

AN INFLUENCE OF DILUTING AGENTS OF BOAR SPERM AND A METHOD OF ITS PROCESSING ON RESULTS IN SOWS' REPRODUCTION

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Abstract

During the first period monitoring of sperm survival was done in 46 samples of breeding boar sperm. Sperms were halved and diluted by two diluting agents in the reason of their quality verification. In used diluting agents reached results in conception and fertility of sows were put in context with sperm survival after 3 days from preparation of sperm doses. Unambiguously was acknowledged that sperm doses with decline of survival under 50% of all spermatids or with higher percentage of survival, but with changed character and velocity of movement (slower moving and luminous spermatids) significantly lower fertility of sows (for 2.66 piglet per litter) and conception after the first insemination (for 9.9%).

During the second period preservative effect of two of the best diluting agents of boar sperm (in our opinion) which are accessible in the Czech Republic was put to verification. Diluting agent C (APS+) showed better preservative effect when in 2168 of the first inseminations was reached better of conception for 6.43% and better fertility for 0.17 of piglet compared to diluting agent D (diluting agent with bovine serum albumin) with 2209 of the first inseminations.

Introduction

In a sector of pig breeding it happens in the long term that production of piglets decline seasonally or fitfully. This fact is very good known in practice but unique proof on an influence of concrete factors does not exist. In scientific literature and special breeders' discussions a seasonal biological character of breeding process of pigs is mentioned as a reason. This is certified by decline of heat activity of sows and gilts (1,2) and quality of spermatids in boar sperm during summer (3,4). In smaller range it declines during other parts of the year. These declines are observed in animals witch have in long term good level of reproduction. In our study we aimed on an influence of male part – breeding boars and possibilities of minimization of these declines.

Material and Methods

During August and September 2003 we chose (in our opinion) two quality diluting agents of boar sperm and we used them for diluting of individual sperm.

With accurate comparative procedure – halving of sperms, diluting with both diluting agents to the same number of sperm doses with the same technological procedure and colorings of sperm doses according to used diluting agent for easy determination. Next the same insemination technicians inseminated sows in the same turns in capacity breeding. In laboratory survival of spermatids from individual halved diluted sperms after 3 and 5 days from diluting was examined. After evaluation of conception and fertility of sows we reached results, which are shown in Tables 1. and 2. In August and September 2004 on a base of reached results we tested alternation of two different diluting agents, which are used during all sperm doses making on Station of Boar Insemination in Grygov in 14 days intervals. There we could not halved sperms because of needfulness of time for making a big amount of sperm doses. After farrowing we evaluated reached results. They are shown in Table 3. Evaluation was done in 16 agricultural companies with stabilized results in sow reproduction to negate possible negative influence of staff transacting insemination.

Tab. 1 Testing of diluting agents August – September 2003

Agricultural company	Diluting agent	Halved sperms	I. ins.	Conception %	All litters	Born piglets per litter	Litters to 8 piglets	
							Number	%
1800 sows	A	46	238	84.4	213	9.97	15	7.04
	B	46	224	76.8	186	9.76	19	10.21
Total	A+B	46	462	80.7	399	9.87	34	8.52

Tab. 2 Results according to survival of spermatids 3 days after collection

Period	Survival of spermatids after 3 days	Number of sperms	I. ins.	Conception after the first insemination %	Litters	Born piglets per litter
August – September 2003	Over 50 %	35	357	82.9	318	10.41
	Under 50 % *	11	105	73.3	81	7.75

* Sperms with survival of spermatids under 50 % and sperms with higher percentage of moving spermatids, but with changed character of moving are included in survival under 50 %.

It happens in practice that a percentage of moving spermatids with movement forwards after the head is evaluated without any regards on character of movement. It is a wrong evaluation. Survival of boar spermatids must be defined as a percentage of active spermatids with straight or slightly round fast movement forwards after the head with maintenance of natural character of movement.

The movement is given by angle of flagellum fluctuation. If the angle of flagellum fluctuation is smaller then survival of spermatids is shorter (their longevity in genitalia of sow. Speed and character of the spermatids movement is determined by momentary functional level of mitochondrial spiral (5) which indirectly defines metabolic activity of spermatid and thereby its momentary potential fertilization ability.

Tab. 3 Results of diluting agents testing

Period	Diluting agent	Number of diluted sperms	% sperms with survival under 40%	Number of the first inseminations	% conception	Litters	Born piglets per litter
August – September 2004	C	947	17	2168	78.18	1747	10.71
	D	1112	18.8	2209	71.75	1598	10.54

Discussion

Better preservative effect of diluting agent A was proved by comparing of reached results of spermatids survival and conception and sows fertility during testing of two diluting agents carried out by halving 46 sperms with the same technology of proceeding. It was unambiguously noted during more detailed analysis of reached results in conception and sows fertility in connection with level of spermatids survival in individual sperms that with growing percentage of surviving of spermatids 3 days after collection and manipulation of sperm the conception and fertility of sows is growing. Unambiguously it was verified that in these cases the same sperm gives different results in sow fertility when in one diluting agent percentage of activity, speed and especially character of the spermatids movement are changed. Decline of fertility was one or two or more piglets per litter in average in detriment of lowered surviving an existent half of sperms and it was independent on used diluting agent. If the sperm doses from both half of sperm were quality then conception and fertility were high and contrariwise.

In dependence on a level of a sperm doses quality decline in concrete diluting agent the fertility declined and particularly conception declined. Less numerous litters were in these sperms. In high quality sperms with spermatid survival over 60 % in sperm doses 3 days after collection and manipulation the litters with less than 9 piglets were really rare.

During the second period of testing the best diluting agents of boar sperm (in our opinion) which are accessible on a market in the Czech Republic it was certified that diluting agent C has better preservative effect then diluting agent D. It was confirmed by results in conception and sows fertility during August and September, which are the most critical months for pigs reproduction. And of course the price of diluting agent C is 2.5 times lower so we recommend using of this agent in our stations of insemination.

Reached results confirm our hypothesis that decline of sperm doses quality (sperm of boars in natural breeding) during summer has a high influence on conception and especially on fertility of sows and this influence is probably higher than a level which is usually mentioned.

During summer period and occasionally during the rest of the year these changes can be observed in higher number of sperms just after the collection:

- higher number of dead and morphologically changed spermatids
- changes in speed a character of the spermatid movement
- decline of spermatids concentration
- decline of spermatids tolerance toward process of diluting
- impairment of surviving of spermatids in preserved samples of diluted and preserved sperms of breeding boars

These factors together with impairment of sow heat create seasonal or sudden decline of conception and fertility of sows and gilts. Mentioned changes can appear suddenly during months which are propitious for pig reproduction (November – April) according to changes of weather (after our observing) and it is probably meteorosensitive reaction of pigs. These changes have an influence on libido sexualis of breeding boars and on heat intensity of sows and gilts.

Negative changes in sperm ability of fertilization are created by biological character of seasonal influence and by influence of sudden changes of weather on pigs reproductive process too. These changes can be eliminated in insemination:

- selection of sperms after collection
- strict appraisal of sperms during process of diluting
- configuration of individual degree of dilution of each sperm according to spermatids reaction after pre-diluting in the rate of 1:2 – 3
- using high quality diluting agent of boar sperm which is tolerant especially against spermatids during summer period
- usage of fresh sperm doses. Optimal age of sperm doses is till 2.5 days
- enhancement of number of spermatids which are able to do fertilization compared to norm ČSN 467114 (6) (minimally to 2 milliards of spermatids)
- to have permanent reliable information about level of spermatid survival during the last possible time for using of sperm doses
- evaluation of survival must be done full in regime: percentage of active spermatids, speed and character of movement. According to this trait it is possible to predict for 95 % the result of conception and

Conclusion

If we will summarize results, it is possible to say, that sperm doses (sperms of boars in natural breeding) are one of the most important things in sows conception and fertility. In practice it is hard to determine in advance with high certainty estimation of spermatids fertility of each concrete sperm. It is possible to realize the above mentioned actualities with high expertness of staff and next to minimize negative seasonal or sudden incidence on declines in piglets' production. If we complete mentioned findings for realization of suitable biological and breeding arrangement also in female part of population it is possible to significantly minimize seasonal declines in piglets' production. Our results which were procured in sows' insemination during the most critical months (August, September) for sows' reproduction confirm it.

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