

Consumption foodstuffs originating from exotic animals

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ABSTRACT

Exotic animals such as Iberian pigs, zebras, kangaroos, ostriches, camels, crocodiles, pythons, and some others can be, lately more often, found on the menus of Western European restaurants. In third world countries such food can be found in street sales. Despite the stringent regulations in force in the EU, there is also an illegal market for listed foods which, in this case, represent a significant risk to the health of consumers, and trade in those foods threatens the welfare of animals, traded and domestic because different diseases could be transmitted from imported animals or foodstuffs originating from them. The meat of exotic animals is distinguished by its specific characteristics compared to that of domestic animals, and those are highlighted in this article, and mention is made of the consumption of numerous insects, common in some countries. Consuming certain foods, from the standpoint of the average European consumer, is even of questionable deliciousness (balut) or ethics (blood of venom snake).

Ključne riječi: exotic animal species, meat consumption, legal and illegal trade

INTRODUCTION

The need for meat of exotic species has been increasing in Slovenia in recent years. Meat of Iberian pig (origin Spain), camel (origin Australia), zebra (origin South Africa), kangaroo (origin Australia), ostrich (domestic and foreign origin), crocodile (origin Zimbabwe) and python (origin of Vietnam) can be purchased legally for free sale. Price per kilogram ranges from 21.90 euros per kilogram of kangaroo meat to 59.00 euros per kilogram of python meat (Fin-Tun, 2019). Antelope meat is most often found in the internet offering of African meat, while the market for giraffe, lion, iguana and other animals is less common (Hofer, 2002). Among the

European species, the accent should be made of moose meat and among the American species the meat of bison, llama and alpaca. The choice within the illegal trade is even more diverse.

The home market offers a wide variety of exotic food at gourmet restaurants as well. There are numerous restaurants on the Internet that have flourished all over Europe in recent years. In third world countries (Australia, Philippines, India Indonesia, South Africa, China, Laos, Malaysia, Mexico, Thailand, Vietnam ...) this kind of food is available on the street or in the local market. They most commonly offer different types of insects (grasshoppers, caterpillars, crickets)

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(Durst *et al.*, 2008). The so-called entomophagy - the insect diet - has also become widespread in Europe. It provides an alternative source of protein (Bessa *et al.*, 2017).

If the such meat is distributed legally in the European Union, the market is regulated by EU legislation. Main source of meat of exotic animals are mainly third countries. This would represent about 1.3 million European hunters, of which a smaller proportion would hunt abroad in a given year (Brainerd, 2007).

Since travelling hunters transport hunting souvenirs or trophies back to their home countries, this legal activity is directly monitored and regulated by CITES. CITES evolved through the need to ensure that international trade in specimens of wild animals is properly regulated and does not threaten their survival. The Wildlife Trade Regulation (Council Regulation (EC) No. 338/9738) directly transposes the provisions of CITES in the EU. This Regulation is in many ways stricter than CITES. The EU also adds an Annex D, of species for which import levels are monitored (Uredba Sveta (ES) št. 338, 1997).

Hunting activities are to be regarded as a form of nature tourism, and is thus a part of the broader tourism market. Although hunting may be the primary goal of a tourist trip, there are other elements involved, including consumption of food, this could be the source of outbreak of zoonoses or pathogens.

Hunting has always been an integral part of the cultures and traditions of European rural societies, with an estimated greater than seven million hunters practicing this activity for recreational, social, and/or consumptive purposes. Recently, there has been a growing consumer demand for hunted meat and cured, fermented, and dried game products, which have become more popular and accessible in the European market. Zoonotic diseases acquired from wildlife are mainly linked to the consumption of undercooked venison and hunting or handling infected game carcasses (Navarro-Gonzalez *et al.*, 2016).

The riskiest meat for consumption is that from illegal trade. Bushmeat is very popular in some counties having colonies in Africa. Particularly primates, monkeys and apes can carry diseases like ebola, or HIV (Harris, Karamehmedovic, 2009; Murray *et al.*, 2016). One of the very important zoonotic pathogens is *Echinococcus* spp. in wild carnivorous species (Carmena, Cardona, 2014) or

brucellosis in buffalo (Alexander *et al.*, 2012).

For example, meat samples from various species of exotic animals were received from all fourteen states in Malaysia. Four zoonotic parasites, *Sarcocystis* spp., *Toxoplasma gondii*, *Trichinella* spp. and *Taenia* spp. were screened in exotic meats. Results showed the presence of *Sarcocystis* and *Toxoplasma* cysts at 8.7 % and 4.3 % respectively. No *Trichinella* spp. and *Taenia* spp. were found (Fazly *et al.*, 2013).

Waterfowl have long been considered the natural reservoirs of Influenza A viruses (IAV). The large population of these natural reservoirs and the ability of IAV to undergo genetic mutations and reassortment make Influenza A a noneradicable zoonosis. Wild birds are also the natural reservoirs of Newcastle disease viruses (NDV) which can be transmitted to domestic poultry and cause outbreaks of high mortality after infection with virulent strains (Sanchez *et al.*, 2016).

On the other hand, the illegal hunting poses a risk of species extinction. For instance, an annual assessment of illegal bird hunting has been carried out in Slovenia. Regarding the average number of violations detected between 2002 and 2009, when customs control and estimation was still underway only 1 - 5 % of bird smugglers were intercepted at the borders per year. So we can conclude that between 2002 and 2009, among 38,000 and 189,000 bird specimens were smuggled across the Slovenian borders. The magnitude of the occurrence in recent years is unknown, but it is assumed that it has not decreased significantly (Kljun, 2018).

FOOD DERIVED FROM DIFFERENT ANIMAL SPECIES

Meat of Iberian swine (black Spanish pig) it is not only delicious but also very nutritious and healthy. The Iberian pig grazes freely in Salamanca and Extremadura and feeds on grasses, herbs, cereals, mushrooms and acorns. The meat of this pig has a special, creamy aroma and is rich in protein, minerals and vitamin B (Fin-Tun, 2019).

Camels were domesticated by secondary nomads around 5,000 years ago in the Middle East, mainly for transportation and work rather than as a producer of meat, milk, or clothing (Kadim *et al.*, 2014; Yousif and Babiker, 1989). Camel meat is similar to veal, but is lighter in color, lean and has a

slightly sweet taste. The taste of camel is similar to the mixture between veal and lamb (Fin-Tun, 2019). Camel meat, like other red meats, contains high levels of potassium followed by phosphorus, sodium, magnesium and calcium, plus smaller percentages of other trace elements. Calcium content of camel meat is higher than that of beef which may partially explain the tight structure of some cuts of camel meat. The amino acids and inorganic mineral contents of camel meat are highly compared to beef due to the lower levels of fat content in the meat of the dromedary (Abrahaley and Leta, 2017). There are several reports that equine, camel and caprine milk might be preferable to bovine milk with respect to allergenicity, especially for infants and elderly people. Camel's milk has a generally opaque white color and has a faint sweetish odor and sharp taste; sometimes, it can be salty (Abbas *et al.*, 2013). Camel milk has been found to be a beta-lactoglobulin free. Camel milk can be hypoallergenic alternatives to bovine milk and detection of adulteration of milk samples and products (Hinz *et al.*, 2012).

The dark red zebra meat is reminiscent of a horse with a slightly sweeter, subtler taste. Zebra meat has less fat than beef and is especially recommended for athletes because of zinc and vitamin B (Fin-Tun, 2019).

Kangaroo meat is one of the most natural we can eat today. Kangaroo meat is best for people who care about their health, as it is the succulent meat of excellent quality, very nutritious and almost fat-free (Fin-Tun, 2019). Belgium, France, Germany, and the Netherlands are the world's largest importers of kangaroo meat with annual totals up to 1,000 tons of meat, equivalent to approximately one million animals (Eurogroup for Animals, 2018).

Guinea pigs are popular pets in our environment, not food. In South America, they are part of the daily diet. In developing countries, interest in guinea pig farming is growing exponentially because it provides a regular source of high quality animal protein for domestic consumption, contributing to food security and providing a small but frequent economic income for the population, especially the Andean region, and some countries from Asia and Africa. Guinea pigs have been staple meat for some of the Andes people for at least 3000 years (Sanchez-Macias *et al.*, 2018).

Comparable to beef and other poultry meats, ostrich meat is considered as an alternative to red meat for its favorable fatty acid profile and low

intramuscular fat content. Ostrich meat contains lower fat than red meats, such as beef and other poultry meats. Currently, ostrich meat is marketed as a healthy red meat because it is characterized by high polyunsaturated fatty acid contents, low saturated fatty acid content, and low cholesterol level compared with red meats, such as beef, while tasting similar to lean beef. Ostrich meat contains lower sodium and higher iron contents than other kinds of meat, making it preferable to hypertensive people and those with anaemia. Taken together, ostrich meat is considered as an ideal red meat for individuals seeking healthier lifestyle (Al-Khalifa and Al-Naser, 2014).

Reptiles: Crocodile meat tastes like chicken and is just as fatty and low in cholesterol. The texture is a bit like fish meat. The meat is delicatessen and quick-cooked, making it ideal for grilling White python meat is reminiscent of some fish fillets. Meat is considered a delicacy with a very delicate taste (Fin-Tun, 2019).

In comparison with turtle and tortoise eggs, chicken albumen consists primarily of about 90 % water into which 10 % proteins are dissolved (including albumins, mucoproteins, and globulins). Unlike the yolk, which is high in fats, albumen contains almost no fat, and the carbohydrate content is less than 1 %. The main components of chicken eggs are moisture 74 %, proteins 12 % and fats 11 %. Tortoises eggs contain less protein and fat, and they are more watery than chicken eggs (Stvarnik *et al.*, 2017). The chemical compositions of turtle eggs have not been investigated yet in detail, especially because the eggs are not commercially used for human consumption, as chicken eggs are. Only a few articles are found on this topic (Speake *et al.*, 2001; Tunsaringkarn *et al.*, 2011). In praxis, many turtle's eggs were picked up from sand beaches in Africa and South America. Final destinations are often the restaurants.

Balut is a developing bird embryo that is boiled and eaten from the shell. It originates from and is commonly sold as street food in the Philippines. There are different nutritional values of balut, since it can be either fertilized chicken or duck eggs. Balut nutrition specifications between chicken and duck have minor differences, but both eggs have around 14 grams of crude protein, 188 calories each, and around 100 milligrams of calcium. A duck egg might have a higher value of nutrition than a chicken egg but overall, however chicken and duck balut

have approximately the same nutritional value (Lambio, 2010).

They are more than 2000 edible insect species. Despite the large variation, they provide satisfactory energy and protein, meet amino acid requirements for humans, are high in monounsaturated and polyunsaturated fatty acids, and rich in several minerals and vitamins like riboflavin and vitamin A (Rumpold and Schluter, 2013). Of particular interest are the high iron and zinc contents in comparison with conventional meat. Therefore, entomophagy has been proposed to combat the deficiencies of these minerals in developing countries (Christensen *et al.*, 2006). Insects have dietary fiber, and include mostly unsaturated fat and contain some vitamins, such as vitamin B12 (Schmidt *et al.*, 2019). Insects are nutrient efficiently compared to other meat sources. Insects such as crickets are a complete protein and contain a useful amount of protein, comparable to protein from soybeans, though less than in foods such as cheese (casein) (Huis, 2015).

CONCLUSIONS

Cultural and therefore eating habits are often rooted in people. Taste is a conservative sense and

there are many barriers to the consumption of new and exotic foods. One of these barriers is disgust, which is not only physical, but also interpersonal. It serves a social function of maintaining hierarchies and boundaries between peoples (Lauren, 2010). Despite the conservatism of taste, there was an increase in the eating of exotic foods, especially in countries with the colonies (for example bushmeat in France).

Today, the ingestion of foods that are foreign to us is becoming increasingly. Whether reason are the rituals of exotic, faraway tribes, or just the awakening of memories of a country where we have spent a wonderful holiday, the desire for something that is unknown to us, unknown, and in some way particularly appealing to us. In doing so, people are also often confronted with unethical principles that includes the welfare of an individual animal, or the overexploitation and extermination of individual animal species. Let us mention some typical tourist eating habits, which are often local in nature; meat and fresh blood of snake venoms (Rattle snake), roasted scorpions, whale meat, dog meat and more. Consumption of such products of uncontrolled origin is also much more likely to lead to zoonotic infections. Thus, safe and controlled food remains at the forefront of maintaining human health.

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Delivered: 18.9.2019.

Accepted: 25.09.2019.

Konsumiranje hrane podrijetlom od egzotičnih životinja

Sažetak

Sve češće se na jelovnicima restorana u Zapadnoj Europi mogu naći jela podrijetlom od egzotičnih životinja poput iberijske svinje, deve, zebre, klokana, noja, deve, krokodila pitona, ali i nekih drugih. U zemljama trećeg svijeta takva se hrana može naći u uličnoj prodaji. Unatoč strogim zakonskim propisima koji su na snazi u EU, postoji i ilegalno tržište navedenim namirnicama koje, u tom slučaju, predstavljaju značajnu opasnost po zdravlje konzumenata, a njihovom trgovinom ugrožava se dobrobit životinja kojima se trguje, ali i domaćih na koje se uvezenim životinjama ili namirnicama podrijetlom od njih, mogu prenijeti različite bolesti. Meso egzotičnih životinja odlikuje se određenim specifičnostima u odnosu na meso domaćih životinja te su one u ovome radu istaknute, a spominje se i konzumacija brojnih insekata, koja je uobičajena u nekim zemljama. Konsumiranje određenih namirnica, sa stanovišta prosječnog europskog konzumenta upitne je ukusnosti (balut) ili etičnosti (krv zmija otrovnica).

Ključne riječi: egzotične životinjske vrste, konzumiranje mesa, legalna i ilegalna trgovina

Verzehr von Lebensmitteln, die von exotischen Tieren stammen

Zusammenfassung

Auf den Speisekarten der Restaurants in Westeuropa treten immer häufiger Gerichte auf, die von exotischen Tieren stammen, wie z.B. vom Iberischen Schwein, Kamel, Zebra, Känguru, Strauß, Krokodil, Phyton, usw. In Drittländern werden solche Gerichte im Straßenverkauf angeboten. Trotz der strengen gesetzlichen Vorschriften, die in der EU in Kraft sind, gibt es einen illegalen Markt für die genannten Lebensmittel, der in diesem Fall eine erhebliche Gefahr für die Gesundheit der Verbraucher darstellt. Darüber hinaus gefährdet der Handel mit den genannten Lebensmitteln das Wohl der Tiere, sowohl derjenigen mit welchen man handelt als auch der einheimischen Tiere, die durch die eingeführten Tiere oder durch Lebensmittel, die von solchen Tieren stammen, mit diversen Krankheiten angesteckt werden können. Das Fleisch der exotischen Tiere zeichnet sich durch bestimmte Besonderheiten im Vergleich zum Fleisch der einheimischen Tiere aus, was in diesem Artikel besonders hervorgehoben wird. Erwähnt wird auch der Verzehr von zahlreichen Insekten, der in einigen Ländern üblich ist. Der Verzehr von bestimmten Lebensmitteln hat vom Aspekt des durchschnittlichen europäischen Verbrauchers einen fraglichen Geschmack (Balut) oder wirft ethische Fragen auf (Blut von Giftschlangen).

Schlüsselwörter: exotische Tierarten, Fleischverzehr, legaler und illegaler Handel

Consumo de alimentos provenientes de animales exóticos

Resumen

En los menús de los restaurantes de la Europa Occidental puede encontrarse más a menudo los platos provenientes de los animales exóticos como el cerdo ibérico, el camello, la cebra, el canguro, los avestruces, el cocodrilo, el pitón y otros. En los países del tercer mundo este tipo de comida puede comprarse en las calles. A pesar de las regulaciones legales estrictas vigentes en la UE, existe el mercado ilegal de los alimentos antes mencionados que plantea un peligro significativo para la salud de los consumidores y también está amenazando el bienestar tanto de los animales comercializados como de los animales domésticos que pueden infectarse por diferentes tipos de enfermedades a través de los animales o alimentos importados. La carne de los animales exóticos tiene ciertas especificidades en comparación con la carne de los animales domésticos, destacados en este trabajo. También está mencionado el consumo de numerosos insectos, lo que es común en algunos países. El consumo de ciertos alimentos, desde el punto de vista del consumidor medio europeo, es de la exquisitez (el balut) y de la ética cuestionable (la sangre de las serpientes venenosas).

Palabras claves: especies de animales exóticas, consumo de carne, comercio legal e ilegal

Il consumo dei cibi provenienti da animali esotici

Riassunto

Sempre più spesso, nei menù dei ristoranti dell'Europa occidentale è possibile trovare cibi provenienti da animali esotici come il maiale iberico, il cammello, la zebra, il canguro, lo struzzo, il cocodrillo, il pitone ed altri. Nei paesi del terzo mondo, questo cibo è normalmente venduto per le strade. Nonostante la rigida legislazione europea, esiste un mercato illegale di questo tipo di alimenti che, proprio per questo, rappresentano un pericolo per la salute dei consumatori. Il commercio di tali alimenti, inoltre, minaccia il benessere degli animali, sia di quelli oggetto del commercio, sia di quelli nostrani ai quali, mediante i capi esotici importati o mediante i cibi derivanti da questi stessi animali, possono essere trasmesse varie malattie. La carne degli animali esotici vanta certe specificità rispetto a quella degli animali nostrani, messe in evidenza in quest'articolo. Si fa anche menzione della consumazione di varie specie d'insetti che in certi paesi è consueta. Il consumo di certi cibi, tuttavia, dal punto di vista del consumatore medio europeo, può essere problematico sia per quanto riguarda l'aspetto del gusto (il balut), sia per una questione di natura etica (il sangue dei serpenti velenosi).

Parole chiave: specie animali esotiche, consumo di carne, commercio legale e illegale