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Analysis of the composition of frozen and lyophilisate mare milk for differences in composition – a preliminary results .

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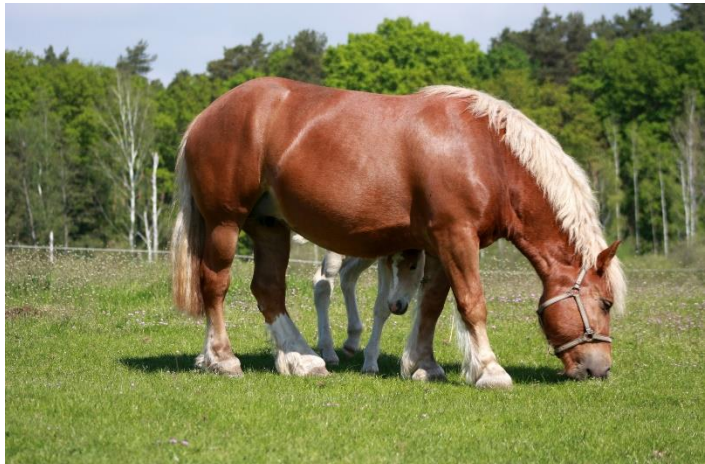
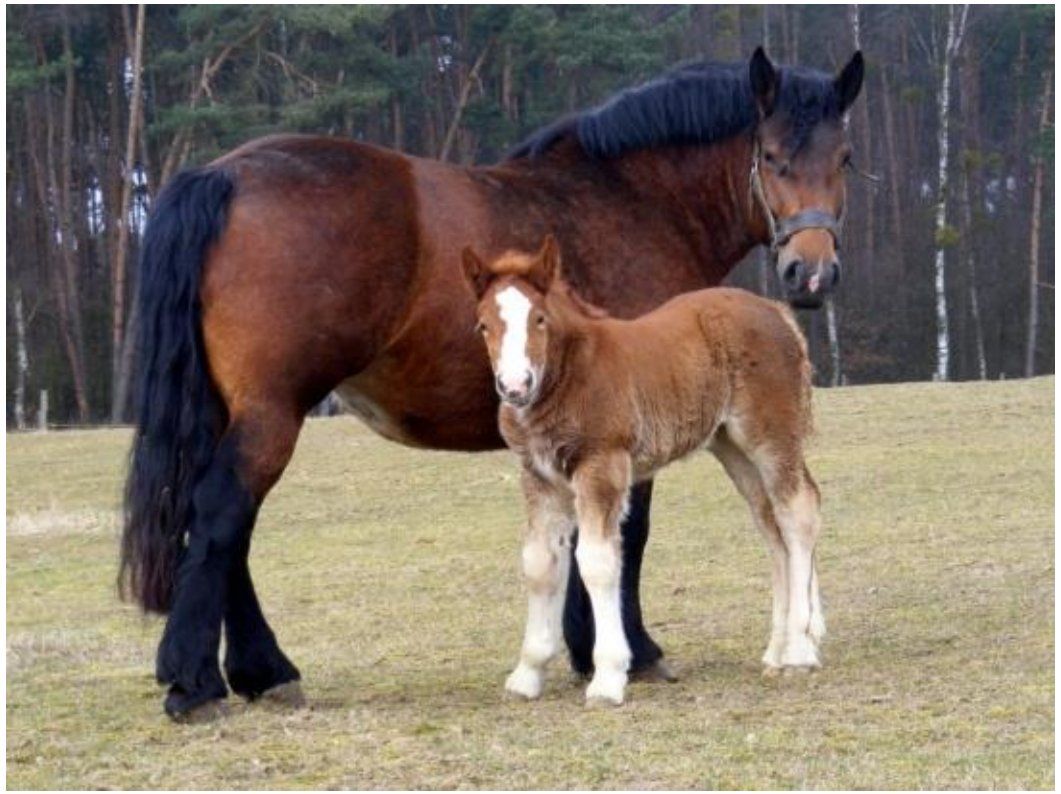


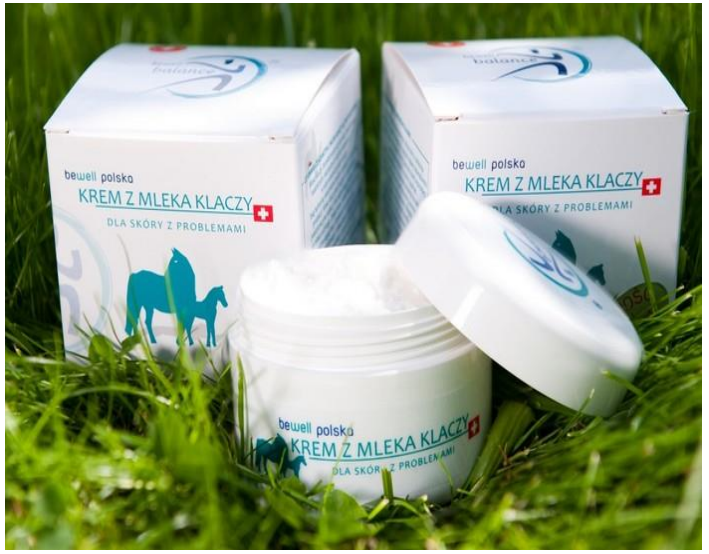
Mare's milk has a high biological and **nutritional value**. In Western Europe, more and more breeders are deciding to produce mare's milk on a larger scale. It is used in the **pharmaceutical, cosmetics and food industries**. Mare's milk can be used both to treat skin diseases and to alleviate gastrointestinal irritation.



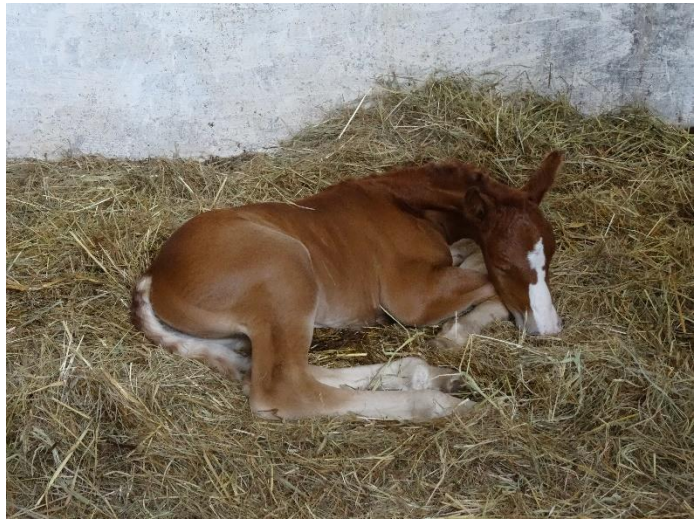
The content of **lysozyme** in mare's milk is almost four times higher than in human milk, which has a beneficial effect on human health. Lysozyme has **antibacterial** properties. It causes lysis of many types of G (+) bacteria.

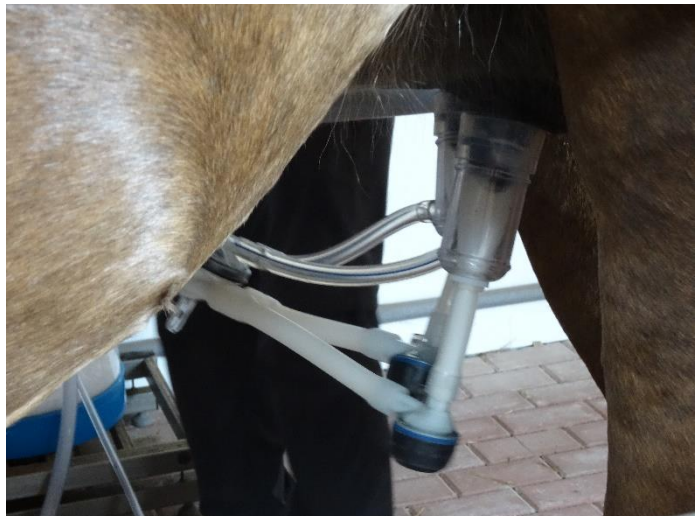
Beneficial effect of mare's milk :

- supporting the treatment of skin diseases (acne, psoriasis);
- treatment of gastrointestinal diseases (ulcers, diarrhea);
- raising immunity;
- children's health (prematurity and anti-allergic diseases);
- myocardial work and circulation;
- lowering cholesterol and treating diabetes;
- detoxification of the body and reduction of body weight;
- support the work of the nervous system;
- treatment of depression and insomnia;
- prevention of aging.



In Western Europe mares milk production turned out to be attractive for owners of large herds (100 and more mares) as well as small farms with 10-20 mares. It is assumed that daily milk production at the peak of lactation corresponds to **2-3%** of the body weight of the mare. In half-blood horses it reaches about **10-14 liters**, and in cold-blooded horses it reaches **18-24 liters**. The season and **environmental condition** have a major impact on the composition of mare's milk (e.g. availability and type of feed, botanical composition of pastures, stage of plant maturity, temperatures).



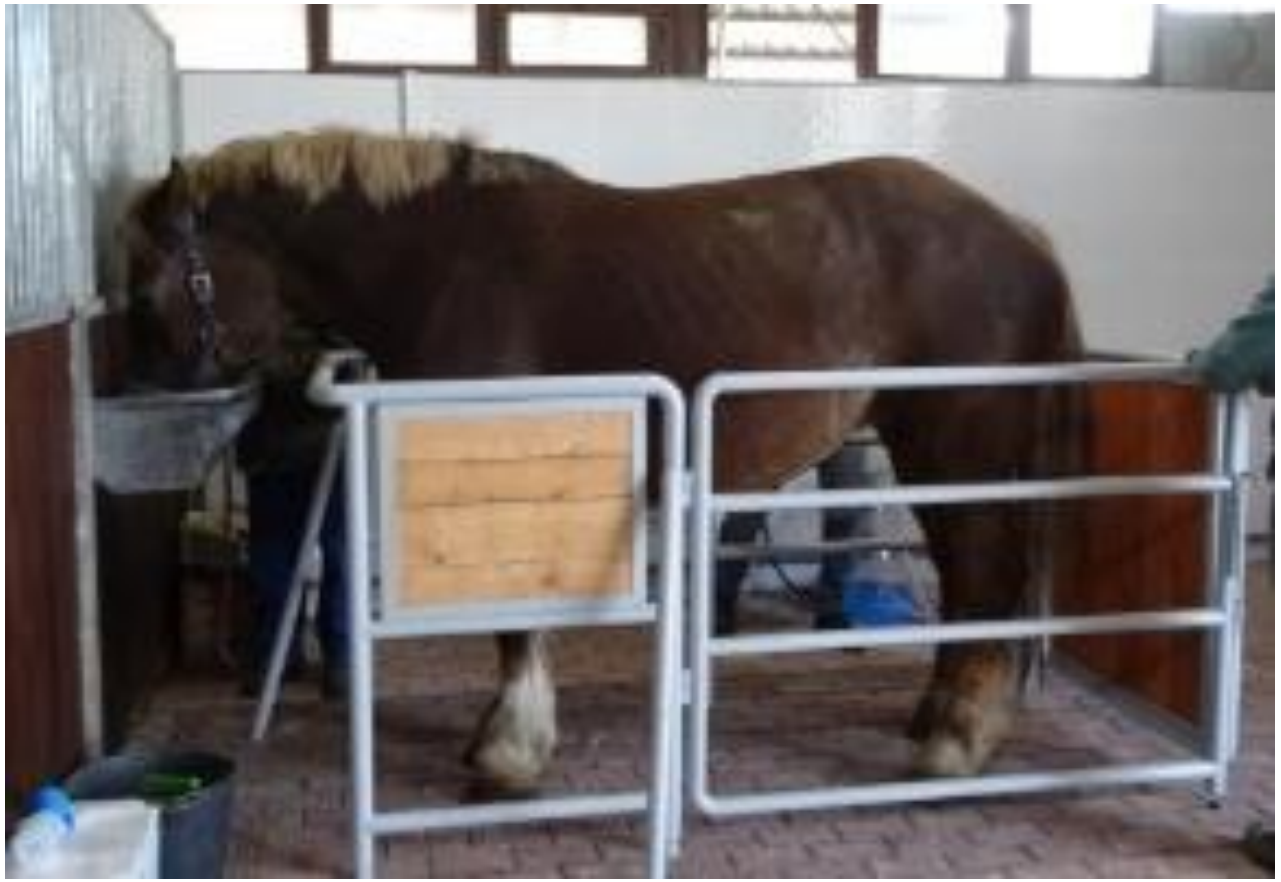


Nutrient content in mare's milk according to various authors

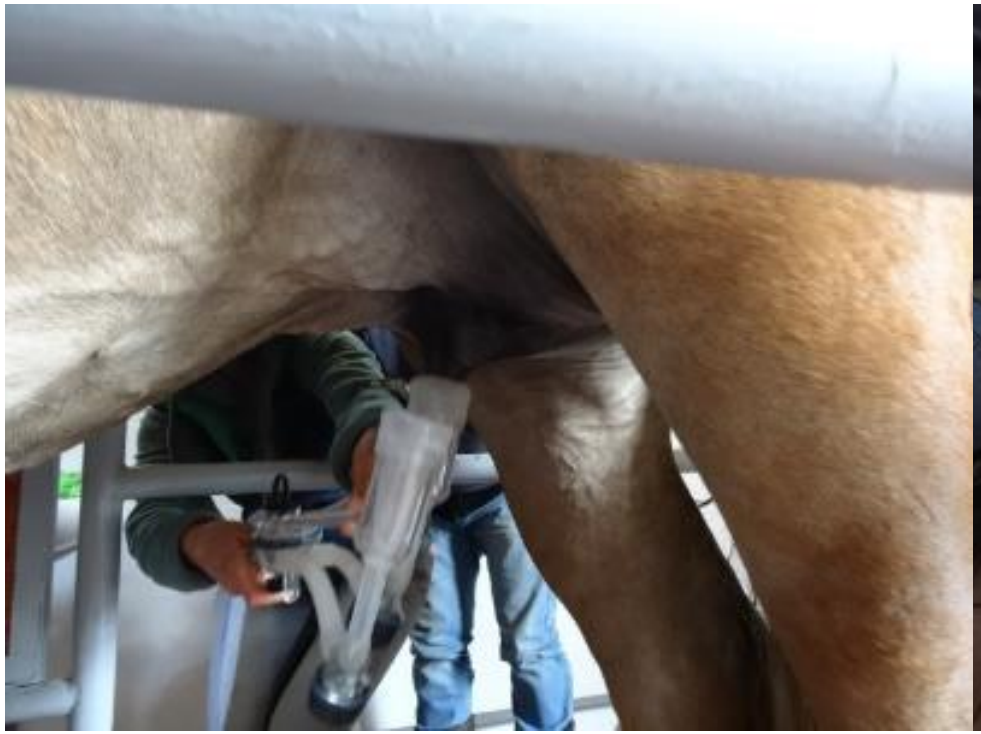
composition	dry matter(%)	proteins (%)			fats (%)		lactose(%)	somatic cells (thousand /ml)	microorganisms (thousand /ml)	Free fatty acids (mmol in 10 l)
		total proteins	lisozyme	lactoferrin	total fat	cholesterol				
Markiewicz- Keszycka,	9,74 - 11,44	1,67 - 2,92	0,75 a 1,26 g/l	0,66 - 1,38 g/l	0,43 - 1,7	1,95 mg/dl	5,85 - 6,63	3	2	
Pieszka, 2011	9,28 - 9, 95	1,15 - 1,85			0,49 - 1,14		7,04 - 7,73			4,86 - 8,54
Salimei & Fantuz, 2012	10,1	2,1			1,4		6,1			
Danków et all., 2006								46	62	
Danków et all., 2012		2,14			1,21		6,37			
Malacarne, 2002		2,1	6,59 (% total protein)	9,89 (% total protein)	1,2	0,3 - 0,4 (% total fats)	6,4			
Kulisa **et all.,** 2010								16 - 111		
Pecka **et all.,** 2011									205 - 254	

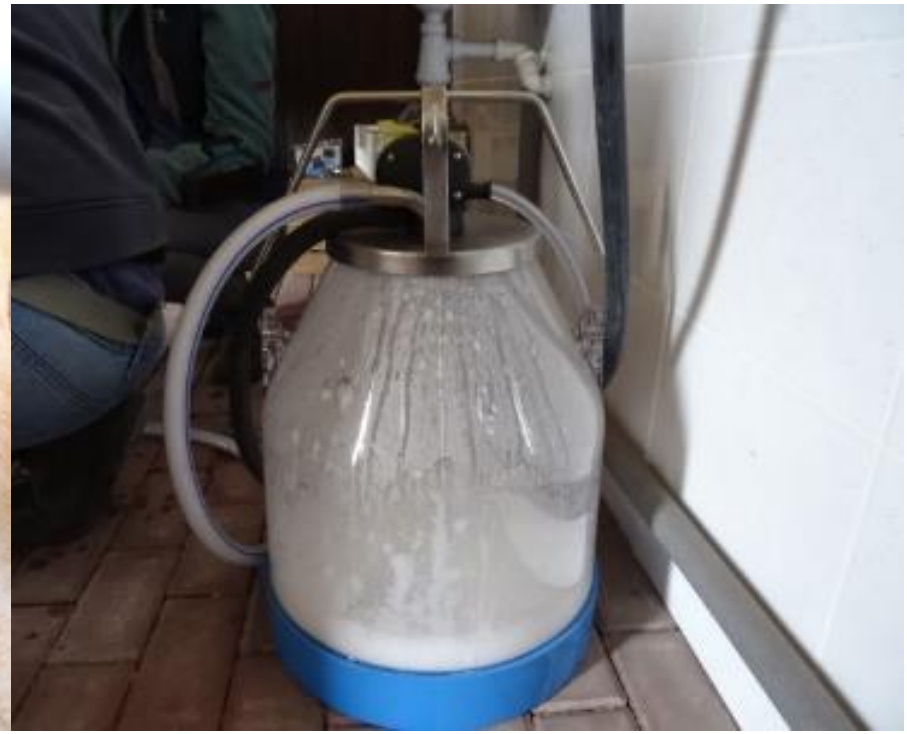
Aim of the study

The aim of the study was to analyze the composition of mare's milk in order to detect the difference in the composition of **frozen and lyophilized milk**.



The 44 samples of milk from the cold-blooded Sokólska (sok) mares and the Polish Halfbred Horse (sp) was analyzed. The milk was obtained from May to early September 2018. The mares was milked once a day. Immediately after milking they were cooled to a temperature of 3-6° C, and then frozen to -20° C.





Results 2018

mare	PASZKA (82 days of lactation)	PERŁA (82 days of lactation)	ASZJA (82 days of lactation)	TELIMENA (82 days of lactation)	GUSTOWNA (59 days of lactation)
foaling	07.02.2017	29.01.2017	01.02.2017	06.03.2017	07.07.2017
∑ milk (l)	Av. kg milk/day	Av. kg milk/day	Av. kg milk/day	Av. kg milk/day	Av. kg milk/day
	0,98	1,93	1,06	1,4	1,87
604,6	77,5	155,35	84,95	176,5	110,3

Results 2018

The differences in the composition of frozen and freeze-dried milk

The milk to be tested was frozen and delivered on dry ice to laboratories in Krakow University of Agriculture, where analysis was carried out for:

a) Chemical composition and energy value
b) Fatty acid profile
c) Physicochemical properties
d) Whey protein profile

Lyophilisates were made from a part of the tests (50% of samples) and then analyzed in the same way as milk. For comparison, the obtained chemical composition results were calculated as their percentage of dry matter.

Freeze drying was performed using a LYO-QUEST -55ECO freeze dryer.

Results 2018

g/ml	g/100 g milk					Energy		Dry matter %			
Density	Dry matter	Protein	Fat	Lactose	Ash	kcal	kJ	Protein	Fat	Lactose	Ash
1,026	8,97	1,56	0,13	6,97	0,31	35,30	149,85	17,34	1,45	77,77	3,45

Lyophilizate	g/ml	g/100 g lyophilizate				Energy		Dry matter %			
	Dry matter	Protein	Fat	Lactose	Ash	kcal	kJ	Protein	Fat	Lactose	Ash
Avearge	92,47	16,35	1,35	71,76	3,01	364,54	1547,61	17,65	1,44	77,66	3,25

In two cases, there were statistically significant differences (at the level of 0.05): - the amount of lactoferrin was higher in milk than in lyophilizate (0.17 - 0.41) - the amount of β-IG have been lower in milk than in the lyophilizate, (0.22-0.56). Which may indicate that freeze-drying of milk has a significant effect on its composition.

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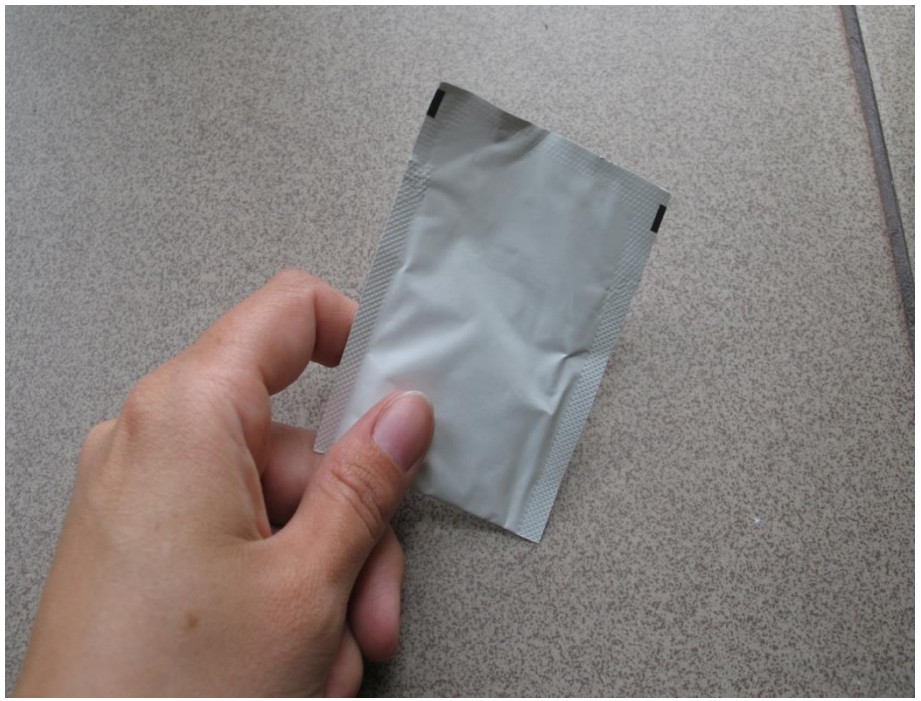
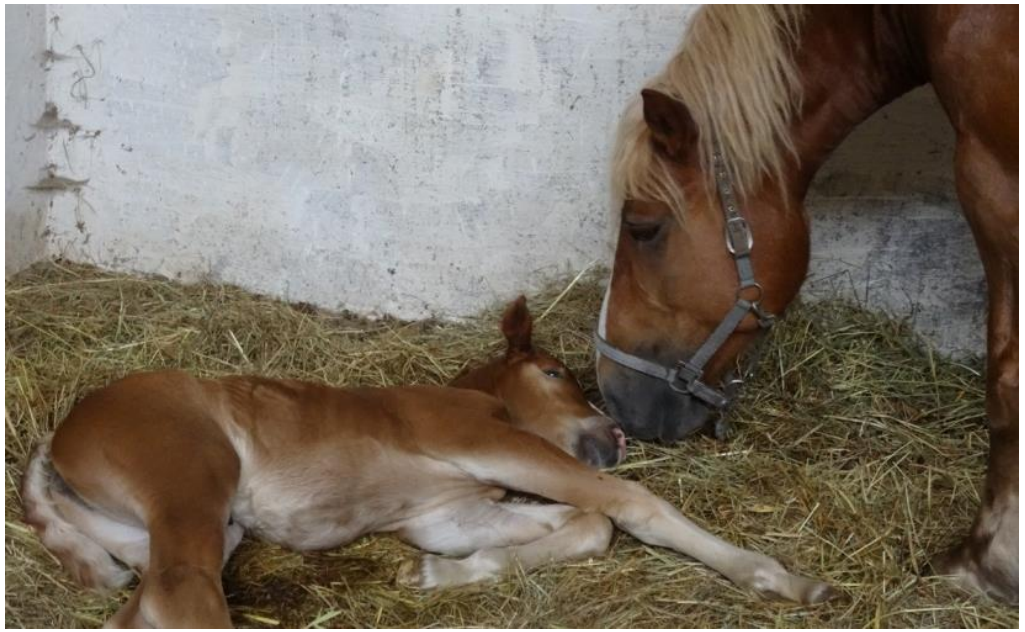


Fot. R. Dankow. Mare milk lyophilizate

Conclusions

- lyophilization of mare's milk may affect its composition
- to confirm the effect of lyophilization on the composition of mare's milk, tests should be continued on a larger number of samples taken



Thank you for your attention