PROAGRO LECTORIUM

Fundamentals of horse breeding

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Introduction

Horse breeding is a branch of animal husbandry that involves breeding and use of horses.

Moreover, “Horse Breeding” is a subject of agricultural science, which includes the following sections.

- Evolution and domestication of horses.
- Status and development of the main areas of horse breeding.
- External features of a horse.
- Reproduction of horses and rearing of young stock.
- Horse breeds.
- Pedigree horse breeding.
- Training and testing of horses.
- Working qualities of horses and their use for work.
- Productive horse breeding.
- Equestrian sports.

Status and development of the main areas of horse breeding

According to FAO (2020), there are about 58,400,000 horses in the world

The following countries have the largest number of horses (top 10 countries):

- USA: 10.0 million
- China: 7.5 million
- Mexico: 6.2 million
- Brazil: 5.7 million
- Argentina: 3.7 million
- Colombia: 2.5 million
- Mongolia: 2.01 million
- Ethiopia: 1.7 million
- Russia: 1.3 million
- Kazakhstan: 1.2 million

Status and development of the main areas of horse breeding

Russia has the most horses of any European country, accounting for 2.2% of the total population, followed by Germany (0.80%), the United Kingdom (0.76%), and Italy (0.68%).

Russia has the smallest number of horses per unit area.

The largest number of horses in Russia is in the Republic of Sakha (Yakutia): 178,600 heads.

Dodokhov V.V., Pavlova N.I. Number of horses in the world, Russia, and the Republic of Sakha (Yakutia)
https://www.elibrary.ru/item.asp?id=42490036
https://www.youtube.com/watch?v=ntJouJhLM48

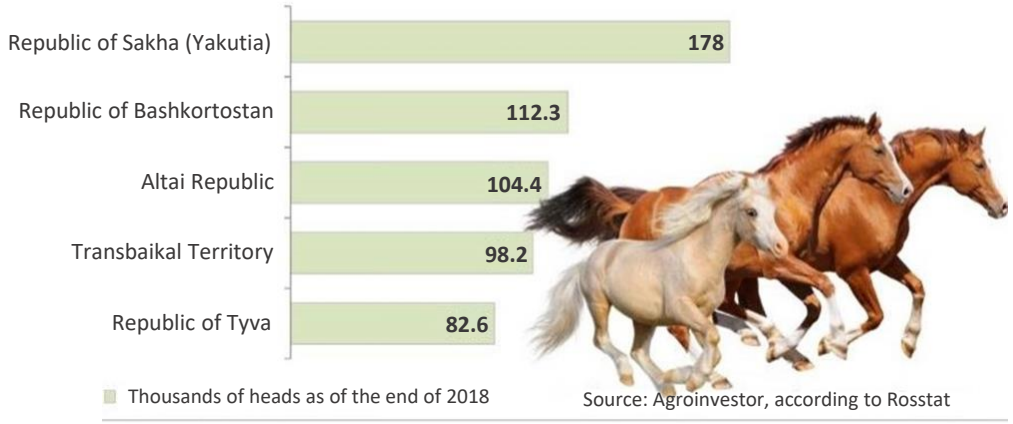

Figure 2. Top regions by the number of horses

https://www.agroinvestor.ru/analytics/news/31714-khod-konem/

Status and development of the main areas of horse breeding

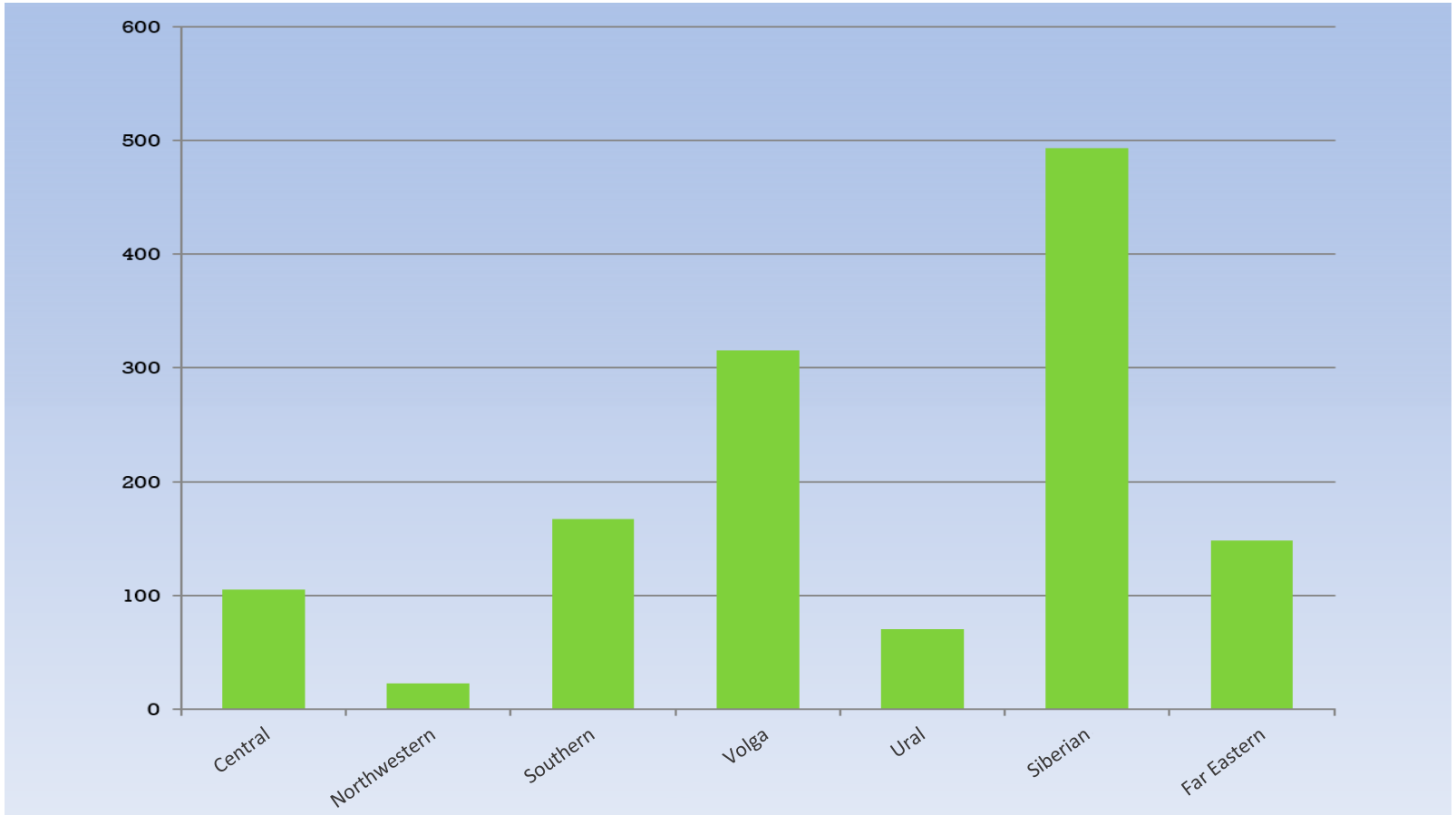

Figure 3. Distribution of horse population by federal districts of Russia

Status and development of the main areas of horse breeding

For hundreds of years in human history, horses were a major military strategic force. Moreover, they were used as working animals for transportation and agricultural purposes. Thus, prior to the introduction of automated means, horse breeding was mostly military and working in nature around the world, including Russia.

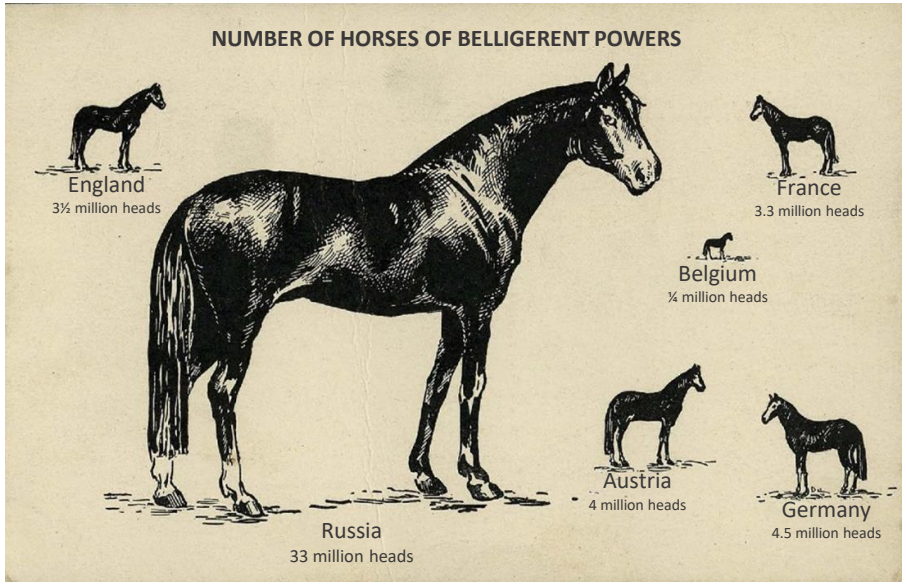

Figure 4. Postcard, 1914. Number of horses of belligerent powers. Horses were a major strategic military force
https://varjag2007su.livejournal.com/8146027.html

Status and development of the main areas of horse breeding

Figure 5. Plowing competitions, a tribute to tradition and the times when all agricultural work was done primarily with horses

Structure of horse breeding in the Russian Federation by areas of use, %

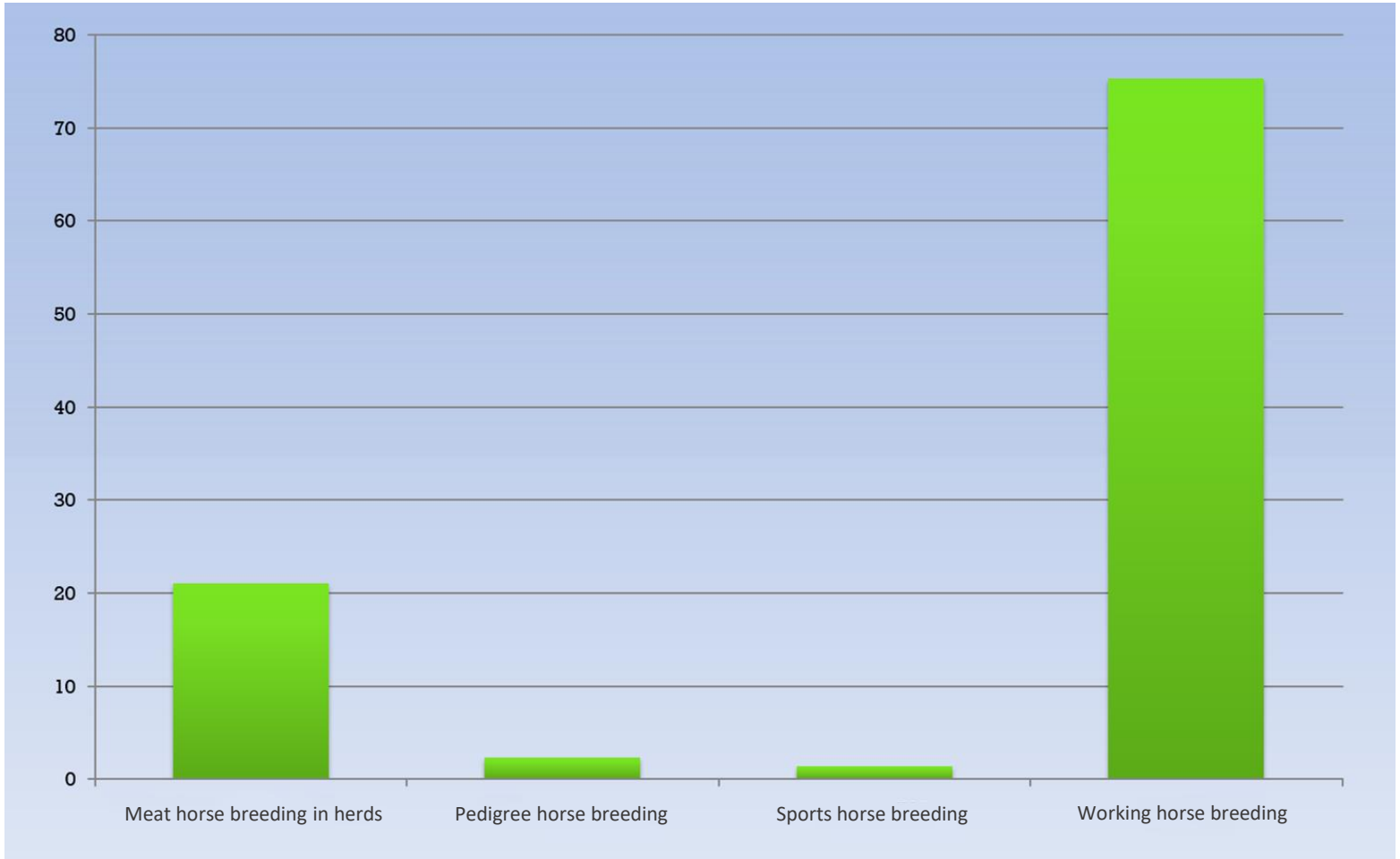

Figure 7. Main areas of horse breeding, %

Horse breeding prospects in Russia and around the world

Horse breeding generates over $300 billion each year globally, demonstrating the industry's importance to the economy of the majority of the world's countries. Equestrian sports make for the majority of money turnover, with horse racing at the forefront https://horsesonly.com/horse-industry/

Figure 8. Use of horses for sports Horse racing

Horse breeding prospects in Russia and around the world

Equestrian sports generally rely on horses from pedigree horse breeding farms located in rural areas.

Russia currently has a minor part in the global horse breeding industry. The small number of horses does not fully represent the need of different areas in horse breeding products. https://ruhorses.ru/

Figure 9. Use of horses for sports Race horses

Horse breeding prospects in Russia and around the world

Studies show that 3 times as many horses, that is, at least 4 million heads, can be effectively used in Russia.

The population's interest in various uses of horses is not fading; there is also a need for food products derived from horse meat and mare's milk. https://ruhorses.ru/

Figure 10. Use of horses for sports. Classic sports

Pedigree horse breeding

The State Register of Breeding Achievements of the Russian Federation includes 45 horse breeds, with 5 intrabreed types of horses.

In total, the country has over 200 breeding farms that raise 32 different horse breeds.

Changes in the number of breeding farms

in 2022		in 2010
67	breeding farms	66
126	pedigree breeding units	120
6	gene pool farms	14
1	stud farm	24

Indoor and pasture management of horses

Figure 12. Stall management of horses

Figure 11. Room management of horses

https://svoevse.ru/news/450 Rules for keeping horses on farms from September 1, 2024

Indoor and pasture management of horses

Figure 13. Stall management of horses

Figure 14. Room management of horses

Indoor and pasture management of horses

Total breeding mares: 32,900 head, excluding mares involved in meat horse breeding in herds

Figure 15. A breeding herd released to a pasture in indoor and pasture management

https://www.garant.ru/products/ipo/prime/doc/405117125/ Order of the Ministry of Agriculture of the Russian Federation No. 336 of June 2, 2022, On Approval of Requirements for Types of Breeding Farms

Breeding records in horse breeding

Figure 16. Breeding records https://ruhorses.ru/

Breeding records in horse breeding

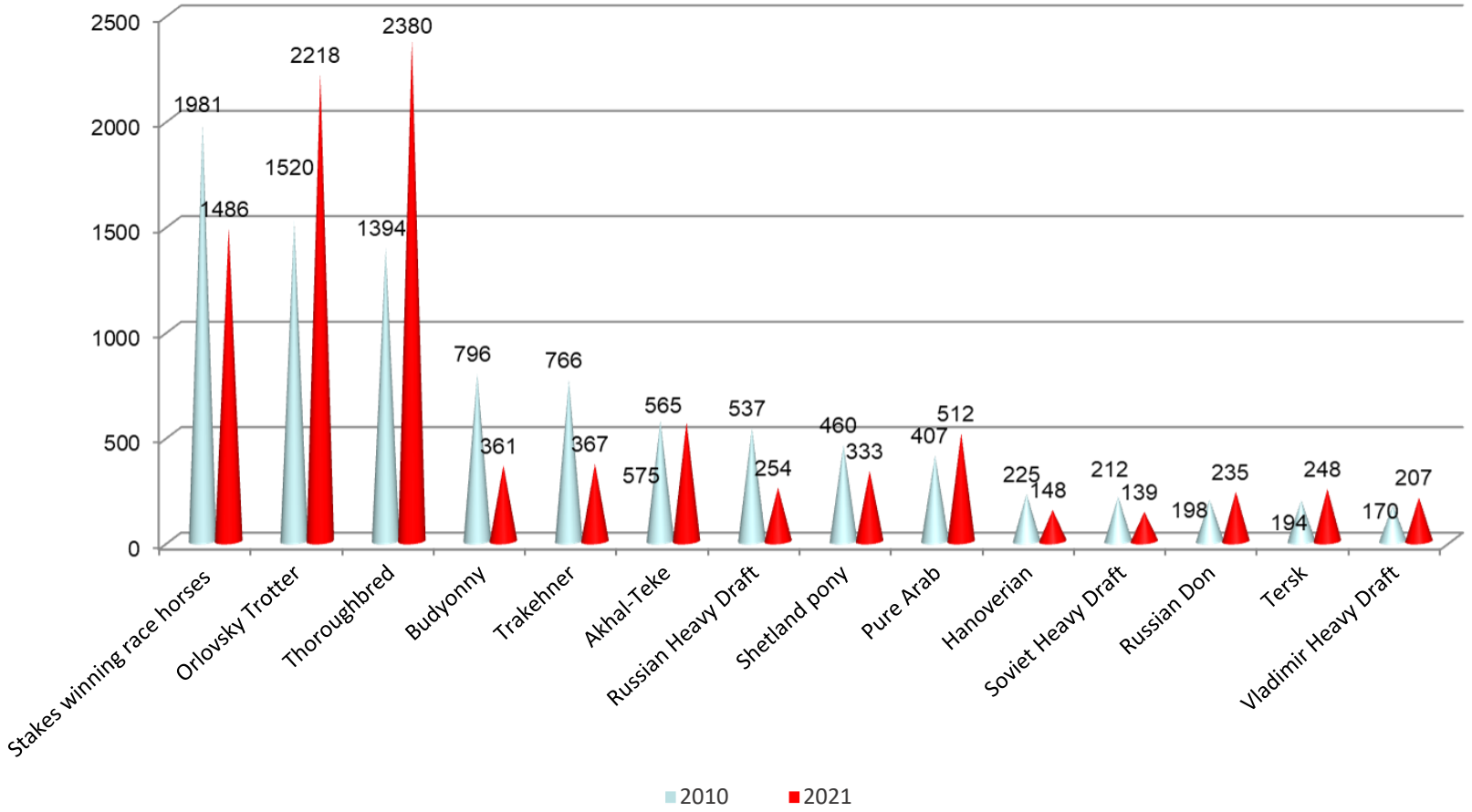

Figure 17. Changes and structure of breeding stock (mares) by breeds

https://ruhorses.ru/

Productive horse breeding

Dairy horse breeding

Currently, around 100 enterprises in the Russian Federation produce kumis from mare's milk. Production is currently plainly insufficient: no more than 2.5–3.0 thousand tons per year, against an annual demand of at least 18–20 thousand tons.
http://agroconsul.tomsk.ru/na_zametku/horses/sovremennoe-molochnoe-konevodstvo/

Figure 18. Kumis from mare's milk
https://vg-media.ru/household/kumysnaia-fierma-siemienovskogho-kak-zarabatyvat-na-kobyliem-molokie-i-aghroturizmie

Productive horse breeding

In dairy horse breeding, commercial kumis farms can be organized using the following technologies:

- intensive (year-round);
- extensive (seasonal).

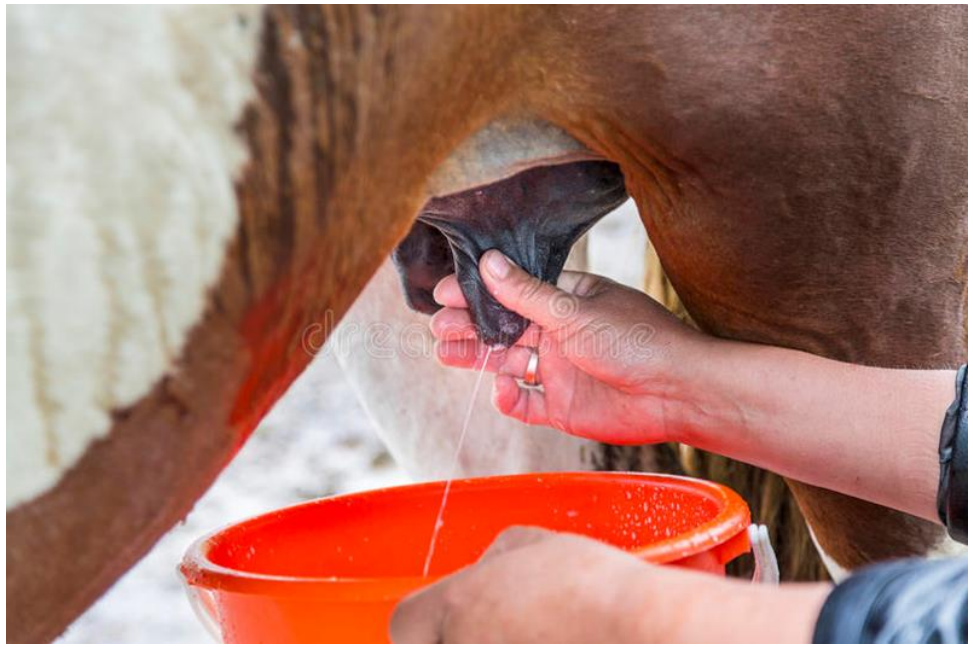

Figure 19. The mare's udder

Lactation phases in mares

Phase 1: milking out udder cisterns: 5–10% of one-time milk yield (30–200 mL), lasts for 20–21 seconds. The milk flow rate is 10–20 mL/sec.

Pause: 20–25 seconds

Phase 2: milk is removed from the alveoli; the volume is 90–95% of one-time milk yield, lasts for 40–100 seconds. The milk flow rate is 30–60 mL/sec.

Semenovsky kumis farm: How to profit from mare's milk and agrotourism

https://www.bashinform.ru/news/social/2022-11-29/uchenye-bashkirii-sozdali-unikalnuyu-tehnologiyu-obrabotki-i-hraneniya-kobyliego-moloka-3049782

Figure 20. Intensive (year-round) kumis farm technology

Lactation phases in mares

Milking is performed in milking stalls that have windows with flaps, so that foals could stimulate lactation. They also have small feeders with additional feed for mares, which encourages them to enter the milking stall.

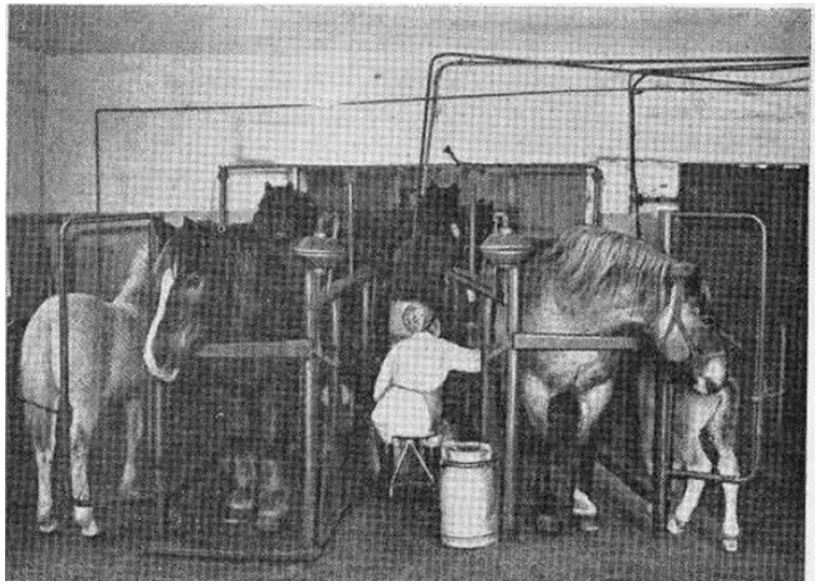

Figure 21. Milking machine DDU-2.
Kumis farm of an experimental horse breeding farm.

Mare milking

Mares are milked 5–8 times a day because the udder capacity is small.

For machine milking, a two-mode milking machine DDA-2 is used, as well as milking units DDU-2 and Tsepochka. Mare milking machines are distinguished by an automatic adjustment of operating modes, taking into account the unique characteristics of the mare milking process.

Figure 22. Mare milking machine

Mare milking

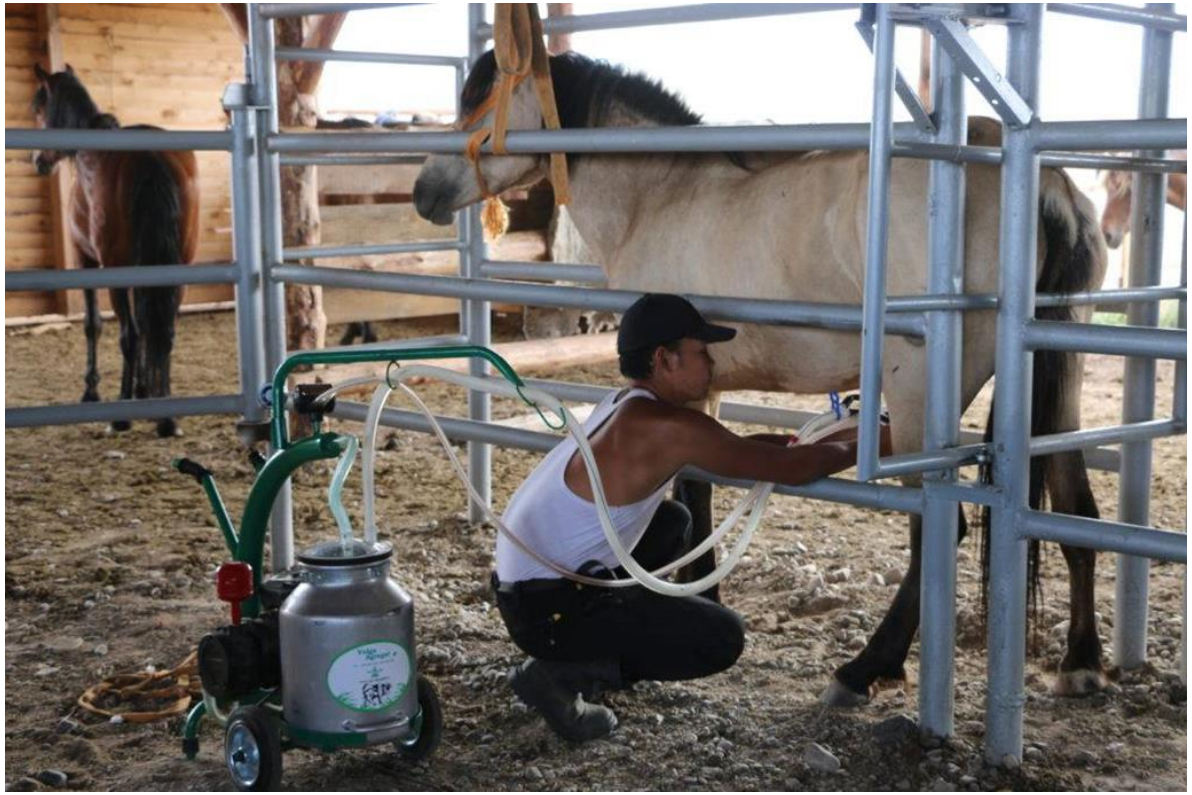

Figure 23. Extensive (seasonal) kumis farm technology

Chemical composition of milk of various animal species and humans, %

Milk	Water	Dry residue	Fat	Protein			Sugar	Minerals
				Total protein	Casein, %	Albumin and globulin, %		
Mare's milk	**89.0**	**11.0**	**1.6**	**2.7**	**50.7**	**49.3**	**6.2**	**0.3**
Human milk	**87.6**	**12.4**	**3.8**	**1.2**	**25.1**	**74.9**	**7.2**	**0.3**
Donkey milk	90.1	9.9	1.4	1.9	35.7	64.3	6.2	0.4
Cow's milk	87.3	12.7	3.7	3.3	85	15	5.0	0.7
Buffalo milk	82.2	17.8	7.8	4.7	89.7	10.3	4.5	0.8
Ewe's milk	83.7	16.3	5.3	5.5	77.1	22.9	4.6	0.8
Goat's milk	86.6	13.4	4.1	3.3	75.4	24.6	5.2	0.9
Camel milk	86.4	13.6	4.5	3.5	89.8	10.2	4.9	0.7

Figure 24. Mare Bichet (Meteoros — Barroy), born in 1976; milk yield 7,007 L (daily milk yield 31.3 L)

Figure 25. Mare Ryabina (Bard — Rozhitsa), born in 1969; milk yield 6,173 L

Figure 26. Kumis shop

Figure 27. Daily routine of a kumis shop in a horse breeding center https://vk.com/kymis_ru

https://cr2.livejournal.com/649942.html

https://vk.com/kymis_ru

Figure 28. Intensive (year-round) kumis farm technology

http://agroconsul.tomsk.ru/na_zametku/horses/sovremennoe-molochnoe-konevodstvo/

Characteristics of kumis produced by various methods (A.I. Saygin)

Grade	Contains, %		
	lactose	lactic acid	alcohol
Long maturation			
Day-old	0.68–0.90	0.55–0.74	1.8–2.2
Two-day-old	–	0.64–0.81	2.3–2.7
Three-day-old	–	0.67–0.90	2.7–3.5
Accelerated maturation			
weak	2.8–3.2	0.7–0.8	0.6–0.9
medium	1.1–2.0	0.9–1.0	1.0–2.0
strong	0.3–1.7	1.5–1.8	2.0–2.5

https://studfile.net/preview/5612030/page:8/

Technology of accelerated kumis production

- Receiving and preparing raw materials
- Fermentation and pre-mixing
- First maturation phase in the mixing tank
- Bottling, capping, labeling, refrigeration
- Self-gassing, storage, final maturation in bottles

Figure 29. Kumis from different producers

Meat horse breeding

Methods of meat horse breeding and horse meat production

- Specialized meat horse breeding in herds
- Horse meat production using culled horses of any breed (additional replacements and culled breeding, working, and sports animals)

Russia produces 80 thousand tons of horse meat per year (47 thousand tons per year according to international databases), accounting for approximately 9% of global production. The prime cost of horse meat production in the areas of traditional horse breeding in herds is 2 and more times lower than the prime cost of beef and mutton production, which ensures good profitability of this industry.

Figure 30. Horse meat products

Meat horse breeding

The use of natural pastures and hayfields significantly reduces the cost of horse meat production. Herd horses meet 80–90% of their nutrition requirements via both summer and winter grazing.

Figure 30. Yakut horses grazing in winter

Meat horse breeding

The main breeds used for horse meat production in herds are local, heavy draft, and specialized breeds (New Altai, Kazakh, etc.).

For horse meat production using culled horses, any breed can be used: trotters, riding horses, heavy draft breeds, ponies, etc.

Figure 31. Horses of Kazakh breed, herd management

Meat horse breeding

Horse meat is a highly valuable food product. The highest average daily gains are observed in young animals in the first two years of life

Figure 32. Composition of horse meat

Composition of horse meat, per 100 g:
Fat: 4.60 g
Protein: 21.39 g
Carbohydrates: 0.00 g,
Water: 72.63 g
Ash: 0.99 g
Caloric value: 133 kcal

100 g of horse meat contains 29% of the daily protein requirement, 6% of fat, and 0% of carbohydrates.

Meat horse breeding

Figure 36. Canned horse meat

Sliced and packaged horse meat from the Netherlands

Horse meat delicacies

Meat horse breeding

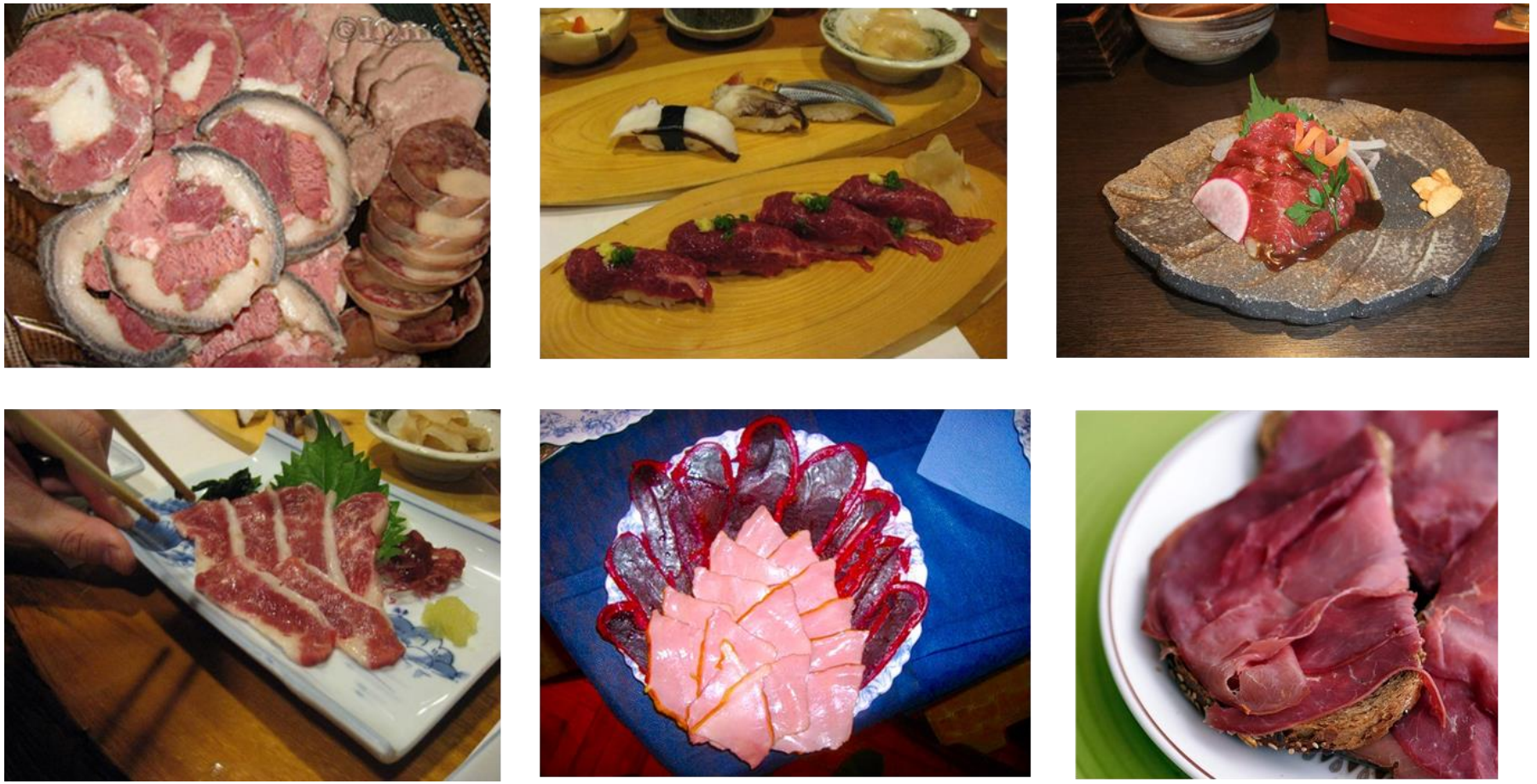

Figure 37. Horse meat delicacies

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Thank you!