Viability of boar semen preserved in Androstar® PLUS**

**new formula containing third generation antibiotics

INTRODUCTION

For long term preservation of semen it is necessary to reduce the metabolic activity of the sperm cells. This can be achieved by extending the semen with an adequate medium and reducing the temperature.

The special characteristics of boar spermatozoa, particularly the lipid composition of its membrane, make the cell very sensitive to temperature changes, especially cold temperatures, which have negative influence on the viability of the cell. When the temperature of the medium is too low, integrity of the membrane is reduced by desegregation of lipid phases. For this reason, in practice doses of semen have to be stored at 15-18ºC (Levis D. G., 2000).
Usually the extenders of boar semen are classified into three groups: for LONG TERM-, MEDIUM- and SHORT TERM- storage. This classification is according to the theoretical capacity to maintain the sperm functionality (Gadea, J. 2003). However, preservation time may be relative, depending on the boar factor (individual differences), the effect of technique used for production of doses (temperatures of semen and extender at the time of dilution, extending rate, semen assessment,…) and an effect of storing semen doses (storage temperature, type of container, transport of doses). All these factors explain why the theoretical periods of storage sometimes are not accomplished. Moreover they justify the value of quality controls of stored semen, in order to deliver to swine producers a product with an extended life-span and a maximum fertility.

Androstar® Plus belongs to the group of long term extenders, having exceptional characteristics, which assure protection of the sperm cells in stress situations, especially when the semen handling temperature of the extended semen is not the ideal one. Its formulation includes a synthetic macro-molecule which protects the sperm membranes, and effective anti-oxidants to neutralize aggressive molecules. The main attributes of Androstar® Plus are the capacity to reduce the metabolism of sperm cells, to compensate non-optimal storage temperatures, especially low ones, and an effective microbiological control through third generation antibiotics (Althouse G. et al. 2000; 2005). These are Aminoglycosids and Cephalosporines, selected by a highly sophisticated process in the laboratory of the Reproduction Centre of the Veterinary University in Hannover. They create an excellent tolerance in the sperm cells, presenting a powerful action against Gram positives and negatives, including E. coli, Klebsiella, Proteus, Serratia, Leptospira, Pseudomonas, Mycoplasma and against most species of Salmonella and Enterobacteriae. The antibiotic mix complies with the EU directive 90/429.

RESULTS OF FIELD TRIALS

Trial 1: Fertility of semen extended with Androstar® Plus and stored at 10ºC (D. Waberski et al. 2008.)

The capacity of the extender Androstar® Plus for preservation of boar semen at sub-optimal temperature of +10ºC was assessed. For a field trial in one farm, 778 sows were inseminated with semen collected from 30 boars, split and extended with Androstar® Plus and BTS. The semen extended with Androstar® Plus was stored at +10ºC , while the semen extended with BTS was kept at +17ºC. Androstar® Plus maintained at +10ºC high motility and membrane integrity up to 96 h of storage, while both parameters declined significantly with extender BTS. This suggests that Androstar® Plus reduces the effect of destabilization of membranes, compared with the control extender. Table 1 shows the fertility results of both groups of sows, inseminated either with BTS at +17ºC (control) or Androstar® Plus at +10ºC, where a tendency to better farrowing rates as well as live born piglets can be seen in the Androstar® Plus group.

Sows	BTS 17ºC (n=389)	Androstar® Plus 10ºC (n=389)
Farrowing rate (%)	90.6	91.9
Live born piglets	11.82	12.29

Table 1: Fertility in both groups of sows inseminated with semen stored at +17ºC vs. +10ºC

Trial 2: Viability of boar semen diluted in two long term storage media (Androstar® Plus and a control extender), stored during 9 days at +17ºC (De Alba et al. 2010.)

The capacity of Androstar® Plus extender for sperm motility preservation was assessed. For the trial 11 fertile boars of a 300-boar production centre were used. Ejaculates were split in two parts for dilution, either in Androstar® Plus extender or the long term extender used normally in the AI-Centre (control). The assessment of semen was done with a CASA-System, analyzing motility in 10 fields with the automatic microscopic stage Scan Stage. Before assessing, samples were incubated at +37ºC for 20 minutes after 3 and 9 days of storage. Figure 2 and 3 show the total and the progressive motility for each extender, as a mean of all the boars during the period of storage. In the semen stored in Androstar® Plus totals and progressive motility is higher as compared with the control extender.

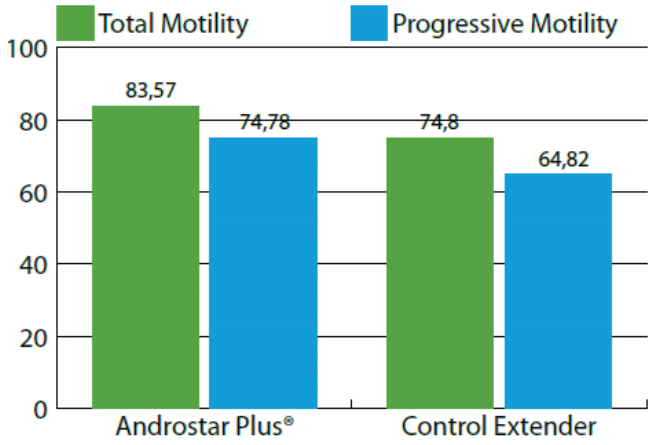

Figure 1: Results with Androstar® Plus vs. Control extender during 9 days of storage. Mean values of 11 ejaculates during the whole storage period (day 1 to day 9).

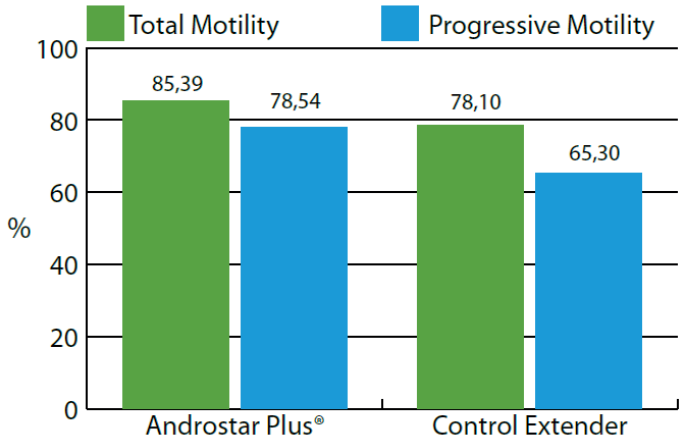

Figure 2: Results of Androstar® Plus vs. Control extender at the 3rd day of storage. Mean values of 11 ejaculates.

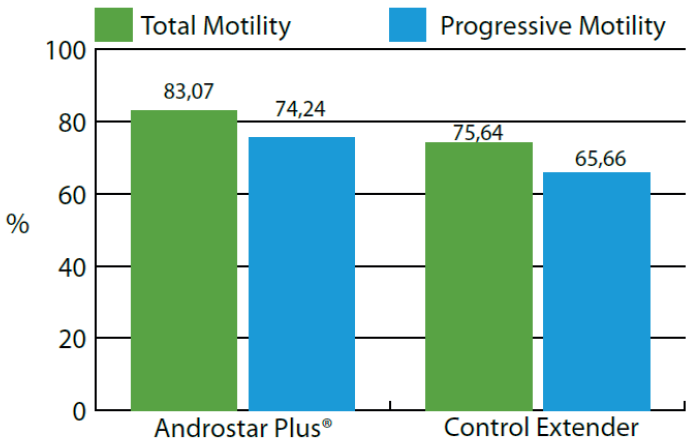

Figure 3: Results of Androstar® Plus vs. Control extender at day 9 of storage. Mean values of 11 ejaculates.

Trial 3: Assessment of the impact of incubation time at +37ºC on the viability of boar semen diluted and stored in two long time extenders (Androstar® Plus and Control Extender) (De Alba et al. 2010.)

The evolution of motility during the incubation period at +37ºC prior to the quality control analysis was studied. For the trial the semen doses of trial 2 were used. The semen assessment was performed with a CASA-System, analyzing 10 motility fields with the automatic Scan Stage after 0, 5, 10, 15 and 20 minutes of incubation at +37ºC. In Figure 3 the total and progressive motility with both extenders are given for the whole incubation period, as the mean values of all the boars. With the control extender a rapid exhaustion of sperm cells is seen when incubated for more than 10 minutes at the physiological temperature of the genital tract, indicating a possible premature declining function of mitochondria with a consequent reduction of fertilizing capacity.

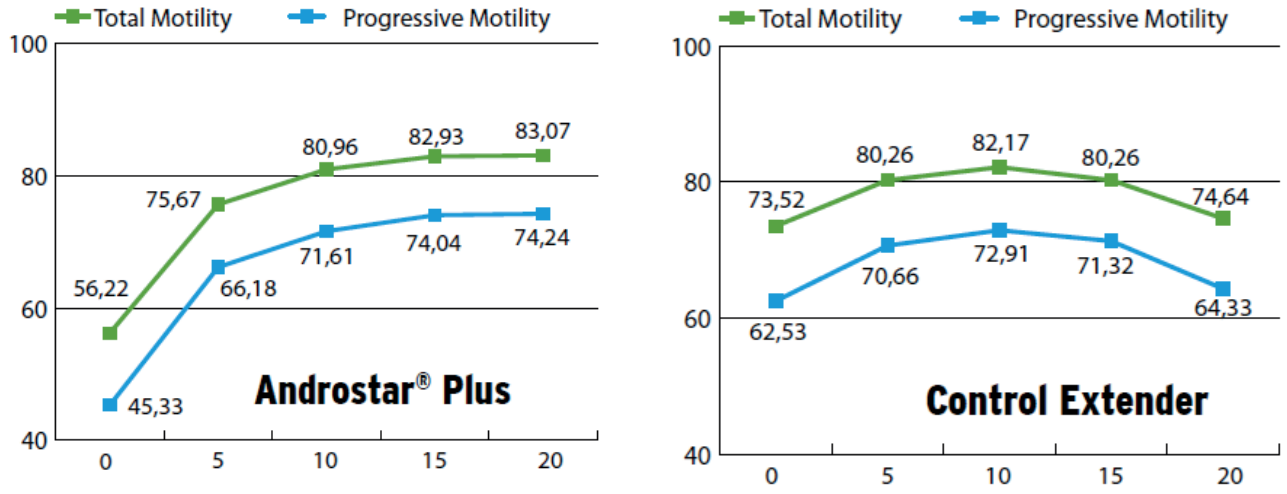

Figure 4: Total and progressive motility of the ejaculates after different periods of incubation.

CONCLUSIONS

- Androstar® Plus shows a high potential to protect boar semen submitted to stress, provoked by non optimal temperatures down to +10ºC, due to protective agents in its composition, which reduce the sensitivity of boar spermatozoa to cold temperature.
- Semen extended with Androstar® Plus exceeds the theoretical storage time of 7 days. Its formula with a specialized macro-molecule for the protection of membranes and with third generation antibiotics assure a higher sperm viability, shown as the percentage of sperm cells with progressive motility.
- The gradual and progressive activation during incubation at +37ºC of the sperm cells extended in Androstar® Plus reflects the maintenance of energy reserves and viability of sperm cells needed to successfully master the path through the reproductive tract of the female and to establish a robust and durable sperm reservoir in the utero-tubal junction.

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