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Chemical Content of Milk from Wild Sows (Sus scrofa ferus)

Skład chemiczny mleka loch dzika (*Sus scrofa ferus*)

Mortality of newborn animals is a very significant factor that lowers the efficiency of rearing various animal species. It is mainly due to the depletion of endogenous energy in piglet organism, low efficiency of thermoregulative system as well as the lack of active immunity. As a consequence newborn animals soon become dependent on colostrum availability as energy source, immunoglobulines and other components required for homeostasis. The investigations (8, 13, 16) point that biological value and maximum adaptation of sows milk content to requirements as well as digestive and metabolic possibilities of newborn pigs are closely connected with the content of female milk and its genotype (2, 15).

In a situation when the interests of breeders-amateurs (11, 14) most often focus on the trials of wild sows performance for meat production (due to the high biological value of meat and needed content of lipid fraction in tissues), it is reasonable to take studies on nutritional value of milk from wild sows that usually rear 6 to 12 piglets in one litter (5).

MATERIALS AND METHODS

Observations were upon 4 wild sows (2 of them in the second lactation and 2 others - in the first lactation) mated in a pure species. The wild sows were maintained in the same environmental conditions in Agricultural Experimental Station AR (RZD) in Uhrusk and they were fed by full-dose mixture LP ad libitum.

Milk for chemical analyses was taken three times from every sow on the 20th, 50th and 70th days of lactation. It was taken manually from each active teat after injection of 2ml oxytocine. In the milk

the contents of water, total protein, lactose and fat were estimated (by Milk-Scan apparatus). The energetic value was evaluated using regression equation given by Bakke and Vold (1). On the 20th day of lactation the fatty acids of lipid fraction concentration were estimated using gas chromatography and the amino acid composition of proteins – by means of ion exchange chromatography in automatic amino acid analyzer. Results obtained for wild sows were compared to those of breeding herd sows (the 20th day of lactation) of Polish Landrace breed maintained in RZD Uhrusk that were giving birth and rearing the litters at the same time.

RESULTS AND DISCUSSION

The numerical data characterizing the changes of basic milk components of wild sows since the 20th till the 70th day of lactation are presented in Table 1.

The percentage of dry mass was 22.8% on the average and slightly increased along with the lactation course (the differences statistically significant). In domestic pigs, along with the increase of sows milking capacity, the decrease of dry mass that lasts till the 3rd week of lactation (7) occurs and then slow increase of this factor percentage is observed (12). The dry mass content analyzed in milk of wild sows is higher by about 5% than analogous factor given by Klobasa et al. (6) for the pig's milk.

The average content of total protein estimated on the 20th day of lactation was 5.23% after 30 days of lactation it was lower by 0.3% and then reached 6.02% in

Table 1. Basic components of milk from wild sows (*Sus scrofa ferus*)

Specification	Day of lactation		
	20th	50th	70th
Dry mass (%)	20.80 ^a	22.00 ^b	23.60 ^b
Protein (%)	5.23 ^b	4.94 ^a	6.02 ^c
Lactose (%)	5.05 ^b	5.53 ^b	2.94 ^a
Fat (%)	8.51 ^b	7.66 ^a	9.77 ^b
Energy (kJ/kg)	5362.60 ^b	5012.58 ^a	5933.00 ^c

a, b, c – $P \leq 0.05$.

the final term. So, along with the lactation course a slow decrease of protein concentration in milk was observed till the 50th day, and after that (till the 70th day) there was slow but systematic increase of protein content. Similar changes characterization of protein content in pigs milk was found out by Walkiewicz (12).

The level of sugar in milk was more differentiated in particular terms of lactation in comparison to changes referring to the protein. The trends were to some extent opposed to changes of protein and fat contents in milk. On the 20th day of lactation the amount of lactose was 5.05%, and in the last phase it was markedly lowered and amounted to 2.94%. The average value for every sow investigated was 4.5%

lactose in milk, that in comparison to pigs is ordinary value. It should be stated that factors of lactose content in pigs milk given in the literature are very differentiated (from 3.1% to 5.8%) [Klobasa et al. (6), Mi g d a ł and K a c z m a r c z y k (7), W a l k i e w i c z (12)].

The lipids in milk are important components of newborn pigs' diet. They are the major source of energy and give the specific fatty acids. Long-chain polyunsaturated fatty acids are important for brain, nervous system and eye retina development (4). The saturated fatty acids of middle length are easily absorbed by digestive system and thus they are accepted as a better source of energy than long-chain fatty acids (17). During lactation the significant changes of fat content took place. On the 20th day of lactation the lipids of milk were 8.51% the basic components. Between the 20th and the 50th days of lactation the fat level decreased by about 1%. In the next period (50th to 70th day) the fat content significantly increased (about 2%) attaining 9.77% on the 70th day of lactation. When the fat content increased, the lactose content decreased at the same time and on the contrary - when the fat content decreased (since the 20th till the 50th days of lactation), the lactose level increased. The mean content of fat found in milk of wild sows (8.64%) represents a higher level in comparison to the results obtained for pigs even in a situation when sows were fed by fodder enriched in natural fats [Wielbo (16)].

The composint of fatty acids extracted from milk lipids are presented in Table 2.

In the structure of fatty acids in the investigated milk the unsaturated acids prevailed and they were by about 2.5% more in milk lipids of wild sows. The major quantity of monoenoic acid was the oleic whose content in milk of wild sows was by about 4% higher than in pigs of Polish Landrace breed. Among the desired

Table. 2. Profile of fatty acids in ether extract (% of total acids) of milk from wild sows (*Sus scrofa ferus*) and Polish Landrace breed

Specification	Wild sow	Polish Landrace pig
Laurinic acid	0.11	0.15
Miristic acid	0.92 ^a	3.37 ^b
Palmitic acid	33.82 ^b	31.52 ^a
Margarinic acid	0.59	0.40
Stearinic acid	4.35	5.51
Saturated fatty acids – SFA (%)	39.79	40.95
Palmitoleinic acid	3.90a	9.61b
Palmitolinolic acid	0.71	0.47
Oleic acid	44.03b	40.02a
linoleic acid	10.57b	7.85a
Unsaturated fatty acids – USFA (%)	59.21	57.95
U/S rations	1.5	1.4

a, b, c – $P \leq 0.05$.

unsaturated acids the linolic acid was in the highest amount in milk of wild sows (about 11%). This acid is a substrate for long-chain polyenoic acids synthesis like arachidonic acid (20 : 4 ω 6) and decosohexanoic acid (22 : 6 ω 3) [Stryer (10)].

Saturated fatty acids (SFA) were about 40% of lipid fraction in milk of wild sow and pig. Among SFA the palmitic acid was of the highest amount. It is consistent with the theory of milk fats biosynthesis (3, 9).

Digestibility of lipids depends on unsaturated fatty acids (USFA) to saturated fatty acids (SFA) ratio. It was 1.5 for milk of pigs of Polish Landrace breed. Wielbo (16) obtained slightly higher values using energetically enriched doses with natural fats during feeding of the sows for reproduction.

According to physiological needs of every organism the amino acid profile of the proteins plays the major role. It determines the biological value of sows' milk. Comparing the mean amino acid composition of protein in milk of wild sows to the analogous composition for pigs (Table 3) a higher level of exogenous amino acids was found, relatively exogenous and endogenous ones in wild sows. Among 18 amino acids the milk of wild sows contained more (10) particularly: lysine, phenylalanine, leucine, isoleucine, cystine, tyrosine, alanine, glutamic acid, serine.

Table 3. Amino acid composition of protein (% of total protein) in milk of wild sows (*Sus scrofa ferus*) and Polish Landrace breed

Specification	Wild sow	Polish Landrace pig
Exogenous amino acid		
lysine	7.26 ^b	6.50 ^b
tryptophane	1.00	1.09
histidine	2.87	2.76
phenylalanine	4.01	3.88
leucine	8.60 ^b	7.65 ^a
isoleucine	4.20	3.16
threonine	3.82	3.96
methionine	1.40	1.41
valine	4.78	4.73
arginine	4.60	4.53
Relatively exogenous amino acids		
cystine	1.73	1.47
tyrosine	4.40	3.59
Endogenous amino acids		
glycine	3.25	3.31
alanine	3.80	3.40
asparagic acid	7.83	8.29
glutaminic acid	21.22	20.35
serine	5.54	5.34
proline	7.40 ^a	10.67 ^b
Total	97.44	96.10

a, b, c - $P \leq 0.05$.

Statistically significant differences were found for lysine, leucine and proline. Among 10 exogenous amino acids lysine was in the highest amounts (about 7%), leucine (about 9%), valine and arginine (about 5%). In a group of endogenous amino acids the glutamic acid was in majority (about 21%), then asparagic acid (about 8%) and proline.

CONCLUSIONS

1. During lactation significant changes of basic milk components in wild sows were observed, which was expressed in differentiation of dry mass, total protein as well as fat and lactose contents:

a) the percentage of dry mass was 22.8% on the average and slowly increased along with the lactation course,

b) the highest concentration of proteins (6.02%) was found in milk samples on 70th day of lactation. During lactation course the slow decrease of protein concentration was observed (till the 50th day), from the 50th till the 70th day the slow but systematic increase of protein content took place,

c) the mean level of milk sugar was 4.5%. The variation trend of lactose level was in reverse to the changes of the protein and fat contents,

d) the ordinary fat content (8.64%) in milk of wild sows represents a higher level in comparison to results obtained for pigs. The increase of fat content in the final lactation phase corresponded to the decrease of lactose contribution.

2. The unsaturated acids were in the majority in the lipid fraction of a milk (about 59%). The main monoenoic acid was oleic acid. Among the desired unsaturated acids the linolic acid was 11%. The USFA to SFA ratio in milk of wild sows amounted to 1.5.

3. In the milk of wild sows a higher level of both exogenous amino acids and relatively exogenous and endogenous ones was found in comparison to the milk of pigs of Polish Landrace breed.

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STRESZCZENIE

Analizowano skład chemiczny mleka loch dzików (*Sus scrofa ferus*) w 20, 50 i 70 dniu laktacji. Obserwowano istotne zmiany podstawowych składników mleka loch dzika, wyrażające się różnicowaniem suchej masy, białka całkowitego, a także zawartości tłuszczu i laktozy. We frakcji lipidowej mleka przeważały kwasy nienasycone. W grupie kwasów monoenowych ilościowo przeważał kwas oleinowy. Stosunek KTN do Ktn w mleku loch dzika wynosił 1,5. Stwierdzono w mleku loch dzika wyższy poziom aminokwasów egzogennych niż u świń rasy pbz.