

Seasonal variation in semen quality of Dorper rams, using different collection techniques



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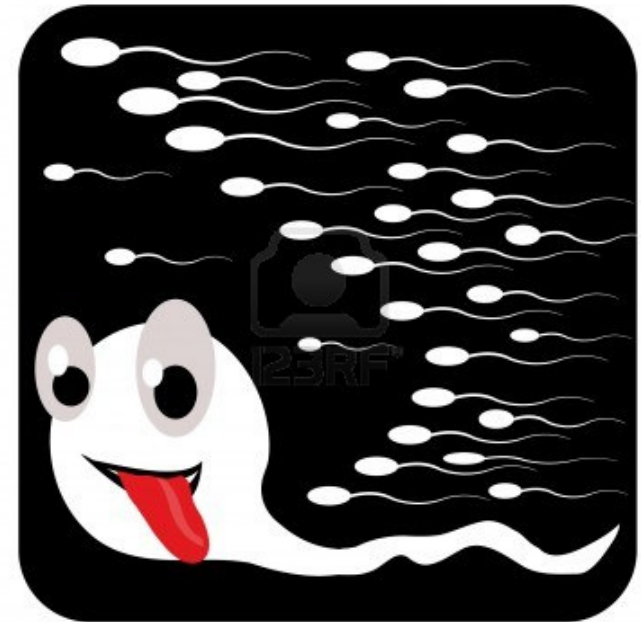
Introduction

- Sheep – seasonal (spermatogenesis) time of collection important
- Dorper breed – internationally renowned (hardy, carcass)
- Disseminating genetic material (cryopreservation of semen; AI)
- Quality semen crucial – preferred season
- Technique of semen collection important (artificial vagina vs electro-ejaculator)



Material and Methods

- 11 Mature Dorper rams (69.9 ± 9.2 kg; 18 ± 4.7 months) – individually housed
- Observation period of 12 months (summer, autumn, winter, spring)
- Semen collected and evaluated weekly
- Artificial vagina (n=6) vs Electro-ejaculator (n=5)



Material and Methods

- Parameters assessed for semen quality
 - i. Ejaculate volume (ml)
 - ii. Colour of ejaculate – density and contamination
 - iii. Semen pH
 - iv. Microscopic semen wave motion (x10 magnification) – score 0 to 5
 - v. Sperm motility (x40 magnification) - percentage
 - vi. Sperm concentration (haemocytometer – 1:100 dilution)
 - vii. Sperm viability (% live sperm – eosin-nigrosin stain)



- Statistically analysed using the one-way analysis of variance (ANOVA)

Results

Table1 Mean ambient temperature, relative humidity and daylight length for the observation period

Season	Ambient temperature (°C)			Relative humidity (%)			Daylight length (h)		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Summer	8.4	36.4	24.5	5.9	93.2	54.0	12.4	14.0	13.4
Autumn	-1.8	32.9	17.2	8.8	92.6	47.6	10.2	12.4	11.2
Winter	-3.6	29.2	10.9	7.1	94.0	47.1	10.1	11.3	10.5
Spring	1.7	34.1	18.6	5.3	90.5	36.5	11.3	13.5	12.6

Results

Table 2 Mean (\pm S.D.) macroscopic seasonal variation in semen volume, colour and pH, following the use of the artificial vagina and electro-ejaculator semen collection techniques in rams for the entire observation period

Semen parameters	Season	Artificial vagina	Electro-ejaculator
Semen volume (mL)	Summer	^x 1.1 \pm 0.2 ^a	^y 1.0 \pm 0.4 ^b
	Autumn	^x 1.1 \pm 0.3 ^a	^z 0.7 \pm 0.4 ^b
	Winter	^x 1.1 \pm 0.3 ^a	^x 1.2 \pm 0.6 ^a
	Spring	^x 1.1 \pm 0.3 ^a	^x 1.3 \pm 0.4 ^b
Semen colour (0-5)	Summer	^y 3.6 \pm 0.3 ^a	^x 2.8 \pm 0.7 ^b
	Autumn	^x 3.9 \pm 0.4 ^a	^x 2.5 \pm 0.8 ^b
	Winter	^z 2.8 \pm 0.4 ^a	^y 1.9 \pm 0.6 ^b
	Spring	^y 3.6 \pm 0.3 ^a	^x 2.6 \pm 1.0 ^b
Semen pH	Summer	^x 6.8 \pm 0.1 ^a	^x 6.8 \pm 0.1 ^a
	Autumn	^x 6.8 \pm 0.1 ^a	^x 6.9 \pm 0.2 ^a
	Winter	^x 6.8 \pm 0.3 ^a	^x 6.8 \pm 0.3 ^a
	Spring	^x 6.7 \pm 0.2 ^a	^x 6.7 \pm 0.2 ^a

^{a,b} Means in the same row with different superscripts differ significantly (P<0.05).

^{x,y,z} Means in a column with different superscripts differ significantly (P<0.05).

Results

Table 3 Mean (\pm S.D.) microscopic seasonal sperm characteristics for the artificial vagina and electro-ejaculator semen collection techniques in Dorper rams

Semen parameters	Season	Artificial vagina	Electro-ejaculator
Sperm motility (%)	Summer	^x 76.7 \pm 5.3 ^a	^x 68.8 \pm 8.0 ^b
	Autumn	^x 76.7 \pm 8.14 ^a	^x 65.8 \pm 10.2 ^b
	Winter	^y 52.2 \pm 15.3 ^a	^y 32.6 \pm 15.8 ^b
	Spring	^x 77.8 \pm 5.2 ^a	^x 63.3 \pm 18.5 ^b
Sperm wave motion (0-5)	Summer	^y 3.5 \pm 0.3 ^a	^x 2.8 \pm 0.7 ^b
	Autumn	^x 3.9 \pm 0.3 ^a	^x 2.5 \pm 1.0 ^b
	Winter	^z 2.7 \pm 0.7 ^a	^y 1.9 \pm 0.6 ^b
	Spring	^x 3.7 \pm 0.4 ^a	^x 2.7 \pm 1.7 ^b
Sperm abnormalities (%)	Summer	^y 7.1 \pm 2.4 ^a	^y 6.2 \pm 2.6 ^a
	Autumn	^z 5.3 \pm 4.0 ^a	^z 4.2 \pm 3.0 ^a
	Winter	^x 9.0 \pm 2.4 ^a	^x 8.5 \pm 2.9 ^a
	Spring	^z 4.4 \pm 1.9 ^a	^z 4.6 \pm 2.8 ^a
Sperm viability (%)	Summer	^y 78.5 \pm 4.5 ^a	^y 74.3 \pm 6.9 ^b
	Autumn	^x 84.2 \pm 9.1 ^a	^x 82.2 \pm 10.6 ^a
	Winter	^z 48.0 \pm 17.3 ^a	^z 39.0 \pm 14.6 ^b
	Spring	^x 81.3 \pm 5.3 ^a	^y 72.8 \pm 16.3 ^b

^{a,b} Means in the same row with different superscripts differ significantly ($P < 0.05$).

^{x,y,z} Means in a column with different superscripts differ significantly ($P < 0.05$).

Results

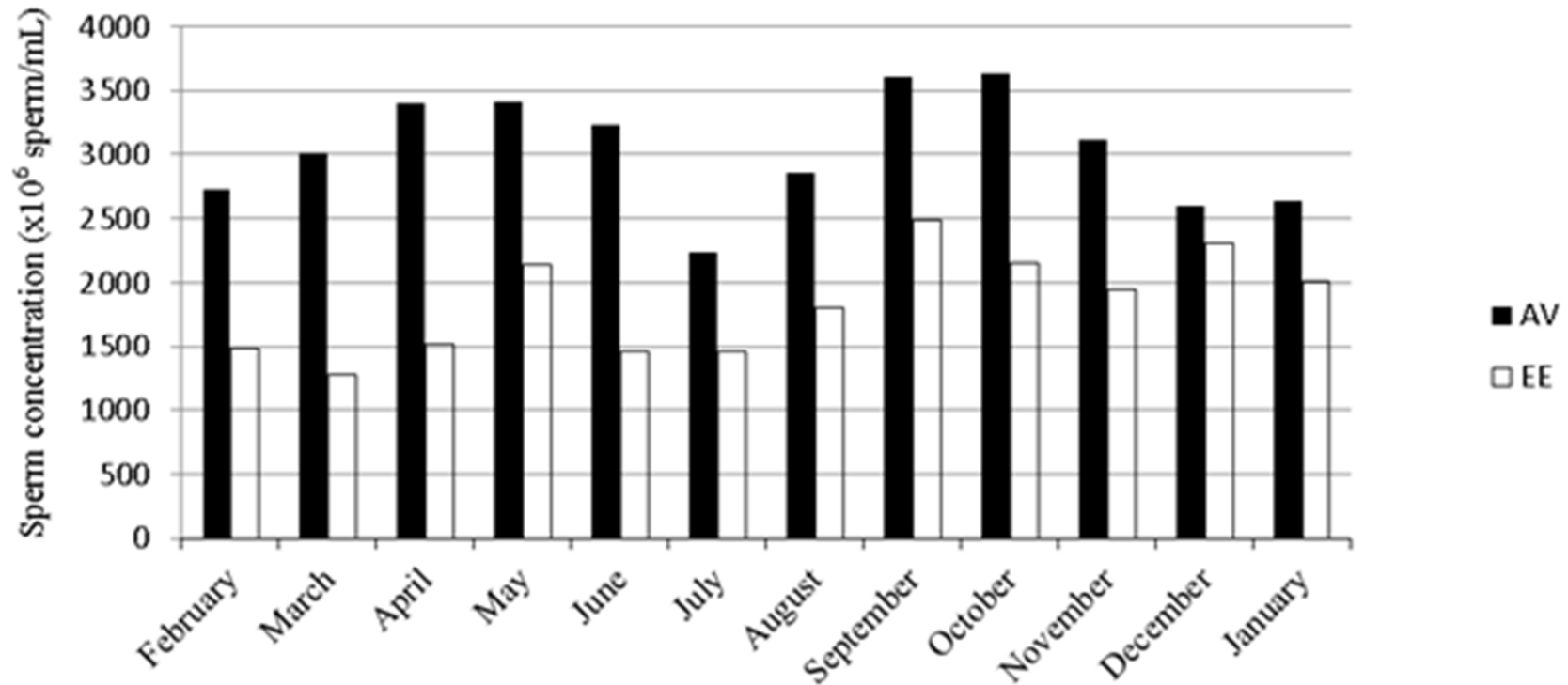


Figure 1 Mean monthly sperm concentration ($\times 10^6$ sperm/mL) recorded in Dorper rams, using the artificial vagina (AV) or electro-ejaculator (EE) semen collection techniques for a 12-month period.

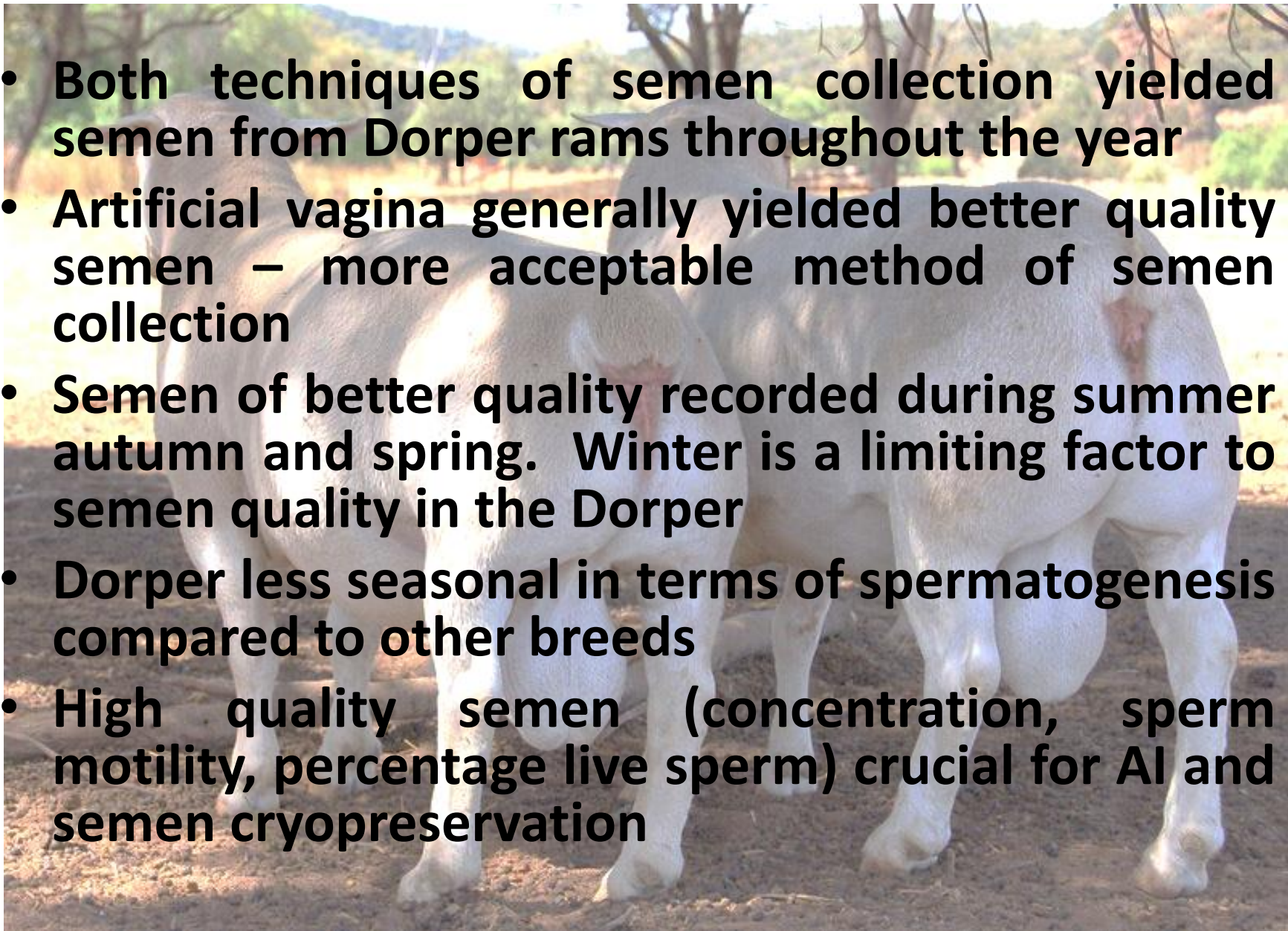
Results

- The electro-ejaculation technique was more variable and less repeatable
- The electro-ejaculation technique produced less dense sample (colour)
- Ejaculate less dense in winter for both collection techniques. Similarly for sperm wave motion
- No difference in semen pH between artificial vagina and electro-ejaculation – AV more acceptable technique
- Sperm abnormalities tended to be higher in winter for both collection techniques



Conclusions

- Both techniques of semen collection yielded semen from Dorper rams throughout the year
- Artificial vagina generally yielded better quality semen – more acceptable method of semen collection
- Semen of better quality recorded during summer autumn and spring. Winter is a limiting factor to semen quality in the Dorper
- Dorper less seasonal in terms of spermatogenesis compared to other breeds
- High quality semen (concentration, sperm motility, percentage live sperm) crucial for AI and semen cryopreservation





THANK YOU!!!

