons of game (carcasses with skin) in 2024. Of this, 1,308.6 tons were sold by hunting clubs, which represents around 86% of the total amount of game sold. The largest share is red deer meat, namely 38.6%, which amounts to 588.1 tons.

Table 2. Mass (t) and structure (%) of game taken in Slovenia in 2024

Type of game	Weight of cleaned carcasses [a] (t)	Share (%)
Red deer	588,1	38,6
Roe deer	323,4	21,2
Chamois	38,3	2,5
Fallow deer	13,2	0,9
Moufflon	8,6	0,6
Alpine ibex	0,2	0,0
Wild boar	552,4	36,2
Total	1.524,3	100

[a] Cleaned carcasses with skin.

Source: OSLIS (2025)

With 552.4 tonnes (36.2%), the amount of wild boar meat obtained is the second most important type of game meat. A decade ago, the number of wild boars hunted was half that of 2024 (Zeleno poročilo za leto, 2024), and the amount of wild boar meat obtained and placed on the market was less than that of roe deer meat.
Due to the increase in the wild boar population and the decline in the roe deer population, roe deer meat represented the third most important source of game meat. In 2024, 323.4 tons were obtained, representing a good fifth of the game meat sold.
A review of available foreign trade data showed that all game meat, excluding hares and rabbits, is classified under the 8-digit tariff code 02089030, regardless of the level of processing. This makes it impossible to convert quantities to a total mass equivalent, as is the case with comparable beef meat, where the equivalent is a carcass slaughter weight.
Based on foreign trade data, trade in game meat is carried out only between EU Member States and Switzerland. In 2024, trade in game products with third countries took place only with China (import of bristles for industrial purposes) and Serbia (export of meat), and the quantities were at the level of a truck or less. In 2024, 1,927 tons of game meat, game meat products or other game products were brought to Slovenia, with around half a percent representing goods for industrial purposes. Game exports in 2024 amounted to 1,469.9 tons, and practically the entire quantity represented meat for human consumption.
Slovenia imports most game from Hungary, Spain, Slovakia and Poland, which are known to have large numbers of red deer and wild boar and are among the largest suppliers of game meat in Europe (Stoica, 2022). These four countries accounted for 79% of total game imports in Slovenia in 2024.
Slovenia exported the most game meat to Switzerland in 2024, which at 491 tons represented about a third of total exports. In the same year, 39% of game meat was exported to Spain and Italy, and 11% to the Netherlands.

Table 3. Foreign trade of game meat in 2024

Import (t)		Export (t)	
Total	1.927,0	Total	1.469,6
Of this:		Of this:	
meat and offal of game other than rabbits and hares	1.884,1	meat and offal of game other than rabbits and hares	1.455,4
Country		Country	
Spain	438,4	Switzerland	490,8
Hungary	430,3	Spain	288,9
Slovak Republic	340,0	Italy	278,8
Poland	309,9	Netherland	164,6
Netherland	122,3	France	94,4
Other	286,1	Other	152,1

Note: provisional data
Source: SORS (2025)

A parallel review of UVHVVR data showed that only two companies in Slovenia are engaged in the purchase of game, preparation of game meat and wholesale sales game or game meat products. One company only purchases game carcasses and transports them to Italy for processing, while the other company purchases game in Slovenia and EU member states for processing, and the main part of the total sales of game meat for this company is sales on foreign markets.
Part of the trade with game meat also takes place through retail sales in trading systems. Due to the lack of data or lack of public availability of data, it is impossible to estimate the quantities through various marketing channels. For now, the only option left is to obtain data directly from business entities.

CONCLUSIONS

The analysis of the game meat market has shown that the game meat trade in Slovenia is by no means a marginal area. For comparison, in 2023 (the latest available data), 1,411 tons of fish and other marine and freshwater aquatic organisms were obtained in Slovenia, which is less than the game meat obtained in 2024 (1,542 tons).
Apart from the availability of data at the level of hunting and placing on the market and data on international trade in game at the aggregate level, public data systems do not currently have sufficiently detailed data to enable the calculations of supply balance sheet for game meat. For this purpose, it would be necessary to establish reporting of international trade in game meat at the level of different levels of meat processing or processing, i.e. separately at the level of game meat and game meat products, similar to the case of beef or pork, whereby for greater accuracy, due to the different meat leans, it is desirable to record separately by species of ungulate game.

To calculate the supply balance sheet for game meat and ensure full comparability with supply balance sheets for meat of domestic animal, records of stocks of game meat and game meat products are also required. Since this is a normal business data from company balance sheets, the availability of the data should not be questionable.
After establishing a suitable database at the meat and product level, separated by different types of ungulate game, and using lean meat coefficients, it is possible to convert to the total equivalent of game carcasses and calculate the supply balance sheet for game meat.
The problem could arise due to the small number of observed units. The data would acquire confidential status, and further use and display of the data could therefore be limited or prevented.

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