

Composition of sow's milk – a new point of view^{*}

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Summary

The chemical composition of sow's milk from particular nipples has been estimated many times. Results were differentiated and often contradictory. It testifies to the variability of the parameter, leaving ground for doubts whether everything has been taken into account at its evaluation. The chemical composition of milk depends generally on: nutrition, breed, age of sows but it may also be determined by the number of milk canals in the nipple. Sow's udders were inventoried with regard to anatomical structure of nipples and then quality of milk on 21-st day of lactation was compared in relation to chosen chemical traits as well as proteinogramme of whey.

Preliminary estimation of chemical composition of milk taken from nipples of different structure shows that 3-canal nipples have milk with slightly higher amount of fat, dry matter and protein as compared to 2-canal ones.

The amount of milk produced does not necessarily go together with its immunological value. Sow's milk differs from milk of other species because of SIgA secreted during the whole lactation period. Number of milk canals is consistent with the area where these immunoglobulines can be synthesized, hence future research on anatomical structure of sow's udder and its effect on piglets' rearing results is highly advisable and may contribute a lot to practical pig breeding.

Key words: sows, sow's udder, milk canals, milk yield

Sows of maternal breeds are perfected to improve their reproductive performance. One of the key parameters affecting this performance is milk yield. Many researchers (Czarnecki et al.,1991; Migdał et al.,1986; Svendsen et al.,1973; Walkiewicz et al.,1999) studied quantity and quality of the mammary gland secretion obtaining various, often contradicting results, which should be attributed to high variability of the parameter or, as could be assumed, inadequate identification of all involved factors. It is obvious that chemical composition of milk is affected primarily by quality of feeding, breed, age of sows and sequence of teats (Göranson 1990; Inoue et al.,1979; Migdał et al.,1989) but it may also be affected by number

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of milk canals leading to the teat (Rzasa et al., 2004). The anatomical structure of the sows' udder is well known. The only controversial issue seems to be the number of out-leading canals. Most authors (Koning and Liebich 2000; Najbrt and Kolektiv 1982) claim that there are 2 to 3 of them. Kudriawcew (1951) demonstrated on the basis of corrosive preparations that there can be from 1 to 3 canals.

The aim of the investigation was to evaluate quality of sow's milk on the basis of proteinogram and chemical composition on 21 day of lactation depending on anatomical structure of teats from which milk samples were obtained.

Materials and methods

The investigation was conducted on 2 large scale production farms on PLWx PL crossbreed sows.

A detailed survey of sows' udders was carried out at the time of parturitions. The data concerning number of teats, their location and anatomical structure (i.e. number of milk canals) evaluated on the basis of milk flowing at manual milking, was collected.

On 21 day of lactation in some chosen sows the number of milk canals in particular teats was again evaluated and on farm B milk samples for initial determinations were taken. Due to low number of 1-canal teats active at milking, only 2-canal and 3-canal teats were milked.

The fresh milk was analysed with respect to per cent content of fat, protein, lactose, dry matter and fat-free dry matter with the use of Milko-Scan 133 B. Total protein level was determined in whey with the use of Benedict reagent. Whey protein fractions were separated with the use of paper electrophoresis, then their per cent share and absolute content in total protein was determined.



2-canal teat

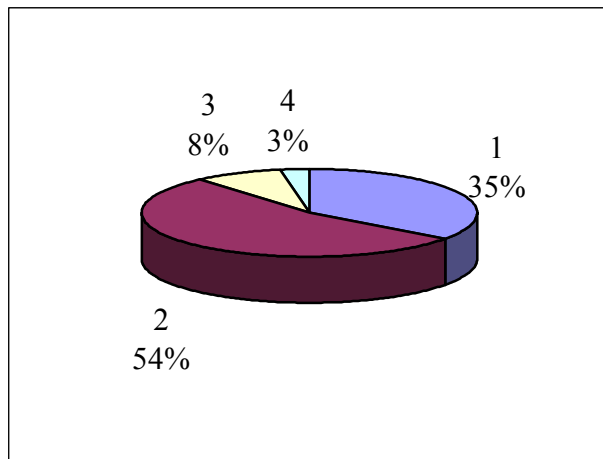


3-canal teat

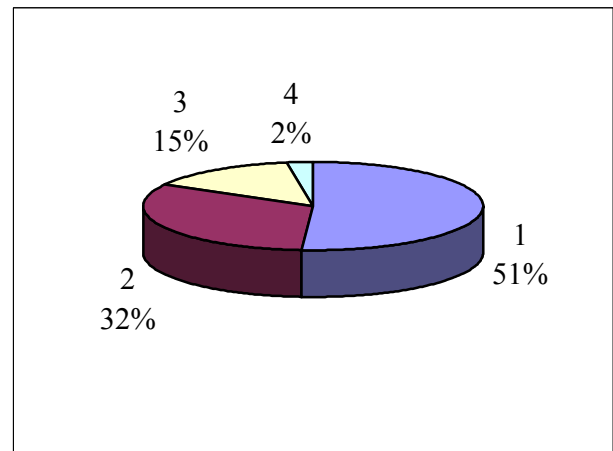
Results and discussion

Division of sows due to anatomical structure of udder

Ferm A



Ferm B



1 - sows with all 2-canal teats; 2 - sows with 1- and 2-canal teats; 3 - sows with 2- and 3-canal teats; 4 - sows with 1-, 2- and 3-canal teats

Anatomical structure of teat		Chemical composition of milk (%)				
		Fat	Protein	Lactose	Dry matter	Fat-free dry matter
2-canal	$\bar{x}$	6,87	4,49	5,39	17,36	10,49
	$\pm$	1,71	0,44	0,58	1,7	0,52
3-canal	$\bar{x}$	7,47	4,92	5,10	18,09	10,62
	$\pm$	1,72	1,15	1,21	1,65	0,48
		Proteinogram (g/L)				
		Total protein	albumine	α -globuline	β -globuline	γ -globuline
2-canal	$\bar{x}$	31	80	60	50	12
	$\pm$	8,5	3,9	1,7	1,9	2,7
3-canal	$\bar{x}$	32	60	70	50	15
	$\pm$	5,73	3,1	1,9	2,1	2,7

The accessible literature does not provide any reports on the relationship between anatomical structure of the sow's udder and its milk yield. Kudriawcew (1951) reported that 1-canal teats are least and 3-canal most lactiferous. Due to relatively low number of such teats in the studied population of sows, it is difficult to take an unequivocal stand.

Yet if the glands can have different number of milk canals, the question arises as to its significance. Kudriawcew reported that a decidedly higher number of teats with one milk canal occurred in primiparous than multiparous sows. Such teats as less milk yielding caused earlier culling of sows due to worse rearing results. Perhaps it would be worthwhile to conduct

selection with a uniform (as far as the number of milk canals is concerned) udder structure in view and secure relatively equal conditions for piglet development.

The quantity of produced milk does not go together with its quality and, more precisely, its immunological value; here the effect of the anatomical structure of particular teats can be observed. Sow's milk is different than in case of other species because in the whole period of lactation it contains locally produced class A immunoglobulines. The number of milk canals goes together with the surface where these immunoglobulines can be synthesized, therefore further studies on the anatomical structure of the sow's udder and its effect on piglet rearing results seem highly advisable and beneficiary in practical pig breeding.

Initial results show that 3-canal teats have milk of slightly higher fat, dry matter and protein contents in comparison with 2-canal ones. The tendency for slightly higher level of protein in 3-canal teats can be also seen in the presented proteinogram.

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