EFFECTS OF ACCOMMODATION CHANGE ON REPRODUCTION EFFICENCY IN BOARS

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Key words: boars, change of accommodation, ejaculate characteristics

Introduction

The production of ejaculate, which is mostly used in artificial insemination of sows, is the main function of boars in intensive pig breeding (Ciereszko et al., 2000). The reproductive ability of boars is predetermined by hereditary traits, frequency of sexual utilization, and environmental factors (Levis, 1997), the size of accommodation space and microclimate conditions of the housing being most important of the latter. Inappropriate microclimate conditions, primarily high ambiental temperature, have unfavorable effects on the boar sperm quality (Heitman et al., 1984; Levis, 1997). In addition, inappropriate illumination may also affect the boar reproductive ability and account for variation in sperm quality over a certain period of time (Chamberlain and Huges, 1996; Prunier et al., 1996). Considering other relevant factors, mention should be made of the stressor effect of transportation on the boar reproductive efficiency (Huges et al., 1997). Yet, the impact of other untoward factors on the boar welfare and reproduction remains in part obscure, whereby the effect of accommodation change on the quality of boar sperm, especially before the warm season, appears to be of special interest.

Material and Methods

The study was performed in six breeding boars, i.e. two of the German Landrace, Swedish Landrace and Pietrain each, exposed to transportation and removal. The first part of the study included monitoring of ejaculate characteristics from the beginning of October till the end of March before removal, and the second part from the beginning of April till the end of September upon removal to new accommodation conditions. Before removal, the boars were accommodated in pens of 8.4 m^2 in size with enclosure of the same size as pen continuation. Upon removal, the boars were accommodated in pens of 10.8 m^2 in size with attached enclosure of 8.1 m^2. Animals were kept on solid floor. Each pen was supplied with a feedlot

and automated watering device, while the enclosure was roofed over. Boar ejaculates were obtained by manual penile fixation upon a phantom placed in a special area of 10.8 m^2 in size. Ejaculate was collected into sterile, prewarmed, 350-mL glass tubes wrapped in cell tissue. Upon evaluation, the sperm was diluted, yielding approximately 3 billion sperm cells *per* inseminating unit.

Results

The characteristics of ejaculate obtained from the breeding boars before removal are presented in Table 1. The lowest rate of ejaculation, mean ejaculate volume and number of units *per* ejaculate were recorded in the Pietrain boars, whereas highest values of these parameters, including mean ejaculate density, were observed in Swedish Landrace boars. The highest mean sperm motility was recorded in Pietrain boars.

Table 1. Ejaculate characteristics of breeding boars before removal, recorded during the fall-winter period

Breed	No. of animals	Total No. of ejaculations	Mean ejaculate volume (mL)	Mean ejaculate density (mill)	Mean motility (%)	Mean No. of units *per* ejaculate
German Landrace	2	47	184.91	361.91	82.0	18
Swedish Landrace	2	48	193.5	369.51	83.77	20
Pietrain	2	41	145.87	363.09	84.44	15

The characteristics of ejaculate obtained from the breeding boars upon removal are shown in Table 2. The lowest rate of ejaculation was found in German Landrace boars, whereas Swedish Landrace boars still showed the best mean ejaculate volume, mean ejaculate density and number of units *per* ejaculate, with even improved mean sperm motility. The lowest number of units *per* ejaculate were recorded in Pietrain boars.

Table 2. Ejaculate characteristics of breeding boars after removal, recorded during the spring-summer period

Breed	No. of animals	Total No. of ejaculations	Mean ejaculate volume (mL)	Mean ejaculate density (mill)	Mean motility (%)	Mean No. of units *per* ejaculate
German Landrace	2	50	201.27	378.25	81.65	21
Swedish Landrace	2	52	209.58	382.88	84.50	23
Pietrain	2	53	155.31	369.37	84.37	16

Discussion

Animals are generally forced to adapt to the space imposed to them by man, which provokes more or less severe stress reactions. Depending on individual adaptability to the new situation, these reactions may proceed free from any major consequences, or may manifest as a variety of disturbances, in breeding animals in the form of impaired fertility (Santoro, 1996). Therefore, ever better accommodation conditions have been searched for and new requirements for animal keeping issued. Here, mention should be made of the Council of the European Communities Directive identifying lowest welfare standards for all pig categories (EC, 1991). The Directive has since become the basic guideline for European Union member countries and candidate countries in the adjustment of pig keeping conditions to EU provisions. According to this Directive, boar pens should be so situated and constructed as to allow the boar easy turning around, which corresponds to a pen sized 6 m^2. Accordingly, in our study the boars were kept in pens of appropriate size both before and after removal, therefore the size of housing had no adverse effect on the animal welfare and fertility. However, as removal of the animals was performed before the beginning of the warm season, and air temperature in boar pens exceeded 27°C during the summer, their reproduction activity was expected to decrease, as previously observed (Heitman et al., 1984). Attempts were made to mitigate the effect of high air temperature during the summer by animal showering 3-4 times a week, which may have had a beneficial effect, along with appropriate accommodation and feeding, on animal welfare in general and indirectly on the boar reproduction activity. The change of accommodation resulted in improved ejaculate characteristics in the boars of all three breeds, which reflected in an increased mean number of units produced *per* ejaculate. The best results were recorded in Swedish Landrace, followed by German Landrace and Pietrain breeds.

Conclusion

Appropriate accommodation conditions and care have favorable effects on the boar reproductive efficiency, whereby ejaculate characteristics after removal should be viewed in the context of comparison among the breeds chosen for breeding. In these terms, boars of the Swedish Landrace breed could be expected to more readily adapt to the new environment than boars of the German Landrace and Pietrain breeds.

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