Production of ecological wild meat products in the hunting organizations of the Hokkaido island (Japan) and the Amur region (Russia)

Aleksandr Senchik^{1,*}, *Aleksandr Tousehkin*¹, *Hiromasa Igota*², and *Aliya Tousehkina*¹

¹Far Eastern State Agrarian University, Blagoveshchensk, Amur Region, Russia

²University Rakuno Gakuen, Hokkaido, Ebetsu, Japan

Abstract. With the growth of the population of our planet, the problem of food production is increasing. In this situation, the importance of hunting farms in providing people with environmentally friendly meat products is increasing. During the study period, about 380 elk, 350 red deer, 2800 roe deer, 240 reindeer, 400 musk deer and 125 bears were harvested annually in Amur region. In Japan, game meat products are obtained mainly from sika deer, wild boar and brown bear. Meat products are used in food by hunters, sold to restaurants within the country and exported. As a result of our research, we came to the following conclusions: the game products in Amur region are mainly used by the hunters themselves in their private consumption, and only a small part of them goes for sale in food stores and agricultural markets. Even smaller amounts of wild meat products go to restaurants. Hunting is unpopular in Japan, and young people in general are not ready to engage in it. In our opinion, "wild meat" is an attractive environmentally friendly product for people in Russia and Japan and can undoubtedly serve to attract tourists to places of recreation and into gastronomic tours in Japan and Russia.

1 Introduction

Ensuring the safe nutrition of people, including food, is an important task of any country. The main industry supplying meat to the population is undoubtedly the livestock sector of agriculture. With the growth of the population of our planet, the problem of food production is increasing. That leads, besides everything else, to the use of various food additives and medicines (antibiotics), which affects the environmental friendliness of the ready meat products. The purpose of hunting is to meet the needs of the population in meat, furs and recreation. In this situation, the importance of hunting farms in providing people with environmentally friendly meat products is increasing. The popularity of hunting in Russia and Japan is falling. The reasons for the low popularity of hunting among the population of these two countries are different. We tried to study the situation in hunting enterprises in Russia and Japan, and also investigated the popularity of hunting meat products among people living in both countries and the possibility of sending hunting meat for export.

* Corresponding author: senchik_a@mail.ru

2 Research methods

The purpose of research. To study the volumes of hunting animals in Amur region and Japan, as a factor of providing the population of the two countries with environmentally friendly meat products and the possibility of export to other countries. The research material was wild animal populations in Amur region (Russia) and Hokkaido Island (Japan). We used analytical research methods to systematize the statistics of census studies of wild animals conducted in two countries. We were also actively engaged in field work in hunting areas, monitoring wild animals, hunting them, dressing carcasses and preparing meat products, as well as conducting a demand analysis and determining the volumes of wild animal meat products obtained from hunting.

3 Results

Research results and discussion. On the territory of Amur region, hunting for ungulates, predators and fur animals is carried out. The local population gets game meat products mainly from hunting ungulates and, to a lesser extent, from brown bear hunting. During the studied period (from 2009 to 2019), the number of elk and red deer in Amur region was relatively stable. The population of wild boar, wild reindeer, musk deer, brown bear was slightly increasing. The population of Siberian roe deer was catastrophically reduced, which resulted in the closure of hunting in the region in 2018. During the study period, about 380 elk, 350 red deer, 2800 roe deer, 240 reindeer, 400 musk deer and 125 bears were harvested annually in Amur region. Village and city hunters in Russia use wild meat for their own food, donate to relatives and seldom sell it. The sale of wild hunting meat in the Far East in Russia is not very profitable, since hunting requires a lot of money and a lot of physical labor. In the Amur Region, there are practically no roads in the hunting grounds. For the passage, expensive high-pass vehicles and all-terrain vehicles on caterpillar tracks are required. Therefore, hunting is not a means of obtaining and obtaining wild hunting meat, but a hobby and a good time with friends. Obtaining a hunting permit is also difficult. There are many hunters, but few permits and they are always in short supply. Therefore, hunters are forced to queue up for obtaining hunting permits, and then pay a lot of money.

In Japan, game meat products are obtained mainly from sika deer, wild boar and brown bear. The last two are almost never used by Japanese. Wild meat in general is not popular among the Japanese population, but recently the government has taken measures to popularize the consumption of game meat by private owners and restaurants. In Japan, the excess number of sika deer (about 3 million animals, of which about 1 million inhabit the island of Hokkaido). Sika deer cause significant damage to the island's ecosystems. It is often hunted to control their population size. Meat products are used in food by hunters, sold to restaurants within the country and exported. In Hokkaido, hunters annually hunt more than 100 thousand sika deer, which are not all used by the Japanese themselves. But these measures are still not enough for the ecological balance of the sika deer population on the territory of the hunting organizations of Japan. The problem is that Japanese hunters are very old and hunters are mostly over 60 years old. Young people do not want to deal with hunting problems and even just hunt and use hunting meat for food. There are very few young hunters, and this is a major problem for the hunting grounds in Japan. The solution may be to attract foreign hunters on the territory of the state, but the laws do not allow this. Hunting in Japan, according to the law, can only be a citizen who permanently resides in its territory and has a state registration (residence permit).

Analyzing the market of hunting services in Japan, we concluded that foreign hunters with pleasure and great desire came to hunt in this country and would get acquainted with the ancient culture and would have a great time hunting. But for this, Japanese

parliamentarians need to amend the country's hunting laws and be willing to work with foreign hunters and provide world-class quality services. We are confident that this is possible and hope to see it in the near future.

Analyzing the composition of wild meat, we want to show people the nutritional value and chemical composition of the hunting products of both countries. The local population hunting for wild animals should more actively consume hunting products. This will stimulate the development and growth of the number of hunting enterprises, as well as popularize hunting tourism in Russia and Japan.

For a more accurate determination of energy and gastronomic value of wild meat, the authors have analyzed the anatomical composition and energy value of wild meat products. Depending on wild animals' types, their meat varies in its anatomical structure of tissues and chemical composition, taste and culinary qualities, as well as organoleptic characteristics. (Tables 1, 2).

Table 1. The anatomical composition of wild meat, %.

Wild animal species	Muscle tissue	Adipose tissue	Conjunctive tissue	Bones
Elk (Alces Alces):				
Adult (over 2 years old)	73.3	0.5	7.5	17.8
Offspring (under 1 year old)	69.5	0.3	9.8	19.0
Red deer (Cervus Elaphus):				
Adult (over 2 years old)	72.3	0.5	7.7	17.5
Offspring (under 1 year old)	68.8	0.4	9.5	18.8
Roe deer (Capreolus pygargus Pall):				
Adult (over 2 years old)	74.5	2.3	6.7	16.8
Offspring (under 1 year old)	73.3	0.8	8.8	17.5
Wild boar (Sus Scrofa):				
adult	64.7	12.3	7.7	18.8
Brown bear (Ursus Arctos):				
adult	65.1	10.7	7.8	16.8

The highest bone index was detected among young elk species, the lowest - among adult roe deer and brown bear species. Most muscle tissue (as a percentage of the body) was found in adult roe deer and adult elk. The authors found large amounts of adipose tissue in wild boars and brown bears. This suggests that the dietary meat with the lowest fat content can be found in young wild ungulates, adult elk and red deer.

Table 2. The chemical composition and energy value of wild meat.

Wild animal species	Humor, %	Proteins, %	Fats, %	Ash, %	Extractives, %	Energy value, kilojoule
Elk (Alces Alces)	75.8	21.4	19.7	11.2	1.1	1.2
Red deer (Cervus Elaphus)	67.3	21.3	18.4	12.5	1.1	1.1
Roe deer (Capreolus pygargus Pall):	65.5	21.2	18.0	12.3	1.2	1.1
Wild boar (Sus Scrofa):	62.1	20.4	20.4	15.5	0.9	1.3
Brown bear (Ursus Arctos):	67	19.8	19.8	13.8	1.4	1.2

After analyzing the energy value of wild meat samples, the authors concluded that all of them are close to identical. Only a wild boar specimen stands out with its greater energy value. Most of the humor was found in elk, the least of all - in wild boar. The meat is rich in protein in elk, red deer and roe deer.

For the full description of wild meat characteristics, it is necessary to take animal diseases into account. The most dangerous is wild boar and brown bear meat, since these species feed on small animals and carrion. The second dangerous is elk's meat, since these animals spend a lot of their time near noncirculating water basins, where there may a large number of larvae of many disease pathogens be found. Red deer and roe deer are the least affected by animal diseases, but this also varies to a greater extent on their populations, habitats and the feed they consume.

Roe deer is a dietary and favorite meat of Russian hunters. They consider it very “pure” and can be eaten even raw and without heat treatment. In this respect, the traditions of the indigenous and small-numbered peoples of the north of Russia and Japan are very similar.

Roe and red deer meat is especially popular in Amur Region. Then there is elk and wild boar meat. Brown bear meat is the least popular, as it is often found infected by parasites. There are laboratories in the region to test wild meat for its suitability for food, but professional and amateur hunters in general tend not to use their services, because these labs are located in the region's capital city of Blagoveshchensk, which often means more than 500 km travel in order to get the tests. Still there are very few cases of people being infected after wild animal meat consumption. Generally, wild meat is environmentally and biologically clean and is readily used by hunters and their families for food. Over the past 10 years the use of wild meat has been popularized in Japan. Many Japanese TV channels have their culinary shows teaching the Japanese to cook delicious and organic wild meat food. Wild meat consumption in the country is growing, especially in the northern island of Hokkaido. Sika deer and brown bear meat are cooked in many restaurants in Sapporo, as well as in many other small towns and villages of the island.

Restaurants that provide wild meat in their dishes are very popular not only among the indigenous people, but also among numerous tourists arriving on the island of Hokkaido. It is necessary to actively develop this direction and provide the widest possible range of hunting products in the form of meat, not only in restaurants, but also in packaged form so that tourists take it with them as a souvenir and treat their friends and family with environmentally friendly hunting wild meat.

Fig. 1. Organization of sika deer hunting in Japan.

Fig. 2. Transportation of sika deer on the island of Hokkaido (Japan).

Fig. 3. Cutting sika deer carcass in Japan.

Fig. 4. Cutting the carcass of an elk in Russia.

4 Conclusion

As a result of our research, we came to the following conclusions: the game products in Amur region are mainly used by the hunters themselves in their private consumption, and only a small part of them goes for sale in food stores and agricultural markets. Even smaller amounts of wild meat products go to restaurants. The reasons for this are small population of wild animals in Amur region, expensive hunting licensing and high cost of hunting. On Hokkaido Island in Japan, the situation is completely different. Japanese do not have strong traditions in eating game meat, but prefer seafood. Hunting is unpopular in Japan, and young people in general are not ready to engage in it. Japanese hunters pay less than Russian hunters for hunting permits, and thus meat products become cheaper and more attractive for them. Therefore, Japanese hunters have the economic benefit of selling meat to restaurants and commercial organizations involved in the export of meat. In our opinion, "wild meat" is an attractive environmentally friendly product for people in Russia and Japan and can undoubtedly serve to attract tourists to places of recreation and into gastronomic tours in Japan and Russia.

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