

# codex alimentarius commission

FOOD AND AGRICULTURE  
ORGANIZATION  
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Agenda Item 12

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## JOINT FAO/WHO FOOD STANDARDS PROGRAMME

### CODEX COMMITTEE ON FISH AND FISHERY PRODUCTS

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#### DISCUSSION PAPER ON THE DEVELOPMENT OF A STANDARD FOR STURGEON CAVIAR

(Prepared by the Russian Federation)

Sturgeon fishes occur in waters of Europe, Asia, and North America, being anadromous species. There are 27 species of sturgeons, 11 of them are found in Russia.

Russian sturgeon fisheries are concentrated in the Caspian, Azov, Black Seas, as well as in the rivers of Siberia and Far East.

Sturgeon meat is characterized by its extraordinarily delicious properties, however the most expensive regale is caviar.

The most valuable product is considered to be top-quality caviar from Caspian sturgeons.

Fish oocytes (eggs) are developed in ovaries (female gonads), which resemble a pair of flat cylinders symmetrically attached in the abdominal cavity along the vertebral column. The main part of the ovary is represented by the connective tissue which holds oocytes and fat deposits. Ovaries are covered with a thin transparent film. Unripe oocytes are tightly fixed to the ovary tissue, but when the oocytes become ripe, they are easily detached from the connective tissue. This property of eggs is applied in the production cycle when for their separation from the ovary tissue they are rubbed through a special sieve. The ovary size depends on the fish size and species, as well as on the stage of eggs ripeness. Sturgeon females can have ripe ovaries (with eggs at stages IV or IV-V) of about 20% of the whole fish weight, on average, while sometimes the ripe ovaries can reach 30% of the fish weight. Granular caviar is prepared from ovaries achieved stage IV of maturation and extracted from live sturgeons.

Separated eggs are sorted by quality, color, and size. Before salting the roe is washed in clean cool water to remove blood clots, crumpled eggs and film remains. The washed roe is sent to the vibrating sieve to remove residual water. The roe is processed with salt or a mixture of salt with/without preservatives and packed in tins.

The essential technological requirement is a strict sanitary regime by using treated water, thorough cleaning of technological equipment, fish and roe, using special disinfectants and devices, and constant medical checking of personnel.

Sturgeon caviar possesses high nutritional and biological value. Table 1 summarizes caviar chemical composition by some characteristics and its energy value depending on sturgeon species.

**Table 1**

Product	per 100 g of product		Energy value, Kcal
	Proteins	Fats	
Granular beluga caviar	27	14	237
Granular kaluga caviar	28	14	240
Granular sturgeon caviar	29	10	203
Granular stellate caviar	28	12	221

Studies showed that caviar contains a practically entire set of essential and non-essential amino acids and vitamins A, B, C, PP and others. The total content of mineral elements in caviar is higher than in fish meat; phosphorus ranks first among mineral elements. The caviar lecithin stimulated elimination of excessive cholesterol. Beluga and kaluga sturgeon caviar of light color possesses the highest consumer properties and, correspondingly, the highest price on all the world markets.

For several years the VNIRO<sup>1</sup> scientists studied the size and weight composition of sturgeon eggs against the raw material. As a result of this work the researchers have elaborated norms by size groups of eggs and weight indices for one hundred fish eggs (Table 2).

**Table 2**

Eggs	Size group	Maximum diameter of eggs (along the lengthwise axis), mm	Weight of 100 eggs, g
Beluga	Large	> 3.0	> 2.5
	Medium	2.7 – 3.0	1.9 – 2.5
	Small	< 2.7	< 1.9
Kaluga	Large	> 3.2	> 2.8
	Medium	2.8 – 3.2	2.0 – 2.8
	Small	< 2.7	< 2.0
Sturgeon	Large	> 3.0	> 2.2
	Medium	2.7 – 3.0	1.6 – 2.2
	Small	< 2.7	< 1.6
stellate	Large	> 2.5	> 1.5
	Medium	2.2 – 2.5	1.0 – 1.5
	Small	< 2.2	< 1.0

Caviar is a perishable product having a short shelf life.

Therefore, great attention is paid to the protection of consumers' rights and health, as well as to the insurance of quality and safety of the production and prevention of the product falsification.

<sup>1</sup> Russian Federal Research Institute of Fisheries and Oceanography

The right labeling of caviar helps efficiently regulate the international caviar market.

Caviar processing technologies differ from country to country.

It should be pointed out that methods for caviar preparation in the countries of the former USSR and Iran are similar to those developed in Russia. Historically, the caviar product and the respective quality requirements were standardized as far back as a century ago under the name RUSSIAN CAVIAR.

Moreover, for decades (in the early 20<sup>th</sup> century) Russia conducted sturgeon fishery in the Iranian waters and produced caviar using processing methods developed by Russian specialists; these methods were improved and scientifically based by Russian leading fishery scientists in the 1920s and 1930s.

At present, granular caviar from sturgeon fishes is produced in the following countries of the former Soviet Union: Russian Federation, Azerbaijan, Kazakhstan, Turkmenia and Ukraine, as well as in Iran and China which export their production to the world market. The present standard requirements for caviar production in the CIS countries and Iran are very similar and can be summarized in a uniform standard. Unfortunately, we have no information on China standards for caviar production.

The major part (over 90%) of the world sturgeon stocks is concentrated in the Caspian Sea basin. The main suppliers are the above-mentioned CIS countries and Iran. Given below are the names of sturgeons whose roe is used for caviar production in Russia:

- two species of genus *Huso*:  
great sturgeon (beluga) (*Huso huso*) and  
great Siberian sturgeon (kaluga) (*H. dauricus*);
- six species of genus *Acipenser*:  
Russian sturgeon (*A. gueldenstaedtii*),  
Siberian sturgeon (*A. baerii*),  
Amur sturgeon (*A. schrencki*),  
Sakhalin sturgeon (*A. medirostris*),  
stellate sturgeon (*A. stellatus*),  
ship (barbel) sturgeon (*A. nudiiventris*).

In addition to Russia, the Caspian and Azov Seas caviar quotas' users are also Azerbaijan, Kazakhstan, Turkmenia and Ukraine.

According to the estimates made by Dieckmann and Hansen (an oldest European trade company), in 1995 the caviar production in Russia and Iran achieved 228 tons, while the world demand for caviar amounted to 450 tons. According to the data from the US Department of Commerce, the sturgeon caviar import doubled from 1991 to 1995.

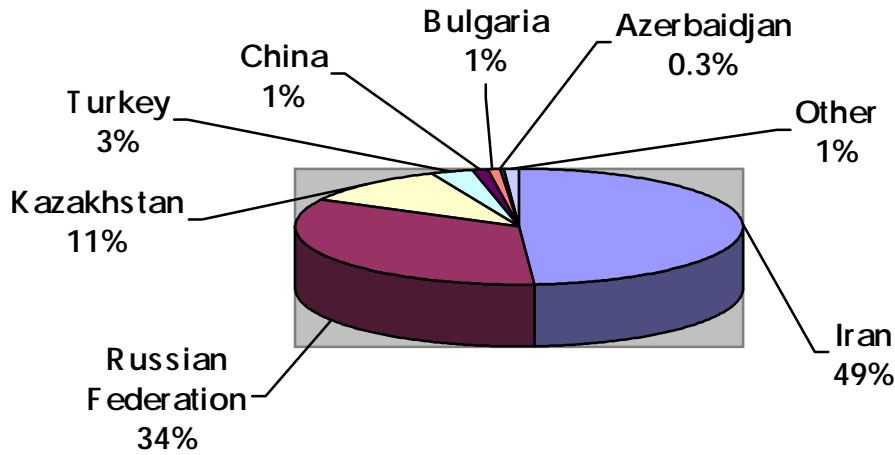
In 1997, Russia exported to the European Union (EU) countries 18.034 tons of caviar. The importers include the following countries:

- Belgium – 2.9 t
- Germany – 9.516 t
- Denmark – 4.001 t
- Finland – 1.027 t
- Switzerland – 0.59 t

Besides, caviar was also delivered to China, Japan and the US.

According to the STURGEON BRIEFING (March 2000), in 1998 there were seven main caviar producers (Fig.1):

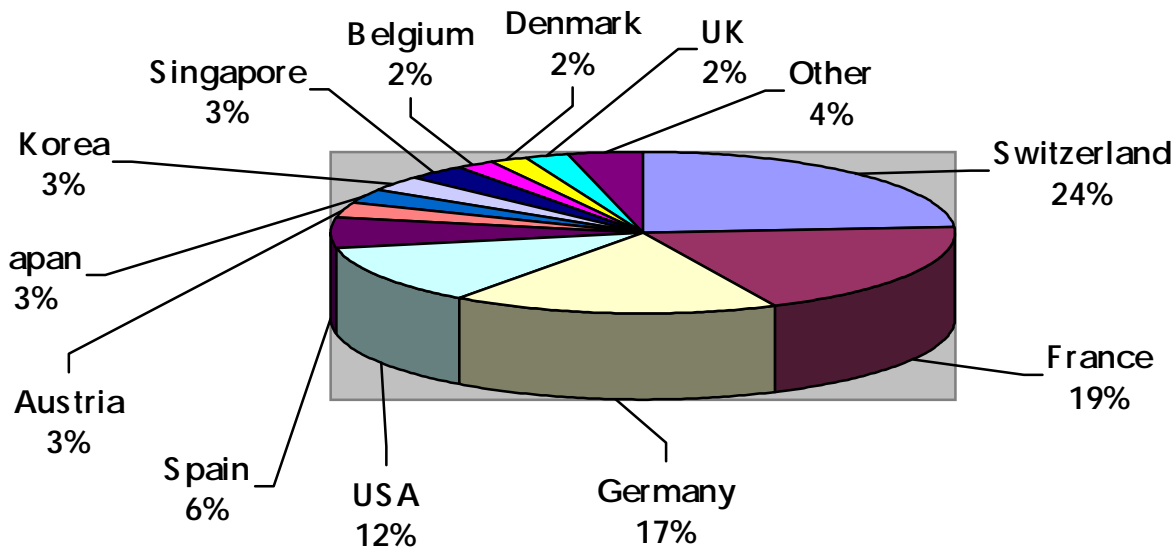
FIGURE 1: Origin of caviar in 1998 - Total volume: 216 t (CITES<sup>2</sup> Annual Reports)



The largest producers were Iran (49%) and Russia (34%).

In 1998, 95% of caviar was exported to the EU countries, Japan, Switzerland and the US (the EU share was more than 50%) (Fig.2):

FIGURE 2: Destination of caviar in 1998 (CITES Annual Reports)



Switzerland was the world largest importer (24%), followed by France (19%) and Germany (17%). More than 90% of caviar came from the Caspian Sea basin.

Caviar from stellate sturgeon (*Acipenser stellatus*) is the most commonly used species in the caviar trade, accounting for 48% of the species traded, followed by 31% consisting of Russian sturgeon (*A. gueldenstadtii*).

Total caviar export quotas for some sturgeon species are summarized in Table 3 (TRAFFIC EUROPE, February 7, 2001).

<sup>2</sup> Convention on International Trade in Endangered Species of Wild Fauna and Flora.

**Table 3 Total export quotas by species in 1998 - 2000 (kg)**

Scientific Name	English Name	1998	1999	2000
<i>Acipenser baerii</i>	Siberian sturgeon	19 000	2 000	400
<i>Acipenser gueldenstaedtii</i>	Russian sturgeon	79 100	66 720	60 840
<i>Acipenser nudiiventris</i>	ship sturgeon	3 000	1 500	5 600
<i>Acipenser persicus</i>	Persian sturgeon	45 000	53 000	38 000
<i>Acipenser ruthenus</i>	sterlet		30	300
<i>Acipenser schrencki</i>	Amur sturgeon	5 483	4 010	4 510
<i>Acipenser stellatus</i>	stellate sturgeon	135 000	111 800	94 000
<i>Huso dauricus</i>	kaluga sturgeon	8 587	6 930	9 430
<i>Huso huso</i>	beluga	12 900	16 584	21 500
TOTAL		308 070	262 574	234 580

Because of depletion of sturgeon stocks CITES has introduced trade restrictions on all sturgeon species and derivative products. Since 1998, sturgeon species have been enlisted in the CITES Appendix II. In conformity with decisions of the Convention and on agreement with the interested organizations, Russian government establishes volumes of annual export quotas for sturgeon species and products, including caviar. These quotas are based on the total allowable catches and recommendations of research institutes.

The established quotas are then communicated to the Convention Secretariat for notification development.

Since 1998, the functions of the Russian Authority of CITES for sturgeons, including caviar, have been delegated to the State Committee for Fisheries of the Russian Federation, which also controls exports, and imports of caviar.

In recent years, total allowable catches of sturgeons were established by basins (Caspian, Azov and Black Seas, Siberian region and the Amur River). The export quota for sturgeon caviar allocated for 1998, 1999, 2000 and 2001 was 178, 162, 85 and 69.4 tons, respectively.

The stocks of sturgeons are formed on the account of natural and artificial reproduction. In Russia there are 23 Sturgeon Hatcheries (SHs), which annually grow over 90 million sturgeon fingerlings. In the Azov Sea basin 90% of total number is produced at 5 SHs in the Kuban area. In the Caspian Sea basin there are 20 SHs, 10 of which are located in Russia, 3 in Azerbaijan, 2 in Kazakhstan and 5 in Iran.

Against the background of depleted stocks of sturgeons in natural water bodies more emphasis is placed on sturgeon farming. At present in some countries (Russia, France, Italy, Germany and USA) much work is conducted on sturgeon farming including production of caviar made of farmed sturgeon.

At the 4<sup>th</sup> International Symposium on Sturgeons held in USA (July 8-13, 2001) under the motto "Sturgeons for future" there were submitted papers by Alan Jones (France) and Ken Beer (USA), which contained information on the present-day state of commercial sturgeon aquaculture in Europe and USA. Among the European countries, France and Italy are most important producers of sturgeon meat and caviar. In particular, in the year 2000, Italy which deals mainly with farmed white, Adriatic and Siberian sturgeons, produced 750 t of sturgeon meal and 2.5 t of caviar, while France produced 150 t of sturgeon meat and 5 t of caviar (Siberian sturgeon). Sturgeon commercial cultivation is also developing in Poland,

Germany, Hungary, Spain and Portugal. Beluga, sterlet, Russian sturgeon and various hybrids are grown in addition to the above-mentioned species.

The total European production of sturgeon meat approximated one thousand tons. In the year 2000, USA and Canada produced over 1000 t of sturgeon meat and 5 t of caviar. The main area of sturgeon farming is California.

Four countries of the former USSR were proposed to elaborate a long-term program for sturgeon conservation in the Caspian Sea basin until June 20, 2002.

Russia is the leading country in the development of standards for fish and fishery products among countries of the former USSR.

Moreover, Russia has a lot of developments in caviar production.

Russian GOST 7442-79 GRANULAR CAVIAR FROM STURGEON FISHES IN TINS is valid for caviar production not only in Russia, but also in countries of the former USSR.

Now Russia is developing a draft standard GRANULAR CAVIAR FROM STURGEON FISHES which will substitute the present one. Its prime aim is to protect caviar from falsification on the international scale. It concerns not only producers, but also consumers.

The draft standard has been already approved by Ukraine, Kazakhstan, Turkmenia and Azerbaijan and is to be sent for approval to the Inter-Governmental Committee on Standardization.

The draft standard specifies requirements to sturgeon species used for collection of roe in order to simplify identification of the final product; safety requirements based on sanitary regulations of quality and safety of food raw material and food products, as well as instructions on sanitary and microbiological control of production from fish and marine invertebrates.

The draft standard for the final product establishes sensory indices and specifies color characteristics of caviar. Additionally, section "Labeling" provides new requirements for labeling of consumer package which are in accordance with decisions of the 11th and 13th CITES Conferences on unified labeling of caviar from sturgeon fishes. The draft standard is to be adopted in 2002.

Therefore, the above-mentioned draft can make the base for the international standard under development.

Thus, there is a possibility to study the problem on caviar standardization at the international level for providing conditions for caviar competition based on uniform approaches to the evaluation of product quality, to remove technical barriers in trade on the world and regional markets.

In the context of the above-stated, criteria for definition of priorities in further work could be as follows:

1. Assessment of pollution parameters and rules regarding the consumers' life and health safety; product identification in a manner so as not to confuse or mislead the consumer, as well as to prevent product falsification.
2. Concurrence of requirements and rules by caviar producing nations in terms of national legislation in respect of public sanitary and epidemiological conditions and international (CITES) provisions.
3. Elimination of technical barriers in caviar trade by taking into account the interests of producing countries in considering national legislation, e.g. inclusion into standards the names of sturgeon species used for caviar production, respective terms and definitions, requirements to food additives, labeling, etc.
4. The present great demand for caviar both on the world and regional markets, as well as an increase in the number of countries interested in this product allow us to anticipate that the market will not decrease in the coming decades.

5. As international standard for sturgeon caviar does not exist yet, Russia offers to develop this standard based on uniform approaches to the product quality evaluation and uniform product labeling.

6. Establishment of the international standard would help to adjust requirements of the world caviar market; meet multinational consumers' demand for the high-quality and safe product made in accordance with the requirements of up-to-date technologies; and provide reliable information on the product and a possibility to identify it.

7. The proposed draft of the Codex Standard can be submitted for discussion (see Appendix 1).

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**PROPOSAL FOR A  
CODEX STANDARD FOR STURGEON GRANULAR CAVIAR**

**1 Scope**

This standard applies to granular sturgeon caviar.

**2 Description**

The following definitions are used in this standard:

**Definitions**

The following definitions are used in this standard:

2.1.1 **Caviar-grain:** product obtained from fish ovary by separating the eggs from the connective tissue of ovary.

Note: ovary is assumed to mean female ovary with eggs; grain eggs are the eggs released from the connective tissue of ovary.

2.1.2 **Granular caviar:** caviar made from grain eggs of fish of the sturgeon family, treated with salt or mixture of salt with a food additive.

**Potable water:** fresh water suitable for human consumption.

Note: The quality of drinking water shall not be less than the Standard requirements contained in the latest edition of the WHO “International Guidelines for Drinking Water Quality”.

2.1.3 **Food additive:** natural or synthesized substances, compounds intentionally included in food products for the purpose of their preservation and/or imparting to them special characteristics.

2.1.4 **Caviar lot:** an amount of caviar taken from one fish species, treated in the same manner and packed in similar containers by the same producer for delivery to the same customer.

2.1.5 **Primary package (primary container):** tin cans or glass jars used for caviar packing.

2.1.6 **Secondary package (secondary container):** package containing one or more primary cans.

2.1.7 **Biological species:** any fish species, subspecies or its separate population.

**Foreign admixtures:** any matter not derived from caviar, posing no threat to human health, and readily recognizable without magnification, or present at a level determined by any method including magnification, that indicates non-compliance with sanitation standards and rules.

**Product definition**

The product is prepared from the grain eggs of sturgeon fishes belonging to the following biological species shown in Table 4.

**Table 4**

Denomination of sturgeon fishes	
English name	Scientific name
- giant sturgeon	Huso huso
Kaluga	Huso dauricus
Adriatic sturgeon	Acipenser naccarii
American white sturgeon	Acipenser transmontanus
Amur sturgeon	Acipenser schrenkii
Sea sturgeon	Acipenser sturio
Baikal sturgeon	Acipenser baerii baikalensis
Chinese sturgeon	Acipenser sinensis
Korean sturgeon	Acipenser dabryanus
Persian sturgeon	Acipenser persicus
Little sturgeon	Acipenser brevirostrum
Lake sturgeon	Acipenser fulvescens
American sturgeon	Acipenser oxyrhynchus
Mexican sturgeon	Acipenser oxyrhynchus desotoi
Sakhalin (green) sturgeon	Acipenser medirostris
Siberian sturgeon	Acipenser baerii
Japanese sturgeon	Acipenser micadoi
Stellate Sturgeon	Acipenser stellatus
Sterlet sturgeon	Acipenser ruthenus
Spiny sturgeon	Acipenser nudiventris

The product is made with, or without food additives, and is intended for direct human consumption.

**Process definition**

2.1.8 Upon appropriate preliminary processing grain eggs shall be salted with edible salt, with or without food additives, packed in containers, and chilled to the temperatures so as to maintain the quality during storage, transportation and marketing.

Caviar shall be packed in:

- metal tins coated inside with stable food lacquer or enamel;
- glass jars.

Freezing of product shall not be permitted.

2.1.9 Industrial re-packaging of the caviar from larger to smaller containers under controlled conditions shall be permitted without mixing caviar from different species of different colour. Product shall be packaged so as to minimize the time that the caviar remains unpacked in order to prevent its warming and secondary microbial contamination.

**Presentation of the product**

2.1.10 Any presentation of the product shall be permitted provided that it:

- meets all requirements of this standard;
- contains eggs of only one biological species of fish;
- is adequately described on the label to avoid confusing or misleading the consumer.

### 3 Essential composition and quality factors

#### Caviar

Granular caviar shall be prepared from ovaries extracted from live sturgeons of the biological species described in Section 2.2 which are of a quality fit for human consumption.

Caviar shall have organoleptic, physical, and chemical characteristics listed in Table 5

**Table 5**

Index	Characteristics and norms
Appearance	Eggs of one size
Color	Even and characteristic of roe from the given biological species: from light gray to black, or from light yellow to yellowish gray. Yellowish and brownish shades are permissible
Consistence and state	Eggs can be easily separated from each other
Taste and odour	Characteristic of roe from the given biological species; without foreign taste and odour
Salt, %	3.5 – 5.0
Foreign admixtures	Unacceptable

#### Other ingredients

Portable water and salt shall be of a food quality, and shall meet the requirements of Codex standards.

#### Final product

Caviar shall meet the requirements of this standard when a lot examined in accordance with Section 9 comply with the provisions set out in Section 8.

The product shall be examined by the methods given in Section 7.

### 4 Food additives

The use of preservatives approved by the health authority of the consumer country shall be permitted.

### 5 Contaminants and hygiene rules

Caviar shall be free from any matter that may pose a threat to human health

When tested by the established methods of sampling and examination the product shall not exceed the norms listed in Table 6

**Table 6**

Indices	Admissible levels in mg/kg, not over
Toxic elements:	
Lead	1.0
Arsenic	1.0
Cadmium	1.0
Mercury	0.2

Pesticides:	
hexachlorocyclohexane ( $\alpha$ , $\beta$ , $\gamma$ -isomers)	0.2
DDT and its metabolites	2.0
Polychlorinated byphenyls	2.0
Radionuclides:	
Caesium-137	130 Bk/kg
Strontium-90	100 Bk/kg

Caviar shall not contain microorganisms exceeding the amounts given in Table 7

**Table 7**

Indicators	Level
Mesophilous aerobic and facultative anaerobic microorganisms in 1 g of product, SPC, not more than	$1 \times 10^4$
Mold in 1 g of product, SPC, not more than	50
Yeast in 1 g of product, SPC, not more than	30
Colibacilli, in 1 g of product	not allowed
Staphylococcus aureus, in 1 g of product	not allowed
Clostridium (sulfitereducing), in 1 g of product	not allowed
Pathogenic, incl. salmonella, in 25 g of product	not allowed

It is recommended that the product covered by the provisions of this standard be prepared in accordance with the requirements of the following documents:

- the appropriate sections of the International Code of Practice
- General Principles of Food Hygiene (CAC/RCP 1-1985, Rev. 3, 1997);
- the Draft International Code of Hygienic Practice for the Products of Aquaculture (under elaboration, 1994);
- International Code of Practice for Sturgeon Caviar (to be elaborated).

## 6 Labelling

The name of the product shall be formed in accordance with the provisions of the General Code Standard for labelling of packaged food products (CODEX STAN 1-1985, Rev. 1 -1991).

The name of the product shown on the label shall be “caviar” or “granular caviar”, and may precede or follow the common or established name of the biological species of sturgeon in compliance with the laws and traditions of the country where the product is distributed to avoid misleading of the customer.

The label has a three-letter code of a sturgeon species given in Annex A. Product prepared from farmed sturgeons has a special note “Aquaproduct”.

Tin cans (primary container) with net contents of 249 g of caviar and the secondary package (secondary container) which contains cans with net contents less than 250 g of caviar shall have an expendable label with the following information:

- name of the biological species in English;
  - code of the biological species of fish, in accordance with Annex A;
  - code of the country of origin (two Latin script letters);
  - years of capture;
  - identification number of the manufacturing establishment (four digits and/or letters);
  - identification number of the batch of caviar (four digits).
- When the identification numbers of the manufacturer of caviar consist of less than four symbols (digits and/or letters) the label carries less than four symbols.

**Example.** Giant sturgeon having species code HUS; prepared in the Russian Federation (RU) in the year 2000 at an establishment having identification code 231 and lot code 99 shall be identified as follows:

Beluga/HUS/RU/2000/231/0099/ or

Beluga.HUS.RU.2000.231.0099

Labels for primary and secondary packages (containers) shall be identical and have sizes: 210 mm x 30 mm; lettering shall be typographically printed. Figures for the producer number and the lot number shall be bulging.

The producer number and the lot number are separated by a hologram of 23 mm in diameter, CITES encircled with sturgeon fishes. On the angle CITES changes for "RUSSIA"/"РОССИЯ".

The label shall be made of sticky paper. The label shall be stuck on the primary package (with the net contents of 249 g of caviar); it shall pass from the bottom enveloping the side and come to the top. The producer number as well as the lot number and the hologram shall be on the top. When a container is opened the label shall be broken. When ripped off, the label shall be rejected.

The sides of the secondary package shall carry two labels.

## **7 Methods of sampling and analysis**

### **Sampling**

7.1.1 Sampling of lots for examination of the caviar, as is indicated in section 3.3, shall be in accordance with the FAO/WHO Sampling Plans for Prepackaged Foods of the Code of Standards and Rules for Food Products (AQL 6.5)(CAC/RM 42-1969).

A lot of granular caviar shall mean a volume of product prepared in accordance with Section 2.1.7.

7.1.2 Sampling of lots for examination of net weight shall be carried out in accordance with an appropriate sampling plan meeting the criteria established by the CAC.

### **Sensory and physical/chemical examination**

Samples taken for sensory and physical/chemical examination shall be assessed by experts trained in such examination and using procedures elaborated in Sections 7.3, 7.4 and the Codes of Practice for the Sensory Evaluation of Caviar and Caviar Products (to be developed).

### **Determination of net weight**

The net weight of each sample unit shall be determined in accordance with the following procedure:

20. container filled with the product shall be swept dry and weighed;
21. container shall be opened, and freed from caviar;
22. empty container with lid, and with rubber ring (slip lid container), cleaned of the product, washed and dried, shall be weighed;
23. Subtract the weight of the empty container, or that of the empty container with rubber ring (slip lid container) from the weight of the container with the product, and determine the net weight of product.

The weight share of salt shall be determined using the method developed for salted fish.

## **8 Definition of defects**

The sample unit shall be considered as defective when it exhibits any of the properties defined in Sections 8.1-8.3.

### **Foreign admixtures**

The presence in the sample unit of any matter which has not been derived from sturgeon eggs, does not pose a threat to human health, is readily recognized without magnification; or when it is present at a level determined by any method including magnification, that indicates non-compliance with good manufacturing practices and sanitation rules.

### **Odour and flavour**

The product affected by persistent and distinct objectionable odour and/or flavour indicative of decomposition, oxidation, or taste of feed (in sturgeon reared in aquaculture).

### **Consistency and condition**

Hard scale of eggs, not easily chewable, or tenuous, destroyed when eggs are separated from one another.

## **9 Lot acceptance**

A lot shall be considered as meeting the requirements of this standard when:

- the total number of defectives as classified according to Section 8 does not exceed the acceptance number (c) of the sampling plan given in Section 7;
- the total number of sample units not meeting the requirements regarding presentation in accordance with Section 2.4 does not exceed the acceptance number (c) of the appropriate sampling plan given in Section 7;
- the average net weight of all sample units examined is not less than the declared weight provided there is no unreasonable shortage in any individual container;
- the food additives, hygiene and labelling requirements of Sections 4, 5.1, 5.2 and 6 are met.

## Annex A

### Identification Codes of Sturgeon Species

Table A.1

Denomination of sturgeon fishes		Codes
English name	Scientific name	
- Giant sturgeon	<i>Huso huso</i>	HUS
Kaluga	<i>Huso dauricus</i>	DAU
Adriatic sturgeon	<i>Acipenser naccarii</i>	NAC
American white sturgeon	<i>Acipenser transmontanus</i>	TRA
Amur sturgeon	<i>Acipenser schrenkii</i>	SCH
Sea sturgeon	<i>Acipenser sturio</i>	STU
Baikal sturgeon	<i>Acipenser baerii baikalensis</i>	BAI
Chinese sturgeon	<i>Acipenser sinensis</i>	SIN
Korean sturgeon	<i>Acipenser dabryanus</i>	DAB
Persian sturgeon	<i>Acipenser persicus</i>	PER
Little sturgeon	<i>Acipenser brevirostrum</i>	BVI
Lake sturgeon	<i>Acipenser fulvescens</i>	FUL
American sturgeon	<i>Acipenser oxyrinchus</i>	OXY
Mexican sturgeon	<i>Acipenser oxyrinchus desotoi</i>	DES
Russian sturgeon	<i>Acipenser gueldenstaedtii</i>	GUE
Sakhalin (green) sturgeon	<i>Acipenser medirostris</i>	MED
Siberian sturgeon	<i>Acipenser baerii</i>	BAE
Japanese sturgeon	<i>Acipenser micadoi</i>	MIK
Stellate Sturgeon	<i>Acipenser stellatus</i>	STE
Sterlet sturgeon	<i>Acipenser ruthenus</i>	RUT
Spiny sturgeon	<i>Acipenser nudiventris</i>	NUD