THE UKRAINIAN GREY

by Andrea GADDINI

[GADDINI Andrea, (2020) La Grigia ucraina. *Eurocarni*, 9: 126-135]
http://www.pubblicitaitalia.com/eurocarni/2020/9/18711.html

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1. Corrected version, according to the rewiev of Ms. Natalia Reznikova
2. Original version, as published on Eurocarni

Corrected version

Podolia, a region former Soviet republic of Ukraine, is traditionally considered the area of origin of the Podolian or Steppe strain, a group of long-horned grey cattle breeds, very rustic, with a strong aptitude for work, but with a good beef production.

In Ukraine a breed can be still found, the Ukrainian grey (*Sira ukrayinska*), which shows the same traits as the other breeds of Podolian strain, with some peculiarities, such as large size, low birth weight and excellent quality of the hides.

History

Volodymyr Kozyr, an academic of the sciences of Ukraine, among the main supporters of the autochthonous breeds, wrote: "*The Ukrainian grey cattle is a living monument of an era of prehistoric Trypillian culture*". The reference is to the prehistoric culture of Cucuteni-Trypillian, active between 5400 and 2700 BC. in present Ukraine, Moldova and Romania, whose artifacts portray cattle with long lyre-horns, or buildings and anthropomorphic figures decorated with such horns. However, the cattle represented could be aurochs, wild ancestors of domestic cattle *(Nikitin et al.).*

Like all livestock breeds, the Ukrainian grey took origin from a vital need of the local population, linked to the production system of the place and the time. The breed was actually mainly used as a working animal, resistant, frugal and well adapted to the environment of southern steppes of Ukraine, part of the Russian Empire.

The grey cattle were an important part of the wealth of the Zaporozhian Sich, a proto-state of the Cossacks in Ukraine, active from 1552 to 1775 (*Chegorka*).

These animals were essential in the Chumakstvo, traditional Ukrainian transport over long or very long distances, on ox-drawn wagons, for the transport, above all of salt from the Crimea, but also of fish, timber and grains. Chumakstvo was active from the late Middle Ages to the end of the 19th century, on routes known as the "Milky Way", and is very present in Ukrainian culture, language and folklore. The favorite oxen were the Ukrainian greys, in particular of the Bessarabian variety, towards which the carters, the Chumaks, had an almost superstitious respect *(Chegorka)*.

The grey oxen were characterized by great tameness and resistance at work, they could work in the fields for 10-12 hours in a row or carry weights up to 2000 kg. This, together with their frugality, the ability to feed on very raw fodder, made them the ideal animals for small farms in the steppe environment, to which they supplied work and meat. They were employed for work from the age of four to fifteen, with greater productivity between seven and ten years.

Oxen were called with characteristic names, and in Boris Grinchenko's dictionary over fifty were mentioned, such as Bilan (white ox), Karaman (black ox), Buyan (capricious ox), Kyslitsia, i.e. sour fruit (stubborn ox), Khalabuda, i.e. hut (large-horned oxs).

Since the first Odessa fair in 1843, the breed was present with many specimens *(Guziev et al.,* 2009b), and in 1845 in the Poltava region there were over 782 thousand heads. In the same year the cattle were 3.5 times the horses, which gives a measure of their importance in the economy of the time.

The situation dramatically changed from 1861, with the discovery and exploitation of iron and coal mines in Ukraine. The establishment of industrial settlements, with the concentration in urban centers, determined a demand for milk, dairy products and meat, and induced the crossing of local livestock with improved breeds. In addition, the draft oxen were replaced with draft

horses, more productive and with a longer producing lifespan (up to double compared to an ox). Moreover the development of railways, linked to industrialization, made transport on animal-powered vehicles progressively obsolete *(Chegorka)*. Already in 1866 cattle census had decreased by 15 thousand units *(Zhitnyak).*

So, unlike it happened in other countries, the main distress for the traditional rustic draft cattle breeds was the replacement with draft horses, before than with tractors.

Despite this, until the beginning of the twentieth century the Ukrainian grey was still the main cattle breed of Ukraine. Some breeders, such as Ekaterinoslav landowner Stepan Dekonski, tried to maintain the breed and to promote its qualities. In 1900 he wrote: "*I am one of those breeders who firmly believes in all the best qualities of Ukrainian cattle. I believe this breed is universal.*"

In 1908 there were 7.5 million heads *(French)*, and in 1910-11, a census of cattle in the Yekaterinoslav province showed that out of over 787,700 cattle, almost 70% were Ukrainian grey.

It should be noted that in Yekaterinoslav area (today Dnipro), the herds of the noble Konstantin Brodskij were raised, that in 1900 purchased in Ravenna some breeding bulls of Romagnola breed, that he had admired on a breeders' journal, probably finding them very similar to the Ukrainian grey cattle (see: Gaddini A., La Belle Époque della Romagnola, in *Eurocarni*, 8-2018, p. 107).

The herd book was established in 1909 by the Kharkiv Society, on the initiative of Prof. P.A. Pahomova, and until 1918 the data of 1,250 adult cattle are reported *(Guziev et al., 2009b).*

The crisis of this breed can be read from what the expert breeder Mitrofan Shchepkin said, telling his impressions on the Ukrainian grey cattle presented at the Kharkiv Zootechnical Fair in 1913: "*They were swept away by the virgin steppe that has maintained its cover since the time of Pechenegs ... in the past*" (the Pechenegs were a nomadic people of the steppes, which invaded Europe at the end of the Roman Empire).

In 1916, 2 million 813 thousand heads were reared in the country *(Chegorka),* but a further drive towards the nearly disappearance of the breed was the long civil war that followed October Revolution of 1917, with the consequent devastation and famine. In this situation many breeding bulls were killed, as they were considered unproductive *(Zhytniak)*.

Bulls of other breeds were then introduced, in an unscheduled way, and productivity dropped. However in 1922, Ukrainian grey cattle census still reached 2.6 million head *(Zhytniak)*, and in 1923 farms were established for the breeding of the Ukrainian grey, whose rearing was planned in Ukraine together with that of the Red steppe, the Ukrainian Whitehead and the Poliska.

Still in 1926 M.D. Potemkin wrote: "*The Ukrainian breed is a living monument to an entire age of breeding, to the southern steppes and to animal husbandry: you got to love it*" *(Guziev et al.*, 2009b). In 1928 there were 1.6 million heads and the herd-book was established (*French*), in 1929 the *Book of purebred herds*, in which 1932 5,430 herds were registered, and in 1935 the *State Herd-book* were established *(Porter)*.

In the 1930s the selection on the breed took place in three state farms: "*Oktyabry*" (October) in the Poltava region, "*Liubomirovka*" and "*Polivanivka*" in the Dnipro region, in addition to the first state farm for the breed in Gradizhsky, whose cattle came from what remained of the livestock of small private farm *(Guziev et al.*, 2009b).

In the following decades, however, Soviet animal husbandry chose to import and breed foreign breeds, even achieving absorption crossbreeding of the local breeds in them. As a result, if in 1935 the Ukrainian grey still represented about 6.4% of Ukrainian cattle, before the Second World War it was only 1% of the total, and after the war the population was still halved *(Zhytniak)*.

From 1948 and until 1965 in Polivanivka crossbreeding with bulls of the Kostroma dairy breed began, followed by Prof. M.F. Rostovtseva, to improve milk production but with little attention to the genetic value of the bulls, and from 1961 to 1965 the Ukrainian Grey was crossbred with bulls of Charolaise and Shorthorn beef breeds, under the guidance of prof. I.F. Sul'zhenko *(Guziev et al.*, 2009b).

In 1955 over 200,000 heads were reared in six regions of Ukraine, which represented 3.7%

of the total number of cattle in the Soviet Union, but already in 1968 the number dropped to 17,000 heads, concentrated in many farms in the regions of Dnipro, Kherson and Cherkasy, and in 1974, in the Dnipro region less than 10,000 cows and heifers of the Grey breed were raised, and above all many of them were crossed with the Red Steppe *(Zhytniak).*

Dimitriev *et al.* in 1980 counted 1,000 heads, of which 410 purebred, Wezyk in 1989 reported 650, with serious risk of extinction, while according to FAO DAD-IS in 1990 the census was 1,500 heads, of which 684 cows (73% purebred) and 13 bulls. Kozyr, in 1995, counted only a thousand animals, and in 2007 the conservation level of the breed was defined by FAO as "critical".

Diffusion and census

The wide area of spread of the breed, especially in the past, determined the presence of different local varieties (a work by Bodó *et al*. mentions fourteen), or in any case of different names with which these cattle were known in the Russian Empire and then in the Soviet Union, and only at the beginning of the twentieth century the name was unified in "Ukrainian grey".

The breed was known as Malorussian, Poltava, Cherkasy (Circassian), Podolsk, Hutsul, Bessarabian or Chersonesus (present Sevastopol). In the northern Caucasus it was known as Ciornomorska (Black Sea breed) or Kuban, region of southern Russia, on the Black Sea.

In the nineteenth century, the largest number of Ukrainian grey cattle were in the provinces of Kiev, Kharkov, Yekaterinoslav, Kherson and Taurida. According to French, Ukrainian grey cattle were also widespread in the northern Caucasus and in the Russian regions of Stalingrad (today Volgograd) and Rostov.

In 2015 in Ukraine about 850 animals were reared, including 13 bulls and 364 cows, raised in two farms of the National Academy of Agrarian Sciences: the main one is the experimental Polivanivka farm (Sicheslavshchina), of Institute of Animal-Breeding, in the region of Dnipro, with 266 cows, which is still the farm whose breeding animals have the highest value, with a sturdy build and peculiar quality of hair and skin and which are under continuous control.

The second herd is in Markeyevo farm (Kahovske), in Kherson region, with 197 heads, 85 of which are cows (in 2019), which lies in the historic nature reserve of "Askaniya-Nova", in the Kherson area with 36 cows (*Kozir*). In addition, there once were the subsistence farm in Kyiv-Pechersk Lavra monastery, with 62 cows, but now with no animals, and a small herd in Golosievo monastery, currently not breeding. For 2018 DAD-IS reports 952 heads in 2 herds, including 12 bulls and 352 breeding cows.

Other heads were bred in Russia: actually from Askaniya-Nova 125 heads were moved from 1982 to Siberia, in the Shebalin region, in the experimental breeding center of the Russian Academy of Sciences, Siberian section, of Cherga, in the Russian republic of Altai, from which some dozens of heads later formed a new nucleus, in an experimental farm of the same Russian Academy of Sciences in Elbashi, in the Iskitim district, Novosibirsk region. However the Cherga heads were moved to Polivanivka and DAD-IS does not report Ukrainian grey breed heads in the Russian Federation nowadays.

Morphology

These animals are big with large skeletons and long, sturdy limbs, well-developed and dry joints, the limbs direction is very correct and the structure is robust and proportionate; the hooves are made of a very resistant horn, the gait is lively. The head is long and narrow, but it can have an aquiline profile and be heavy, the forelock of the forehead is thick, light and sometimes reddish, the eyes are small, lively and slightly bulging, the profile is straight. The horns are large, whitish in color with black tips and come out from the nape of the neck, then curve forward and sometimes backward, showing a lyre shape. The neck is not long, with abundant dewlap, the foretrunk is very developed, typical of draft animals, but this morphology is attenuated in the selected animals.

The chest is wide and deep, and makes 53% of the withers height, the ribs are well arched or flat, the sternum is well developed, the withers are narrow and prominent, with well-developed muscles and thick skin. The trunk is elongated and the dorsal line is straight and robust, the loins are long, frequently low, rising slightly towards the tail joint.

The sides are deep, the abdomen is bulky but not hanging. The hindquarters are moderately developed, the thighs are straight, slightly flexed, and the poor development of the hindquarters is the main defect of many animals, which reduces their potential for beef production *(French)*. The udder is rounded, of reduced volume, with forequarters more developed than hindquarters. The teats of the forequarters are well directed, while those of the hindquarters are often too close together.

The skin has dark pigmentation, protective against the sun rays, and the muzzle, the eyelid margin, most of the tongue, the palate, the anal mucous membranes, the vulva, the lower part of the scrotum, the hooves and dewclaws are also dark, as the tassel of the tail, which can bear grey hair, like the hair on the edge of the auricle, the inside of which is grey, dark grey, yellowish-red. The eyes are also black and expressive, with long black eyelashes. Depigmentation can occur between the thighs, the scrotum, the breast, the ears and above the lips.

The coat varies from silver grey to black, often with dark shades on the neck, chest and belly and black or reddish spots. A white edging of the muzzle is frequent *(Guziev,* 2001*)*. The bulls are definitely darker than the cows. The sides of the dewlap are dark, often black in the bulls, in which there are often "spectacles", white on a black coat or black on a grey coat. The backline in some specimens is black, on a light coat, or light on a dark coat *(Guziev et al.* 2009b). Calves at birth show the classic fawn color of the steppe breeds calves, locally defined as burnt orange, and change their coat at 4-6 months. The hair is thick, and together with thick skin it works as a defense against climatic and biological adversities.

Size

The average weight of the bulls is 780 kg (according to DAD-IS 850 kg), with peaks of 1000 kg for animals in excellent feeding conditions and up to 1400 to 1500 kg for specimens fed and fattened in a special way *(French)*. The average weight of the cows is 580-600 kg, (*DAD-IS*-500, *French* 400-500) with peaks of 700 kg with ideal feeding ration. The average withers height is 137 cm for bulls and 129 cm for cows (*DAD-IS*). According to *Guziev et al.,* 2009b, the withers height of bulls is 155-158 cm and 133-135 for cows. According to French in the cows of this breed the trunk length is 166 cm, the chest girth is 185 cm, the chest depth is 75 cm and the chest width 44-48 cm. The udder is 31-36 cm long and 23-29 cm deep. The horns length varies between 61 and 92 cm, and the distance between the tips can reach 213 cm.

Zhitnyak reports of a record bull that before the Second World War reached 1572 kg of live weight, 160 cm of withers height and 200 of trunk length, in a farm then in Oposhnia district. The body of the bull was also exhibited in the museum of popular traditions of Poltava, but it went destroyed in a fire that devastated the museum during the war.

In the last decades the breed size decreased *(Guziev et al.,* 2009a*)*. Since the end of the war the conformation has changed, lessening the draft characters and emphasizing the beef traits, with an increase in thoracic circumference (12 cm), width (by 6 cm), consistency index (from 118.8 to 124.2), weight (from 132 to 150.3) and extension index from 116.9 to 121.0.

Production traits

The breed is known for its resistance to diseases and harsh climatic conditions of the steppe, with very chilly winters and hot and arid summers. The cattle are long-lived, with an average productive lifespan of 13 years and frugal, managing to sustain themselves at pasture also throughout the year, and to recover with a considerable compensatory growth after periods of food deprivation. As a supplement, hay, straw, corn silage, alfalfa hay, mixed grain cereals, compound feed and mineral feed are usually administered.

They have excellent viability, longevity and reproductive capacity, with a strong maternal instinct. The small size of the calf at birth (27-29 kg according to Dimitriev *et al.*) guarantees great calving ease. The breed has a high fertility rate: it is reported that for many years the level of calves born per 100 cows has been around 90-99%. The average age at first calving is 28 months and the average calving interval according to DAD-IS is 375 days while Guziev *et al.* (2009a) reports 367 days. The average duration of pregnancy is 282.5 days, the percentage of fertilized

cows is 92%, the twinning rate is 9.7%, the heifers' weight at the first fertilization is 370 kg *(Guziev et al.,* 2009b*)*.

The prevailing purpose today is **meat production**. Locally its quality, in particular that of the Cherkasy variety is compared to that of Chianina and Charolaise, and in 1917 it was recognized as the best beef breed in Russia. The selection was not initially oriented towards meat production, to which only animals at the end of their production lifespan or those who were sick or injured were destined, but when selected for beef purpose, the breed showed an excellent potential for building muscle mass, although suffering the competition from cosmopolitan races, but remaining more productive in the adverse conditions of the southern steppes.

The breed is late-maturing but its rate of development and size are largely determined by feed levels and breeding practices *(French)*. This determines a certain discrepancy in the production data.

The meat is lean with poor marbling and medium thickness of the subcutaneous fat, and is also highly appreciated for broths. The fattening response is good *(Zhytniak).* The average daily growth at the age of 9-12 months is 766-822 g *(Dimitriev et al.).*

According to Guziev *et al.* (2009a) if calves are suckled, the weaning weight at seven months is from 177 to 215 kg. At the age of 16 months the calves reach 439 kg (range 420-480), with a consumption of 7.8 feed units per kg of weight gain *(Dimitriev et al.)*, at 18 months they weigh 500 kg and at two years 670 kg *(Slowfood)*. The reported dressing percentage is 58.7% *(Dimitriev et al.),* 59-61% *(Slowfood)* and 60.1% *(Ferma.org)*, while according to French is 54%, which can however reach 65% with suitable feeding.

During the period when the Ukrainian grey was used for draft, milk production was destined for calves and didn't undergo a selection. In 1910 the milk production in the best herds was from 1,100 to 1,500 kg, but from the 1960s with selection it reached average values between 2,900 and 3,200 kg, with a butterfat rate between 4.23 and 4.53% and protein between 3.20 and 3.45%. Record milk production was achieved in 1971: Iriska 5180 cow produced 5,365 kg of milk with 5.02% butterfat *(Dimitriev et al.).* Production records were achieved between the 5th and 9th lactation, testifying to the productive longevity of the breed *(Guziev et al., 2009a).*

Since 1979 the cows are no longer milked and milk is intended for suckling the calves. The cows, given their mild character, agree to feed other calves, in addition to their own.

It must also consider the **production of hides**, of high quality for their thickness, elasticity and hardness of leather. According to French, the raw hides of the 12-month old Ukrainian grey young bulls weighed 33.4±2.25 kg, and were treated as heavy hides being highly quoted on the local market. The final weight to raw weight ratio was 10.21%, the raw hide length was 208±4.5 cm. The thickness at the last rib is 12.3 cm, with considerable variability (13.1-14.7%). Young bulls at 15-16 months provide heavy hides, between 41-42 kg, equal to 8-10% of their slaughter weight, of good size, 244 cm long and 177 wide.

Genetic traits

Despite the great bulk of research on the phenotypic variability of zootechnical characters with respect to structural genes, mitochondrial DNA, inter-microsatellite polymorphisms, etc., the biological characteristics of the Ukrainian grey and its genetic and zootechnical history have not yet been fully studied, and scientific research work is still ongoing *(Kozyr)*.

The animals of this breed are carriers of rare genes, and Ukrainian grey should exist at least as a potential source of genetic material for future purposes. Recent studies on blood and milk have discovered unusual genetic combinations in the genotype, such as specific alleles of the B system blood groups or rare hereditary units of milk casein alleles. A variant of the phosphoglucomutase protein has been found in erythrocytes, and a new protein, post-transferrin 3 has been found in plasma.

However, the use of a limited number of bulls is reducing the variability observed in blood group antigens. The Polivanivka herd includes five related groups that vary in productivity and polymorphic systems and all females derive from two genealogical lines: Petushka (62%) and Shamrin (38%).

The data also show a significant change in the genetic structure of Askaniya-Nova animals, starting in 1994, perhaps due to an increase in the population and to worsening environmental conditions *(Glazko et al. 2009b)*.

Conservation

According to Volodymyr Kozyr the Ukrainian grey has an assortment of highly valuable genetic traits, important for the breeding of the future, and which would be a serious mistake to lose. The main conservation purpose is to maintain the gene pool that determine the specific characteristics of the breed and to maintain genetic variability and fertility traits, external appearance, high butterfat rate in milk, adaptability to local environmental condition

The State Breeding Station was established in 1935, focusing on milk and meat production (*French*), a conservation program started in the 1960s, and the conservation groups of Polivanivka and Askaniya-Nova were created, while starting from 1982 those of Cherga and Elbashi were established. Frozen semen has been stored in Polivanivka and Askaniya-Nova since 1990.

In 2005, with the assistance of the WWF, 17 heads of Ukrainian grey were released on Tataru Island on the Danube delta, in Ukrainian territory, in order to restore the natural grazing load and stop the degradation of the adjacent forests. The adaptation of the animals was good and their grazing activity led to an enrichment of the species composition of the flora and guaranteed an incentive for the development and renewal of natural ecosystems. *(Chegorka)*.

It should be noted that the Danube delta is also close to the Romanian area of Pardina, home to herds of the Sura de Stepă breed (*see Gaddini A., Dascalu D.L., La Sura de Stepă, in Eurocarni, 2-2018, p. 72*) and not far from the Bulgarian breed Balgarsko Sivo Govedo herds near the Black Sea. (*Gaddini A., La Grigia bulgara, in Eurocarni, 4-2019, p. 120*). The Ukrainian grey is included in the Slow Food Ark of Taste, nominated by Yuri Stolpovsky.

A group of Ukrainian scientists has developed a proposal to give the Ukrainian grey the status of national heritage, to allow its conservation and development *(Chegorka*).

Influence on other breeds

The Ukrainian Grey was crossed with beef and dairy breeds, and helped to form new breeds: the Red Steppe took origin from crossbreeding with East Frisian red and Angeln and later with Swiss Brown and East Frisian, the Poliska myasna is the result of a complex crossbreeding with Simmental, Charolaise, Chianina and Ingush. The Lebedin (Lebedinskaya) breed originated by the crossing with Brown Swiss bulls *(Dimitriev et al.)*, the Ukrainian Simmental and the Simmental Steppe type took origin from crossbreeding with Simmental bulls.

The Ukrainian Whitehead (*Ukrainska biligolova*) took origin between the late 1700s and early 1800s, probably when the Mennonites, followers of an Anabaptist church who settled in Ukraine, invited by Empress Catherine II, brought with them some heads of the Dutch Groningen Whitehead breed, which were crossbred with the Ukrainian grey and other local breeds. The extinct Turkish Malakan breed also came from the Ukrainian grey.

FAO DAD-IS cites another Podolian breed now extinct, the Ukrainian Oldenburg or Black-and-White Podolian, a dairy breed widespread in Kamenets-Podolsk, western Ukraine, the herd-book of which was established, obtained by crossing Oldenburg on local cattle at the end of the 'Nineteenth century, then absorbed by the Black Pied.

National statistics

In Ukraine FAOSTAT reports for 2018 3,530,800 live bovine animals, and 2,145,900 slaughtered animals for a total weight of 358,900 tons, with an average of 167.25 kg per carcass.

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Original version

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The situation dramatically changed from 1861, with the discovery and exploitation of iron and coal mines in Ukraine. The establishment of industrial settlements, with the concentration in urban centers, determined a demand for milk, dairy products and meat, and induced the crossing of local livestock with improved breeds. In addition, the draft oxen were replaced with draft horses, more productive and with a longer producing lifespan (up to double compared to an ox). Moreover the development of railways, linked to industrialization, made transport on animal-powered vehicles progressively obsolete *(Chegorka)*. Already in 1866 cattle census had decreased by 15 thousand units *(Zhitnyak).*

So, unlike it happened in other countries, the main distress for the traditional rustic draft cattle breeds was the replacement with draft horses, before than with tractors.

Despite this, until the beginning of the twentieth century the Ukrainian grey was still the main cattle breed of Ukraine. Some breeders, such as Ekaterinoslav landowner Stepan Dekonski, tried to maintain the breed and to promote its qualities. In 1900 he wrote: "*I am one of those breeders who firmly believes in all the best qualities of Ukrainian cattle. I believe this breed is universal.*"

In 1908 there were 7.5 million heads *(French)*, and in 1910-11, a census of cattle in the Yekaterinoslav province showed that out of over 787,700 cattle, almost 70% were Ukrainian grey.

It should be noted that in Yekaterinoslav area (today Dnipro), the herds of the noble Konstantin Brodskij were raised, that in 1900 purchased in Ravenna some breeding bulls of Romagnola breed, that he had admired on a breeders' journal, probably finding them very similar to the Ukrainian grey cattle (see: Gaddini A., La Belle Époque della Romagnola, in *Eurocarni*, 8-

2018, p. 107).

The herd book was established in 1909 by the Kharkiv Society, on the initiative of Prof. P.A. Pahomova, and until 1918 the data of 1,250 adult cattle are reported *(Guziev et al., 2009b).*

The crisis of this breed can be read from what the expert breeder Mitrofan Shchepkin said, telling his impressions on the Ukrainian grey cattle presented at the Kharkiv Zootechnical Fair in 1913: "*They were swept away by the virgin steppe that has maintained its cover since the time of Pechenegs ... in the past*" (the Pechenegs were a nomadic people of the steppes, which invaded Europe at the end of the Roman Empire).

In 1916, 2 million 813 thousand heads were reared in the country *(Chegorka),* but a further drive towards the nearly disappearance of the breed was the long civil war that followed October Revolution of 1917, with the consequent devastation and famine. In this situation many breeding bulls were killed, as they were considered unproductive *(Zhytniak)*.

Bulls of other breeds were then introduced, in an unscheduled way, and productivity dropped. However in 1922, Ukrainian grey cattle census still reached 2.6 million head *(Zhytniak)*, and in 1923 farms were established for the breeding of the Ukrainian grey, whose rearing was planned in Ukraine together with that of the Red steppe, the Ukrainian Whitehead and the Poliska.

Still in 1926 M.D. Potemkin wrote: "*The Ukrainian breed is a living monument to an entire age of breeding, to the southern steppes and to animal husbandry: you got to love it*" *(Guziev et al.*, 2009b). In 1928 there were 1.6 million heads and the herd-book was established (*French*), in 1929 the *Book of purebred herds*, in which 1932 5,430 heads were registered, and in 1935 the *State Herd-book* were established *(Porter)*.

In the 1930s the selection on the breed took place in three state farms: "*Oktyabry*" (October) in the Poltava region, "*Liubomirovka*" and "*Polivanivka*" in the Dnipro region, in addition to the first state farm for the breed in Gradizhsky, whose cattle came from what remained of the livestock of small private farm *(Guziev et al.*, 2009b).

In the following decades, however, Soviet animal husbandry chose to import and breed foreign breeds, even achieving absorption crossbreeding of the local breeds in them. As a result, if in 1935 the Ukrainian grey still represented about 6.4% of Ukrainian cattle, before the Second World War it was only 1% of the total, and after the war the population was still halved *(Zhytniak)*.

From 1948 and until 1965 in Polivanivka crossbreeding with bulls of the Kostroma dairy breed began, followed by Prof. M.F. Rostovtseva, to improve milk production but with little attention to the genetic value of the bulls, and from 1961 to 1965 the Ukrainian Grey was crossbred with bulls of Charolaise and Shorthorn beef breeds, under the guidance of prof. I.F. Sul'zhenko *(Guziev et al.*, 2009b).

In 1955 over 200,000 heads were reared in six regions of Ukraine, which represented 3.7% of the total number of cattle in the Soviet Union, but already in 1968 the number dropped to 17,000 heads, concentrated in many farms in the regions of Dnipro, Kherson and Cherkasy, and in 1974, in the Dnipro region less than 10,000 cows and heifers of the Grey breed were raised, and above all many of them were crossed with the Red Steppe *(Zhytniak).*

Dimitriev *et al.* in 1980 counted 1,000 heads, of which 410 purebred, Wezyk in 1989 reported 650, with serious risk of extinction, while according to FAO DAD-IS in 1990 the census was 1,500 heads, of which 684 cows (73% purebred) and 13 bulls. Kozyr, in 1995, counted only a thousand animals, and in 2007 the conservation level of the breed was defined by FAO as "critical".

Diffusion and census

The wide area of spread of the breed, especially in the past, determined the presence of different local varieties (a work by Bodó *et al*. mentions fourteen), or in any case of different names with which these cattle were known in the Russian Empire and then in the Soviet Union, and only at the beginning of the twentieth century the name was unified in "Ukrainian grey".

The breed was known as Malorussian, Poltava, Cherkasy (Circassian), Podolsk, Hutsul, Bessarabian or Chersonesus (present Sevastopol). In the northern Caucasus it was known as Ciornomorska (Black Sea breed) or Kuban, region of southern Russia, on the Black Sea.

In the nineteenth century, the largest number of Ukrainian grey cattle were in the provinces of Kiev, Kharkov, Yekaterinoslav, Kherson and Taurida. According to French, Ukrainian grey cattle were also widespread in the northern Caucasus and in the Russian regions of Stalingrad (today Volgograd) and Rostov. Cherkasy variety was absorbed in the breed at the beginning of 20th century.

In 2015 in Ukraine about 850 animals were reared, including 13 bulls and 364 cows, raised in three places: the main one was the experimental farm "Markeyevo" of Polivanivka (Sicheslavshchina), of the Ukrainian Institute of Steppe Agriculture, in the region of Dnipro, with 266 cows, which is still the farm whose breeding animals have the highest value, with a sturdy build and peculiar quality of hair and skin and which are under continuous control.

In addition, there were the subsistence farm Kyiv-Pechersk Lavra, with 62 cows and the farm of the Ukrainian Institute of Steppe Agriculture in the historic nature reserve of "Askaniya-Nova", in the Kherson area with 36 cows (*Kozir*). For 2018 DAD-IS reports 952 heads in 2 herds, including 12 bulls and 352 breeding cows.

Other heads are perhaps still bred in Russia: actually from Askaniya-Nova 125 heads were moved from 1982 to Siberia, in the Shebalin region, in the experimental breeding center of the Russian Academy of Sciences, Siberian section, of Cherga, in the Russian republic of Altai, from which some dozens of heads later formed a new nucleus, in an experimental farm of the same Russian Academy of Sciences in Elbashi, in the Iskitim district, Novosibirsk region. However DAD-IS does not report Ukrainian grey breed heads in the Russian Federation.

Morphology

These animals are big with large skeletons and long, sturdy limbs, well-developed and dry joints, the limbs direction is very correct and the structure is robust and proportionate; the hooves are made of a very resistant horn, the gait is lively. The head is long and narrow, but it can have an aquiline profile and be heavy, the forelock of the forehead is thick, light and sometimes reddish, the eyes are small, lively and slightly bulging, the profile is straight. The horns are large, whitish in color with black tips and come out from the nape of the neck, then curve forward and sometimes backward, showing a lyre shape. The neck is not long, with abundant dewlap, the foretrunk is very developed, typical of draft animals, but this morphology is attenuated in the selected animals.

The chest is wide and deep, and makes 53% of the withers height, the ribs are well arched or flat, the sternum is well developed, the withers are narrow and prominent, with well-developed muscles and thick skin. The trunk is elongated and the dorsal line is straight and robust, the loins are long, frequently low, rising slightly towards the tail joint.

The sides are deep, the abdomen is bulky but not hanging. The hindquarters are moderately developed, the thighs are straight, slightly flexed, and the poor development of the hindquarters is the main defect of many animals, which reduces their potential for beef production *(French)*. The udder is rounded, of reduced volume, with forequarters more developed than hindquarters. The teats of the forequarters are well directed, while those of the hindquarters are often too close together.

The skin has dark pigmentation, protective against the sun rays, and the muzzle, the eyelid margin, most of the tongue, the palate, the anal mucous membranes, the vulva, the lower part of the scrotum, the hooves and dewclaws are also dark, as the tassel of the tail, which can bear grey hair, like the hair on the edge of the auricle, the inside of which is grey, dark grey, yellowish-red. The eyes are also black and expressive, with long black eyelashes. Depigmentation can occur between the thighs, the scrotum, the breast, the ears and above the lips.

The coat varies from silver grey to black, often with dark shades on the neck, chest and belly and black or reddish spots. A white edging of the muzzle is frequent *(Guziev,* 2001*)*. The bulls are definitely darker than the cows. The sides of the dewlap are dark, often black in the bulls, in which there are often "spectacles", white on a black coat or black on a grey coat. The backline in some specimens is black, on a light coat, or light on a dark coat *(Guziev et al.* 2009b). Calves at birth show the classic fawn color of the steppe breeds calves, locally defined as burnt orange, and change their coat at 4-6 months, but they can also be grey at birth. The hair is thick, and together

with thick skin it works as a defense against climatic and biological adversities.

Size

The average weight of the bulls is 780 kg (according to DAD-IS 850 kg), with peaks of 1000 kg for animals in excellent feeding conditions and up to 1400 to 1500 kg for specimens fed and fattened in a special way *(French)*. The average weight of the cows is 580-600 kg, (*DAD-IS*-500, *French* 400-500) with peaks of 700 kg with ideal feeding ration. The average withers height is 137 cm for bulls and 129 cm for cows (*DAD-IS*). According to *Guziev et al.,* 2009b, the withers height of bulls is 155-158 cm and 133-135 for cows. According to French in the cows of this breed the trunk length is 166 cm, the chest girth is 185 cm, the chest depth is 75 cm and the chest width 44-48 cm. The udder is 31-36 cm long and 23-29 cm deep. The horns length varies between 61 and 92 cm, and the distance between the tips can reach 213 cm.

Zhitnyak reports of a record bull that before the Second World War reached 1572 kg of live weight, 160 cm of withers height and 200 of trunk length, in a farm then in Oposhnia district. The body of the bull was also exhibited in the museum of popular traditions of Poltava, but it went destroyed in a fire that devastated the museum during the war.

In the last decades the breed size decreased *(Guziev et al.,* 2009a*)*. Since the end of the war the conformation has changed, lessening the draft characters and emphasizing the beef traits, with an increase in thoracic circumference (12 cm), width (by 6 cm), consistency index (from 118.8 to 124.2), weight (from 132 to 150.3) and extension index from 116.9 to 121.0.

Production traits

The breed is known for its resistance to diseases and harsh climatic conditions of the steppe, with very chilly winters and hot and arid summers. The cattle are long-lived, with an average productive lifespan of 13 years and frugal, managing to sustain themselves at pasture also throughout the year, and to recover with a considerable compensatory growth after periods of food deprivation. As a supplement, hay, straw, corn silage, alfalfa hay, mixed grain cereals, compound feed and mineral feed are usually administered.

They have excellent viability, longevity and reproductive capacity, with a strong maternal instinct. The small size of the calf at birth (27-29 kg according to Dimitriev *et al.*) guarantees great calving ease. The breed has a high fertility rate: it is reported that for many years the level of calves born per 100 cows has been around 90-99%. The average age at first calving is 28 months and the average calving interval according to DAD-IS is 375 days while Guziev *et al.* (2009a) reports 367 days. The average duration of pregnancy is 282.5 days, the percentage of fertilized cows is 92%, the twinning rate is 9.7%, the heifers' weight at the first fertilization is 370 kg *(Guziev et al.,* 2009b*)*.

The prevailing purpose today is **meat production**. Locally its quality, in particular that of the Cherkasy variety is compared to that of Chianina and Charolaise, and in 1917 it was recognized as the best beef breed in Russia. The selection was not initially oriented towards meat production, to which only animals at the end of their production lifespan or those who were sick or injured were destined, but when selected for beef purpose, the breed showed an excellent potential for building muscle mass, although suffering the competition from cosmopolitan races, but remaining more productive in the adverse conditions of the southern steppes.

The breed is late-maturing but its rate of development and size are largely determined by feed levels and breeding practices *(French)*. This determines a certain discrepancy in the production data.

The meat is lean with poor marbling and medium thickness of the subcutaneous fat, and is also highly appreciated for broths. The fattening response is good *(Zhytniak).* The average daily growth at the age of 9-12 months is 766-822 g *(Dimitriev et al.).*

According to Guziev *et al.* (2009a) if calves are suckled, the weaning weight at seven months is from 177 to 215 kg. At the age of 16 months the calves reach 439 kg (range 420-480), with a consumption of 7.8 feed units per kg of weight gain *(Dimitriev et al.)*, at 18 months they weigh 500 kg and at two years 670 kg *(Slowfood)*. The reported dressing percentage is 58.7%

(Dimitriev et al.), 59-61% *(Slowfood)* and 60.1% *(Ferma.org)*, while according to French is 54%, which can however reach 65% with suitable feeding.

During the period when the Ukrainian grey was used for draft, milk production was destined for calves and didn't undergo a selection. In 1910 the milk production in the best herds was from 1,100 to 1,500 kg, but from the 1960s with selection it reached average values between 2,900 and 3,200 kg, with a butterfat rate between 4.23 and 4.53% and protein between 3.20 and 3.45%. Record milk production was achieved in 1971: Iriska 5180 cow produced 5,365 kg of milk with 5.02% butterfat *(Dimitriev et al.).* Production records were achieved between the 5th and 9th lactation, testifying to the productive longevity of the breed *(Guziev et al., 2009a).*

Since 1979 the cows are no longer milked and milk is intended for suckling the calves. The cows, given their mild character, agree to feed other calves, in addition to their own.

It must also consider the **production of hides**, of high quality for their thickness, elasticity and hardness of leather. According to French, the raw hides of the 12-month old Ukrainian grey young bulls weighed 33.4±2.25 kg, and were treated as heavy hides being highly quoted on the local market. The final weight to raw weight ratio was 10.21%, the raw hide length was 208±4.5 cm. The thickness at the last rib is 12.3 cm, with considerable variability (13.1-14.7%). Young bulls at 15-16 months provide heavy hides, between 41-42 kg, equal to 8-10% of their slaughter weight, of good size, 244 cm long and 177 wide.

Genetic traits

Despite the great bulk of research on the phenotypic variability of zootechnical characters with respect to structural genes, mitochondrial DNA, inter-microsatellite polymorphisms, etc., the biological characteristics of the Ukrainian grey and its genetic and zootechnical history have not yet been fully studied, and scientific research work is still ongoing *(Kozyr)*.

The animals of this breed are carriers of rare genes, and Ukrainian grey should exist at least as a potential source of genetic material for future purposes. Recent studies on blood and milk have discovered unusual genetic combinations in the genotype, such as specific alleles of the B system blood groups or rare hereditary units of milk casein alleles. A variant of the phosphoglucomutase protein has been found in erythrocytes, and a new protein, post-transferrin 3 has been found in plasma.

However, the use of a limited number of bulls is reducing the variability observed in blood group antigens. The Polivanivka herd includes five related groups that vary in productivity and polymorphic systems and all females derive from two genealogical lines: Petushka (62%) and Shamrin (38%).

The data also show a significant change in the genetic structure of Askaniya-Nova animals, starting in 1994, perhaps due to an increase in the population and to worsening environmental conditions *(Glazko et al. 2009b)*.

Conservation

According to Volodymyr Kozyr the Ukrainian grey has an assortment of highly valuable genetic traits, important for the breeding of the future, and which would be a serious mistake to lose. The main conservation purpose is to maintain the gene pool that determine the specific characteristics of the breed and to maintain genetic variability and fertility traits, external appearance, high butterfat rate in milk, adaptability to local environmental condition

The State Breeding Station was established in 1935, focusing on milk and meat production (*French*), a conservation program started in the 1960s, and the conservation groups of Polivanivka and Askaniya-Nova were created, while starting from 1982 those of Cherga and Elbashi were established. Frozen semen has been stored in Polivanivka and Askaniya-Nova since 1990.

In 2005, with the assistance of the WWF, 17 heads of Ukrainian grey were released on Tataru Island on the Danube delta, in Ukrainian territory, in order to restore the natural grazing load and stop the degradation of the adjacent forests. The adaptation of the animals was good and their grazing activity led to an enrichment of the species composition of the flora and guaranteed an incentive for the development and renewal of natural ecosystems. *(Chegorka)*.

It should be noted that the Danube delta is also close to the Romanian area of Pardina,

home to herds of the Sura de Stepă breed (*see Gaddini A., Dascalu D.L., La Sura de Stepă, in Eurocarni, 2-2018, p. 72*) and not far from the Bulgarian breed Balgarsko Sivo Govedo herds near the Black Sea. (*Gaddini A., La Grigia bulgara, in Eurocarni, 4-2019, p. 120*). The Ukrainian grey is included in the Slow Food Ark of Taste, nominated by Natalia Rezikova and Yuri Stolpovsky.

A group of Ukrainian scientists has developed a proposal to give the Ukrainian grey the status of national heritage, to allow its conservation and development *(Chegorka*).

Influence on other breeds

The Ukrainian Grey was crossed with beef and dairy breeds, and helped to form new breeds: the Red Steppe took origin from crossbreeding with East Frisian red and Angeln and later with Swiss Brown and East Frisian, the Poliska myasna is the result of a complex crossbreeding with Simmental, Charolaise, Chianina and Ingush. The Lebedin (Lebedinskaya) breed originated by the crossing with Brown Swiss bulls *(Dimitriev et al.)*, the Ukrainian Simmental and the Simmental Steppe type took origin from crossbreeding with Simmental bulls.

The Ukrainian Whitehead (*Ukrainska biligolova*) took origin between the late 1700s and early 1800s, probably when the Mennonites, followers of an Anabaptist church who settled in Ukraine, invited by Empress Catherine II, brought with them some heads of the Dutch Groningen Whitehead breed, which were crossbred with the Ukrainian grey and other local breeds. The extinct Turkish Malakan breed also came from the Ukrainian grey.

FAO DAD-IS cites another Podolian breed now extinct, the Ukrainian Oldenburg or Black-and-White Podolian, a dairy breed widespread in Kamenets-Podolsk, western Ukraine, the herd-book of which was established, obtained by crossing Oldenburg on local cattle at the end of the 'Nineteenth century, then absorbed by the Black Pied.

National statistics

In Ukraine FAOSTAT reports for 2018 3,530,800 live bovine animals, and 2,145,900 slaughtered animals for a total weight of 358,900 tons, with an average of 167.25 kg per carcass.

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