Making More from Sheep Article 13/3/13

Helping sperm go the distance

Artificial insemination, especially using frozen semen, is a tool used all over the world to spread superior genetics and breed animals efficiently. Unfortunately, the sheep industry has been unable to take full advantage of these benefits due to low pregnancy rates following cervical artificial insemination with frozen thawed sperm.

Semen freezing causes changes to sperm, which reduce their ability to pass through the ewe's cervix. In the ewe, the cervix is made up of very tight circular fibrous rings and also produces mucus. Combined, these factors make the cervix, a long, complex and difficult barrier for sperm to pass. Cervical AI using thawed frozen semen averages conception rates of about 20% in merinos. To overcome this problem, frozen semen is inseminated directly into the uterus via laparoscopy, in order to bypass the cervix, achieving pregnancy rates of around 70%. However, intrauterine laparoscopic insemination requires the services of a veterinarian, expensive equipment including anaesthetic, skilled operators and flock oestrus synchronisation, which all increase costs and limit the widespread acceptance of AI with frozen semen by producers. Determining why or what causes frozen thawed sperm to struggle through the cervix could highlight a potential solution to the problem. This would allow frozen sperm to pass through the cervix and result in commercially acceptable fertility after 'over the rail' cervical artificial insemination.

Scientists from the Faculty of Veterinary Science at the University of Sydney believe that proteins present on the sperm surface or in seminal plasma (their natural protective medium) are changed or removed during freezing. We believe it is these changes , which affect the ability of sperm and their interaction with the female genital tract. The aim of the current research project at the University of Sydney is to gain greater insight into the protein changes that occur to sperm during freezing, how these changes affect sperm function and ultimately establish methods for fixing the problems identified. One solution maybe through supplementation of frozen semen with performance enhancing proteins identified within seminal plasma.

Thus far, research has shown that seminal plasma from rams with sperm that have high resilience to freezing has the ability to improve the post thaw motility of sperm from rams with semen that freezes poorly. This demonstrates the crucial role played by seminal plasma in freezing success and sperm function. The next step is to find out what is causing this increase in cryoprotective ability and test the effect of this substance on fertility of frozen sperm after AI. Ultimately, success in the research program would offer sheep producers a low cost method of AI for increasing the genetic gain of their flock and mean a more rapid spread of superior genes through the Australian Sheep Industry.

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