# Pre~Seed$^{EQ}$ Fertility-Friendly Lubricating Gel ~ Product Overview

**Clinically proven** in independent studies to not harm sperm from the time of collection, through 48 hours of cold storage.

- ✓ Based on the same patented, ***isotonic*** formula as the only lubricant ever with specific indications of use allowed to include human fertility procedures.
- ✓ With the plant polysaccharide arabinogalactan, for antioxidant support.

**Pre~Seed$^{EQ}$ is uniquely formulated to provide lubrication, while optimizing sperm function:**

- The ONLY lubricant to not decrease stallion sperm motility during either fresh or cold storage in independent studies.
- Does not interfere with the ability of sperm to fertilize eggs, or support subsequent embryo development, even after exposure to high concentrations of 50% (v/v).
- Developed by a DVM, PhD, Theriogenologist with over 15 years of federal funding in sperm physiology.
- Does not cause mucous membrane irritation, as does KY Jelly®, making it a better choice for sensitive mares and stallions, or for any medical procedure requiring mucosal lubrication.
- An excellent sheath cleaner, with a little going a long way, and no rinsing required.
- Isotonic, non-irritating formula makes it excellent for wound cleaning and dressing.

## How Do Other Lubricants Harm Sperm?

**Most lubricants damage sperm and should be avoided for optimal sperm quality and outcomes.**

Numerous studies have shown the damage to sperm caused by lubricants:

- **Zero** percent fertilization or embryo development after exposure to 10% Priority Care in a bovine in vitro fertilization model (Wright, 2007).
- A motile sperm decline of over 30% within 3 hrs of contact to **"non-spermicidal" veterinary lubricants** with fresh, extended storage, as well as over the 48 hrs of routine cold storage (Samper, 2007).

Although the loss of sperm motility after contact with lubricants is widely reported, it is just now being understood that this abnormal sperm motility is, more importantly, associated with

⇒ **a decrease in the sperm's ability to fertilize an egg and support normal embryo development.**

Specifically, Wright (2007) found that exposure of sperm to hyperosmotic lubricants and gels, such as Aquasonic Ultrasound Gel®, KY®, or Priority Care® decreased fertilization potential of bull sperm by 60-100%. Also Meyers (2007), has reported that hyperosmotic conditions cause cytoskeleton reorganization in sperm, leading to sublethal motility and morphology defects associated with damaged fertilization potential.

**Other lubricants cause damage to sperm on contact due to non-physiologic characteristics such as:**

**pH -** The window for optimal **stallion** sperm function is narrower than for other species, being between 7.1 and 7.8, with a rapid decline in motility seen for pH levels above 8.0. Most lubricants have pH values below this optimal level. Sperm motility losses occur with acidic pH exposure. Conversely, pH levels above 8.0 can cause sperm to undergo acrosome loss and death. In order to protect sperm from pH changes, lubricant pH must be stable during contact with air during handling. This requires a buffer, such as the phosphate buffers used in Pre~Seed[EQ]. Products that utilize sodium bicarbonate as a buffer (e.g. MiniLube) may cause sperm damage through pH increases to alkaline levels (outside of a $CO_2$ incubator). This may be why sperm motility declines have been reported with 10% concentrations of Minilube® (Samper, 2007).

**Osmolarity -** Sperm are also sensitive to both high and low osmolarity which causes them to either shrink or swell beyond their "critical volume limits". A physiologic osmolarity of around 320 mOsm/kg (that of semen) is best for sperm function. Stallion sperm motility decreases linearly with exposure to increasing osmolarity above 400 mOsmo, such that sperm motion disappears at 600 mOsm or greater. The use of Priority Care® as a lubricant in an artificial vagina, for example, can cause equine sperm in the ejaculate to be rapidly and suddenly exposed to osmolalities as high as 800 mOsm. Both human and animal model studies suggest that this level of osmotic shock is sufficient to cause irreversible damage to sperm, even if the sperm are moved back into an isotonic situation.

**Ionic Concentration -** Some veterinary lubricants (EquiLube® & Priority Care®) are formulated with glycols (such as propylene glycol) which permeate across sperm membranes *into* the sperm cell, and impact cell function. Although most lubricants with propylene glycol are hyperosmotic, EquiLube's osmolarity is close to physiologic. However, sperm motility still declined during contact with Equilube® in both fresh and cooled sperm storage (Samper, 2007). This may have been due to the osmotic pressure coming from propylene glycol molecules, rather than ionically balanced salts, as in Pre~Seed[EQ].

**pH & Osmolality Levels for Veterinary "Non-Spermicidal" Lubricants**

| Product | pH | | | Osmolality (mOsm/kg) [#] from glycols | |
|---|---|---|---|---|---|
| | Too low | Physiologic 7.1 – 7.8 | Too high | Physiologic 260 - 365 | Too high |
| Equilube® | 7.0 | | | 368[#] | |
| KY® Jelly | 4.5 | | | | 2052 |
| Minilube® | | | 8.0** | 312 | |
| Pre~Seed[EQ] | | 7.3 | | 324 | |
| Priority Care® | 6.0 | | | | 2199[#] |
| Mineral Oil | | | 10.5 | | 1200 |

**[#]Osmotic pressure mostly from Propylene Glycol, not salts**

****Buffered by sodium bicarbonate only**

Some people have suggested that mineral oil is appropriate for lubricating devices in the breeding shed; however, the pH and osmolality are not physiologic, and studies have shown decreased ability of sperm to penetrate ova in laboratory studies after mineral oil exposure.

# What makes Pre~Seed$^{EQ}$ Unique

**Pre~Seed is the *only* lubricant formulated with: the right osmolality and ion concentration; a buffer to ensure that pH remains stable; and an antioxidant to protect sperm from free radical damage during handling.**

**Pre~Seed®'s Patented Ingredients Include:**
Hydroxyethylcellulose: A non-toxic thickener. Has been shown to be similar to cervical mucus.
Pluronic: A non-toxic slippery agent.
Sodium chloride: Makes the product isotonic to semen.
Arabinogalactan: A unique plant polysaccharide, that **provides antioxidant support** to protect sperm.
Sodium phosphate & Potassium phosphate: Protects, buffers and holds the pH to that of semen for an optimal sperm environment.
Carbomer: A non-toxic thickner.
Methylparaben: One of the most mild and well studied of all preservatives against bacterial growth, parabens in the concentrations we use have no adverse effect on sperm or reproduction.
Sodium hydroxide: Raises the pH to that of semen and fertile cervical mucus.
Purified water: Very pure for low bioburden.

**Pre~Seed's Lot Release Testing.** Each Lot is tested before release to ensure the following:

| | |
|---|---|
| **pH** | Between 7.1-7.6 |
| **Osmolality** | 260- 365 mOsmo/kg |
| **Viscosity** | Between 11,000 – 15,000 cps |
| **Sperm motility** | Sperm retain 80% or more of motility in control medium (w/o Pre~Seed) |
| **Microbial count** | 0 cfu/ml pathogenic bacteria, others < 100 cfu/ml |

## COMPARE PRE~SEED TO OTHER "NON-SPERMICIDAL" LUBRICANTS

| | Sperm Motility Unaffected | Fertilization Normal | Contains Antioxidant | Buffered pH + isotonic | Clinical Data on Irritation | Lot Release Report |
|---|---|---|---|---|---|---|
| EquiLube | no* | n/a | no | no | n/a | no |
| MiniLube | no** | n/a | no | no | n/a | no |
| Pre~Seed$^{EQ}$ | yes | yes | yes | yes | yes | yes |
| Priority Care | no | no | no | no | n/a | no |

Independent study (Samper, 2007) used 10% concentrations of each lubricant over 6 hrs for fresh storage and over 48 hours for cold stored, using 22 ejaculates. Unpublished technical data from individual companies reported no effect of these products on sperm at *10% over 10 minutes with 3 ejaculates; and **5% with no time, or sample numbers provided.