

Effect of Sperm Photostimulation in improving reproductive parameters with the use of Artificial Insemination

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Introduction

The use of artificial insemination (AI) with fresh semen is one of the key tools that have established the basis of exponential growth in world pork production last years.

The success of the AI is basically due to that it is an economical and easy technique to use in pig farms of any size. Furthermore, the reproductive performance achieved with AI is optimal.

However, there are some unsolved problems that make the AI is not optimal for all commercial farms. One of these problems is the presence of a strong seasonality that affects fertility and prolificacy results. Thus, in our geographic area there is a noticeable decrease in reproductive parameters in commercial farms during Summer and early Autumn. These effects have been attributed to several parameters like the increase in temperature that affects especially the females but also affects the semen production of boars or the existence of some seasonal cycle that affects sperm production. Notwithstanding, the mechanical bases of this phenomenon are not fully elucidated until now.

The aim of this study is to find a tool that minimizes the effects of seasonality on AI in commercial farms and increases the fertility results in commercial farms.

Materials and Methods

Commercial refrigerated semen doses at 17°C have been used. Samples were subjected to an specific "in vitro" photo-stimulation procedure by utilizing red LED light sources in a regime that lasted 30 minutes. This procedure was adapted to a previously designed photo-stimulation chamber (maXipig®; Iul; Barcelona, Spain) that allowed to apply the procedure in "in vivo" conditions. Following this, a total of 5620 sows were inseminated in 10 commercial farms between October 2014 and May 2015. For each batch of insemination in each farm, have been divided homogeneously the multiparous sows (not including gilts) in two groups. The first group (Control batch) was formed by sows with a conventional AI with refrigerated semen at 17°C. The second group (LED batch) corresponds to sows that were inseminated with semen doses that were previously photo-stimulated by placing them inside the

maXipig® chamber for 30 minutes. Afterwards, both "in vivo" fertility and prolificacy results were collected.

Results

The "in vitro" tests showed a significant improvement of the overall sperm thermal resistance. Likewise, "in vivo" results showed a noticeable improvement of "in vivo" fertility data in all farms and at of each batch of insemination. The average value of improved fertility is 2.11%, but depending on farms is between 1.15% and 11.52%. Interestingly, the greatest effects were observed in those farms in which "in vivo" fertility data were the lowest at the start of the procedure. There are not significant differences in prolificacy results.

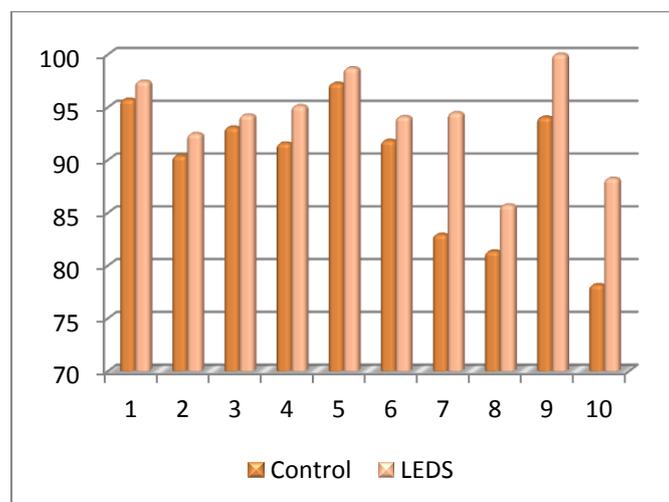


Figure 1: % fertility between Control and LED batches

Conclusions and Discussion

Results clearly indicate a net benefit of using the maXipig® photo-stimulation system on commercial farms to improve fertility results. This benefit is evident not only in seasonal periods in which fertility is affected, but also throughout year. Moreover, the improvement is reflected in both farms with good fertility results (fertility $\geq 90\%$) and in those farms with low fertility ($\leq 85\%$), in which the increase in fertility is actually greater.