NUTRIXcell Ultra

HIGHLY PROTECTIVE MEDIUM

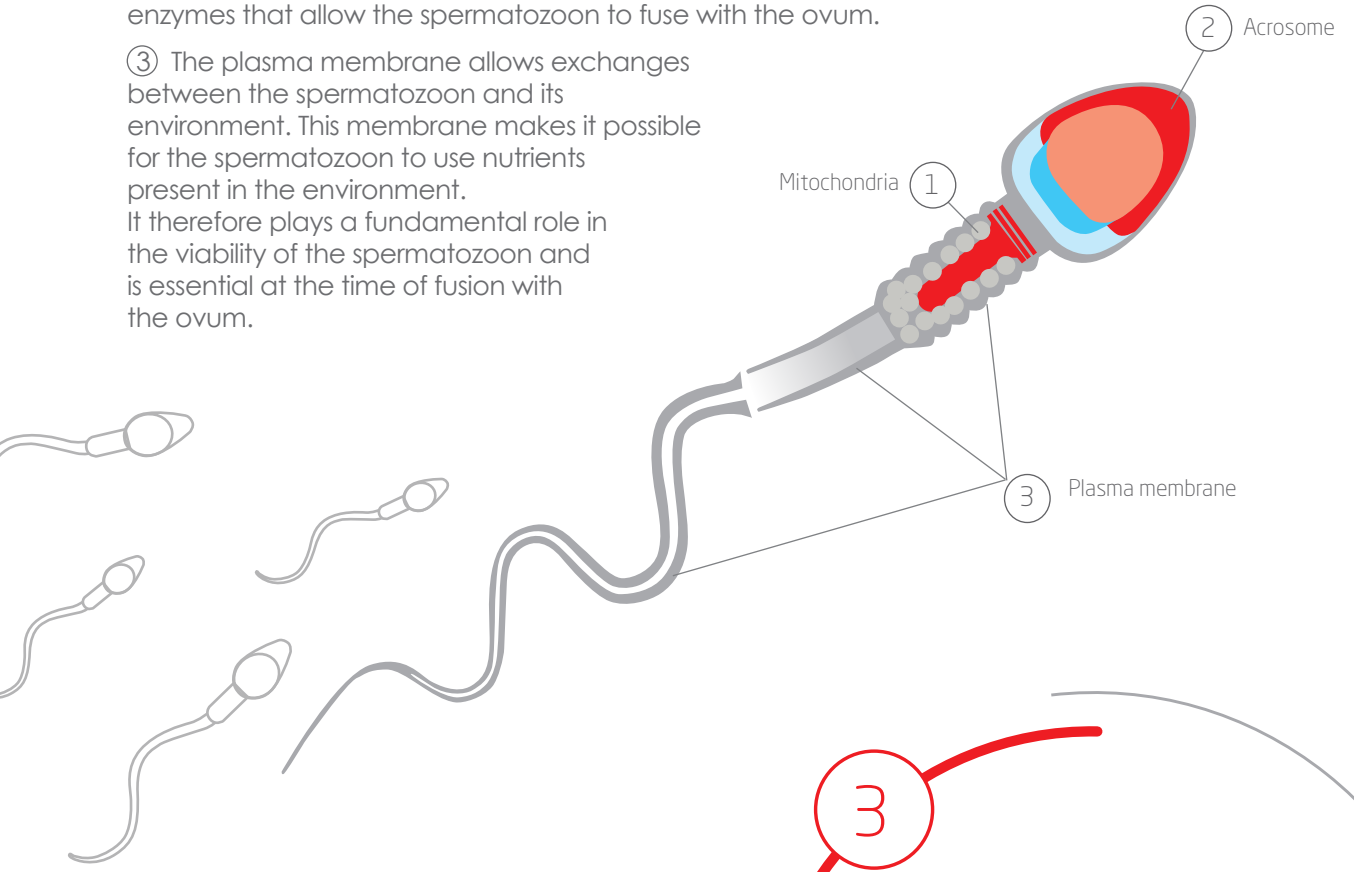
imv TECHNOLOGIES

Key functions of spermatozoa

① The mitochondria, located in the middle part of the spermatozoon, produce the energy needed for cell survival and motility.

② The acrosome, located over the anterior part, contains enzymes that allow the spermatozoon to fuse with the ovum.

③ The plasma membrane allows exchanges between the spermatozoon and its environment. This membrane makes it possible for the spermatozoon to use nutrients present in the environment.
It therefore plays a fundamental role in the viability of the spermatozoon and is essential at the time of fusion with the ovum.



Characteristics of swine spermatozoa

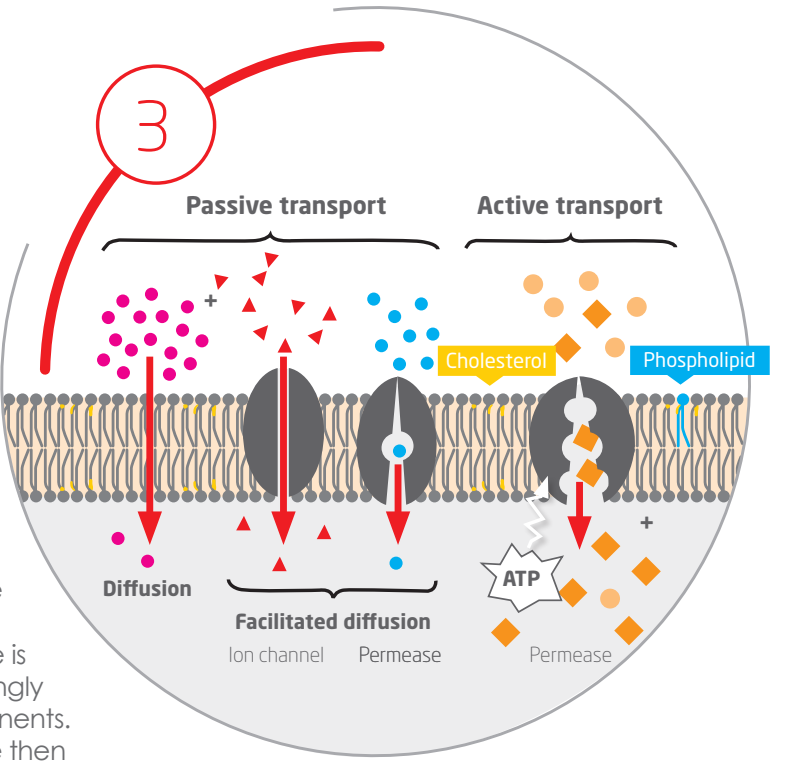
Swine spermatozoa are characterized by a high content of polyunsaturated fatty acids and a low concentration of cholesterol. This makes them more sensitive to stress, such as thermal shock.

Bailey et al., 2008; MartínHidalgo et al., 2011; López Rodriguez et al., 2012; Schulze et al., 2013

Membrane functionality

The membrane allows exchanges between the cell and its environment through various types of transport. If thermal shock occurs, its structure is altered, and the membrane becomes increasingly permeable, which creates a loss of cell components. The mobility and vitality of the spermatozoa are then affected.

Drobnis et al., 1993; Johnson et al., 2000; López Rodriguez



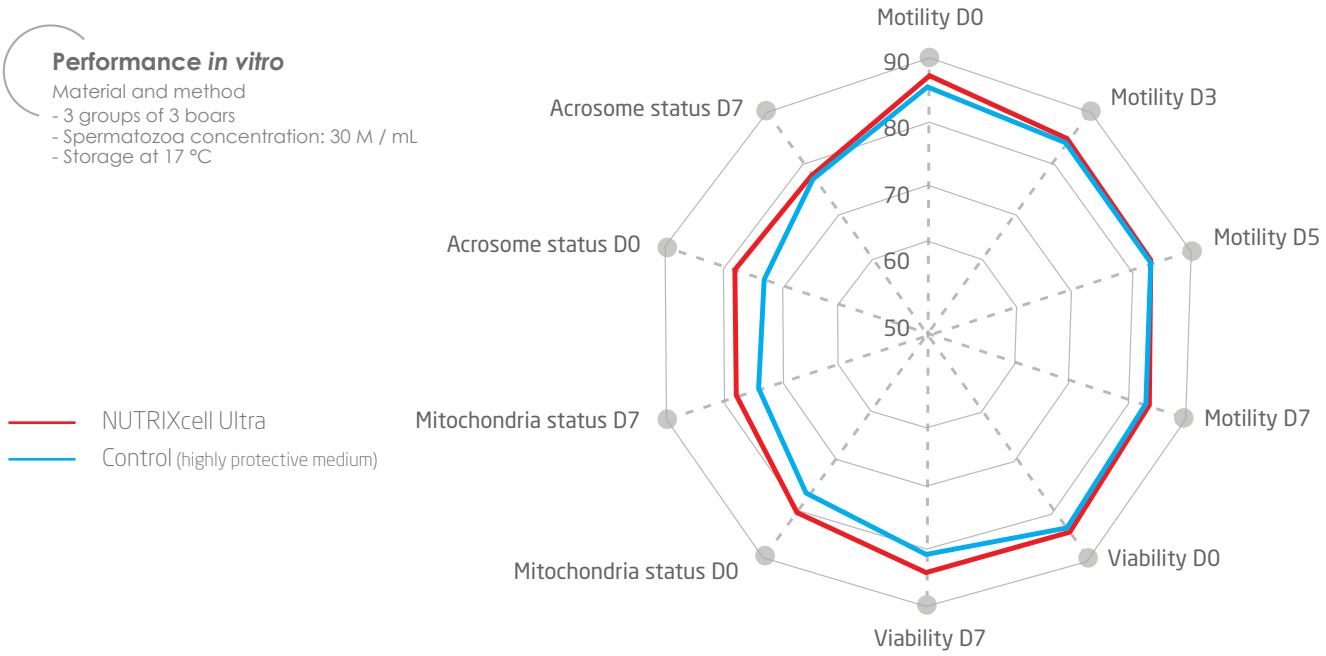
NUTRIXcell Ultra protects semen from stress and thermal shock

NUTRIXcell Ultra provides spermatozoa with the nutrients and elements needed for membrane integrity and metabolism, and it protects them from thermal shock, pH variations, bacterial growth, oxidation, and more.

NUTRIXcell Ultra: excellent performance *in vitro*

In vitro measurements taken at various time intervals show excellent results. The status of the mitochondria, whose role is vital in supplying energy to spermatozoa, are also very good. The same is true for the integrity of the acrosome, essential for fusion with the ovum.
All of these tests show an overall improvement in NUTRIXcell Ultra efficacy.

Performance *in vitro*
Material and method
- 3 groups of 3 boars
- Spermatozoa concentration: 30 M / mL
- Storage at 17 °C



NUTRIXcell Ultra: inhibits bacterial growth

Bacterial contamination reduces the motility and viability of spermatozoa, causes premature acrosome reactions, and promotes the development of resistance.

NUTRIXcell Ultra contains an antibiotic complex that limits bacterial growth.

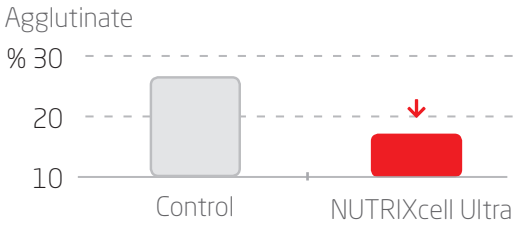
Due to ethics and in accordance with European recommendations, IMV does not use next-generation antibiotics in NUTRIXcell Ultra.

NUTRIXcell Ultra: protects semen from agglutination

Agglutination is a multifactorial reaction that may or may not be reversible. IMV engineers have optimized NUTRIXcell Ultra to restrict the formation of agglutinates.

% of head-to-head agglutination

Material and method
- 14 boars
- Spermatozoa concentration: 30 M / mL
- Storage at 17 °C for 7 days



Bioactivator Ultra: a powerful molecule

Bioactivator is a biological compound that amplifies the biosynthesis of platelet-activating factors (PAFs). PAFs stimulate the motility of spermatozoa, promote ovum penetration, and ultimately improve fertility.

	# Sows (AI)	% Farrowing rate	Piglets born alive	Fertility index
Control (BTS)	356	78.37*	11.74*	920*
Control (BTS) + Bioactivator	360	84.72*	11.6*	982* **+6%**

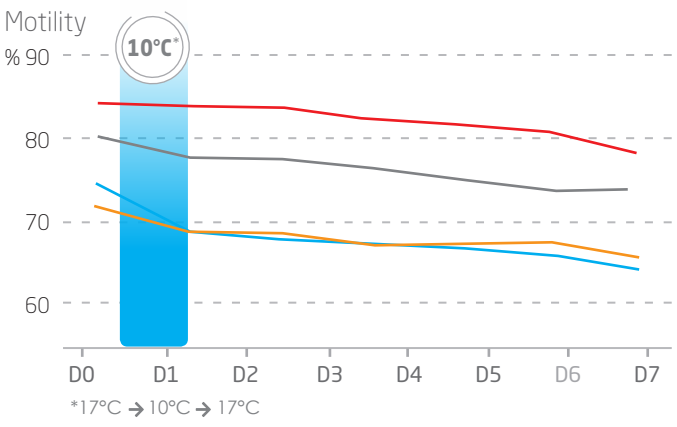
* Publication 2002

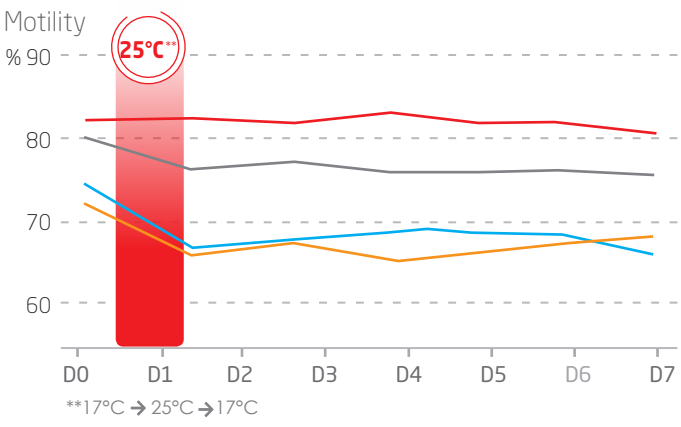
Bioactivator Ultra maintains the properties of Bioactivator, along with a protective role.
This improved molecule is more effective.

Bio ACTIVATOR ULTRA

NUTRIXcell Ultra: protects spermatozoa during thermal stress

Regardless of precautions taken during transfer, semen is never safe from thermal shock that may cause damage to spermatozoa. NUTRIXcell Ultra protects spermatozoa from stress and maintains the quality of the semen even after thermal stress.





Spermatozoa motility after stress at 10°C and at 25°C

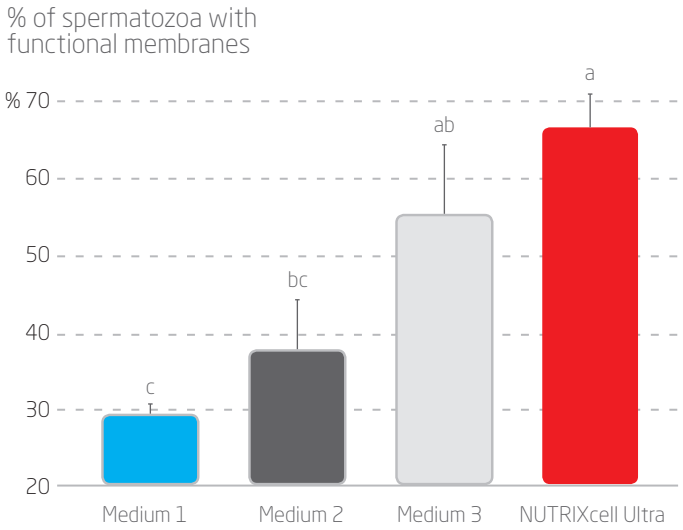
Material and method
- 3 groups of 3 boars
- Spermatozoa concentration: 30 M / mL
- Storage for 12 hr at 17 °C
- Thermal stress at 10 °C or 25 °C for 16 hr
- Return to 17 °C

NUTRIXcell Ultra
Medium 1
Medium 2
Medium 3

NUTRIXcell Ultra: a highly protective medium

The results of the short hypoosmotic swelling test (sHOST) on Day 7 show that NUTRIXcell Ultra maintains the integrity of the plasma membrane, allowing it to resist stress and carry out exchanges for several days with the medium where it gets its energy.

To conduct its study, IMV used the same protocol that was used in the study by B. Pérez-Llano *et al.* (see below). This study shows that the sHOST test accurately reflects the level of integrity of the plasma membrane of spermatozoa.



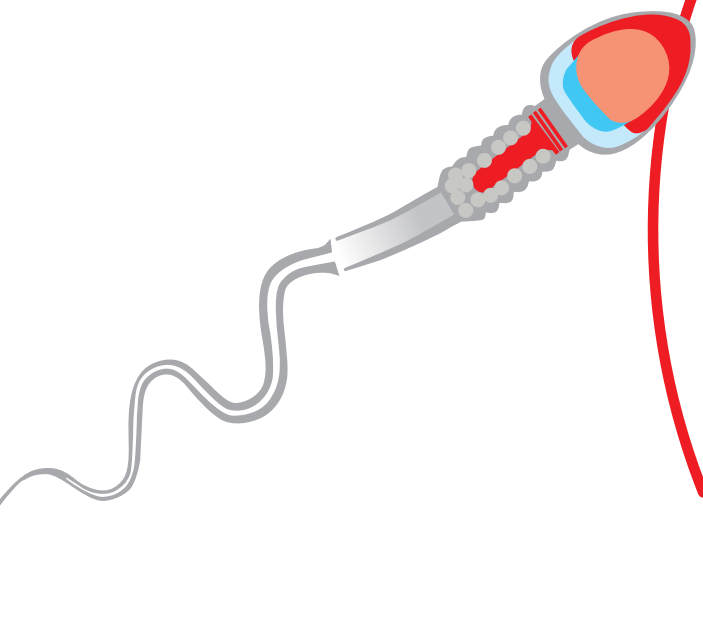
Statistical test used:
ANOVA Student T-test, a≠b if p<0.05

sHOST results on Day 7

Material and method
- 3 groups of 3 boars
- Spermatozoa concentration: 30 M / mL
- Storage at 17 °C

sHOST,

a reliable test for measuring the integrity of the plasma membrane*



This study was designed to explore the relationship between the ejaculate's response to a hypoosmotic swelling test (HOST) and the *in vivo* fertility of a group of 38 boars. Two hundred eighty-eight sows were inseminated to obtain the *in vivo* data on fertility and litter size. On their own, sHOST results showed a significant positive correlation with the *in vivo* fertility data (r=0.43, p<0.01).

This study highlights that the integrity of the plasma membrane plays an essential role in the status of spermatozoa. The sHOST can therefore provide an objective measurement of semen storage quality.

*A short hypoosmotic swelling test for the prediction of boar sperm fertility (B. Pérez-Llano, J.L. Lorenzo, P. Yenes, A. Trejo and P. Garcia-Casado), 2001.

Production and quality control

The IMV production center was designed and developed to meet and exceed quality assurance standards.

Production in a controlled setting

Our media production laboratory is ISO 9001 approved and certified. The center is equipped with an air filtering system and a class 100 laminar flow hood.

Temperature, humidity, and sterility are regularly controlled to ensure that media are produced under the best possible conditions.

Ongoing control of production

All of our components meet the standards of at least one pharmacopoeia system. Each and every lot of end product is inspected based on its appearance, its packaging, and its physical-chemical properties.

In vitro testing and biocontamination analyses are also carried out on all of our lots.

Product reference

NUTRIXcell Ultra

QSF 1L / sold by 100 - 028030
QSF 5L / sold by 40 - 028029
QSF 50L / sold by 4 - 028027
QSF 100L / sold by 30 - 028028