公牛精液保存及添加奈米硒對精子品質的影響研究

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本研究進行公牛精液的採集、冷凍保存處理，並探討奈米硒濃度對精液品質的影響。使用Biladyl-10% LDL精液稀釋液進行凍存，並以iSperm分析精子品質。新鮮精液的平均精子活力為85.6 ± 5.7%，解凍後為56.1 ± 6.5%；新鮮精液的前進活力為26.8 ± 4.6%，解凍後為19.3 ± 5.8%。平均路徑速度、平均曲線運動速度及平均直線運動速度在解凍後也有所下降。基因體分析顯示3頭種公牛具有優異遺傳特性，平均乳量基因體預測傳遞能力為976。於夏季高溫高濕氣候下，添加不同濃度奈米硒（0、1.0、2.0及4.0 ug/ml）改善公牛精液品質。新鮮精液的活動精子比率為85.4 ± 4.5%，解凍後的活動精子比率約下降3成，0 ug/ml奈米硒處理組的比率為54.3 ± 4.9%，添加1 ug/ml奈米硒處理組顯示解凍後精子的平均曲線速度（129.1 ± 22.1）、平均直線速度（53.8 ± 10.8）及平均路徑速度（70.0 ± 8.7）均有較佳表現，添加1 ug/ml奈米硒有助於精子解凍後的泳動能力。

表1. 三頭種公牛經基因體分析包含淨值、產乳量、體細胞分數、使用年限及體型指數PTA等重要性狀

Table 1. The genetic testing of a dairy bull includes important traits such as net merit, milk production, somatic cell count, production life and type index (PTA).

Bull ID	Birth	NM$	Milk	SCS	PL	PTAT
14E208230966	10/07/2023	810	1,140	2.94	3.1	1.62
TWN14E20824M874	05/09/2024	284	554	2.81	1.4	0.75
TWN14E20824M927	07/07/2024	641	1,233	2.79	4.2	-0.07

表2. 公牛精液稀釋液添加奈米硒對解凍後精子活力分析

Table 2. Analysis of sperm motility after thawing by adding nano-selenium to bull semen diluent

Item	Fresh semen	Post-thawed semen			
		Se-NP, 0 ug/ml	Se-NP, 1 ug/ml	Se-NP, 2 ug/ml	Se-NP, 4 ug/ml
Motility, %	85.4 ± 4.5%^{a}	54.3 ± 4.9%^{b}	53.6 ± 4.7%^{b}	51.5 ± 3.9%^{b}	51.1 ± 3.9%^{b}
Progressive motility, %	27.3 ± 5.4%^{a}	20.0 ± 3.4%^{bc}	22.0 ± 4.5%^{b}	17.9 ± 3.5%^{bc}	16.0 ± 3.5%^{c}
Velocity of curvilinear, VCL, μm/ s	156.6 ± 18.8^{a}	100.7 ± 17.4^{c}	129.1 ± 22.1^{b}	94.2 ± 17.2^{c}	98.3 ± 14.9^{c}
Velocity of average path, VAP, μm/s	88.4 ± 6.0^{a}	49.9 ± 8.3^{c}	70.0 ± 8.7^{b}	46.6± 6.0^{c}	47.3 ± 6.7^{c}
Velocity of straight line, VSL, μm/s	78.7 ± 5.6^{a}	47.0 ± 6.8^{bc}	53.8 ± 10.8^{b}	42.7 ± 4.9^{c}	43.8 ± 4.4^{c}

Study on the effects of bull semen preservation and nano-selenium addition on sperm quality

This study involved the collection and frozen storage of bull semen, and explored the effects of different concentrations of nano-selenium on semen quality. Using Biladyl-10% LDL semen extender for freezing. The sperm quality was analyzed using iSperm. The results showed that the average sperm motility of fresh semen was 85.6 ± 5.7%, while post-thaw motility was 56.1 ± 6.5%. The progressive motility of fresh semen was 26.8 ± 4.6%, compared to 19.3 ± 5.8% post-thaw. The average path velocity, average curvilinear velocity, and average straight-line velocity also decreased after thawing. During the hot and humid summer season, this study investigated the improvement of bull semen quality by adding different concentrations of nano-selenium (0, 1.0, 2.0, and 4.0 μg/ml). The motile sperm ratio of fresh semen was 85.4 ± 4.5%, while the post-thaw motile sperm ratio dropped by about 30%. The motile sperm ratio of the control group was 54.3 ± 4.9%, while the group treated with 1 μg/ml Se-NP showed better post-thaw performance, with an average curvilinear velocity of 129.1 ± 22.1, an average straight-line velocity of 53.8 ± 10.8, and an average path velocity of 70.0 ± 8.7. These results demonstrate that the addition of 1 μg/ml nano-selenium significantly improves the motility of sperm after thawing.