

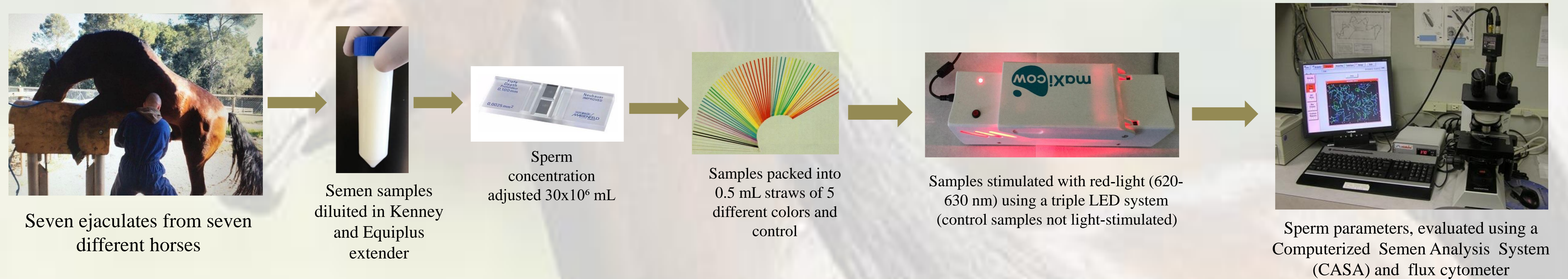
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INTRODUCTION AND OBJECTIVES

- Previous studies carried out in other mammalian species have shown that red-light stimulation has positive effects on motility and causes an increase in mitochondrial activity, suggesting an improvement in artificial insemination (AI) results.
- These positive effects demonstrated in other species have also shown when photo-stimulating equine sperm, but neither the color of the straw nor the extender used has been taken into account.
- The present work aimed at demonstrating if the different degrees of turbidity of the extender and the color of the straw vary the effects of sperm photo-stimulation with a triple red LED system (620-630 nm) in refrigerated semen of horses.

MATERIALS AND METHODS



RESULTS

Extender	Treatment (straw color)	Kinetic parameters							
		VCL ($\mu\text{m/s}$)	VSL ($\mu\text{m/s}$)	VAP ($\mu\text{m/s}$)	LIN (%)	STR (%)	WOB (%)	ALH (μm)	BCF (Hz)
		mean \pm SEM	mean \pm SEM	mean \pm SEM	mean \pm SEM	mean \pm SEM	mean \pm SEM	mean \pm SEM	mean \pm SEM
Equiplus	Control	79.3 \pm 4.2 ^{1a}	45.7 \pm 3.1 ^{1a}	63.6 \pm 3.1 ^{1a}	56.5 \pm 3.0 ^{1a}	71.9 \pm 2.3 ^{1a}	78.5 \pm 1.7 ^{1a}	2.8 \pm 0.1 ^{1a}	9.2 \pm 0.4 ^{1a}
	Blue	84.6 \pm 5.6 ^{1a}	53.5 \pm 4.1 ^{1a}	71.0 \pm 4.4 ^{1a}	61.9 \pm 2.4 ^{1a}	75.5 \pm 1.4 ^{1a}	82.1 \pm 1.6 ^{1a}	2.5 \pm 0.1 ^{1a}	9.6 \pm 0.4 ^{1a}
	Yellow	84.9 \pm 4.8	54.2 \pm 3.2 ^{1a}	68.1 \pm 4.7 ^{1a}	62.2 \pm 3.2 ^{1a}	78.7 \pm 1.4 ^{1a}	78.8 \pm 2.0 ^{1a}	2.7 \pm 0.1 ^{1a}	9.1 \pm 0.4 ^{1a}
	Red	88.8 \pm 5.1 ^{1a}	59.4 \pm 3.1 ^{2a}	75.4 \pm 3.2 ^{2a}	65.3 \pm 3.1 ^{1a}	78.4 \pm 2.0 ^{1a}	83.0 \pm 1.3 ^{1a}	2.6 \pm 0.1 ^{1a}	9.1 \pm 0.4 ^{1a}
	White	82.3 \pm 5.2 ^{1a}	53.7 \pm 3.9 ^{1a}	68.3 \pm 3.3 ^{1a}	63.2 \pm 3.3 ^{1a}	77.6 \pm 2.1 ^{1a}	81.2 \pm 1.6 ^{1a}	2.5 \pm 0.1 ^{1a}	9.2 \pm 0.4 ^{1a}
	Transparent	86.2 \pm 4.6 ^{1a}	52.6 \pm 3.2 ^{1a}	68.0 \pm 3.6 ^{1a}	62.0 \pm 3.5 ^{1a}	79.4 \pm 2.1 ^{1a}	81.0 \pm 1.6 ^{1a}	2.9 \pm 0.1 ^{1a}	9.5 \pm 0.4 ^{1a}
Kenney	Control	86.4 \pm 3.0 ^{1a}	52.8 \pm 3.0 ^{1a}	68.5 \pm 3.1 ^{1a}	60.0 \pm 4.0 ^{1a}	76.8 \pm 2.1 ^{1a}	77.9 \pm 1.4 ^{1a}	2.6 \pm 0.1 ^{1a}	9.5 \pm 0.4 ^{1a}
	Blue	90.0 \pm 3.8 ^{1a}	59.1 \pm 2.8 ^{1a}	72.7 \pm 4.1 ^{1a}	66.1 \pm 3.3 ^{1a}	83.1 \pm 1.6 ^{1a}	79.9 \pm 2.7 ^{1a}	2.7 \pm 0.1 ^{1a}	9.8 \pm 0.4 ^{1a}
	Yellow	87.6 \pm 3.7 ^{1a}	57.6 \pm 2.5 ^{1a}	70.8 \pm 4.2 ^{1a}	66.0 \pm 2.8 ^{1a}	83.6 \pm 1.8 ^{1a}	79.5 \pm 2.7 ^{1a}	2.6 \pm 0.1 ^{1a}	9.8 \pm 0.4 ^{1a}
	Red	86.5 \pm 2.8 ^{1a}	57.3 \pm 2.5 ^{1a}	70.0 \pm 3.5 ^{1a}	64.4 \pm 3.1 ^{1a}	82.4 \pm 1.6 ^{1a}	79.0 \pm 2.7 ^{1a}	2.6 \pm 0.1 ^{1a}	9.5 \pm 0.4 ^{1a}
	White	86.6 \pm 3.2 ^{1a}	55.0 \pm 2.5 ^{1a}	70.8 \pm 3.7 ^{1a}	63.3 \pm 3.0 ^{1a}	78.8 \pm 1.5 ^{1a}	80.9 \pm 2.7 ^{1a}	2.6 \pm 0.1 ^{1a}	9.8 \pm 0.4 ^{1a}
	Transparent	91.7 \pm 3.4 ^{1a}	60.7 \pm 2.8 ^{1a}	74.6 \pm 3.2 ^{1a}	65.0 \pm 3.9 ^{1a}	82.7 \pm 1.7 ^{1a}	79.5 \pm 2.7 ^{1a}	2.6 \pm 0.1 ^{1a}	9.8 \pm 0.4 ^{1a}

Table 1. Kinetic parameters (mean \pm SEM) in stallion sperm in control and light irradiated samples with the 3-3-3 minutes pattern using different colors of straws and extenders.

Different numbers (1, 2) indicate significant differences ($P < 0.05$) between the control and the different colors of the straws in the samples irradiated with light within each extender.

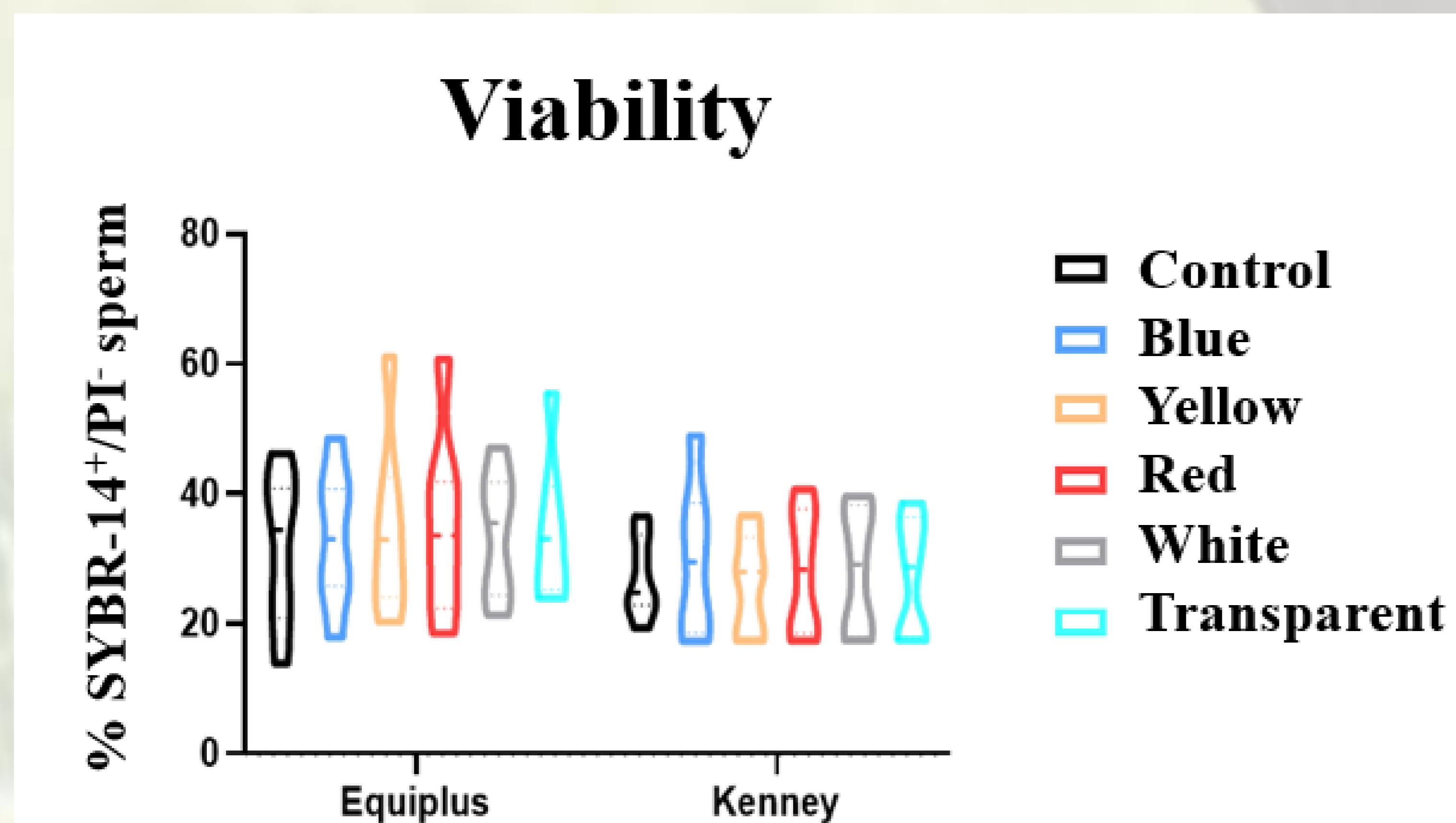


Figure 1. Percentage of viable sperm after they have been photo-stimulated with red light, differentiated according to the extender used and the color of the straw.

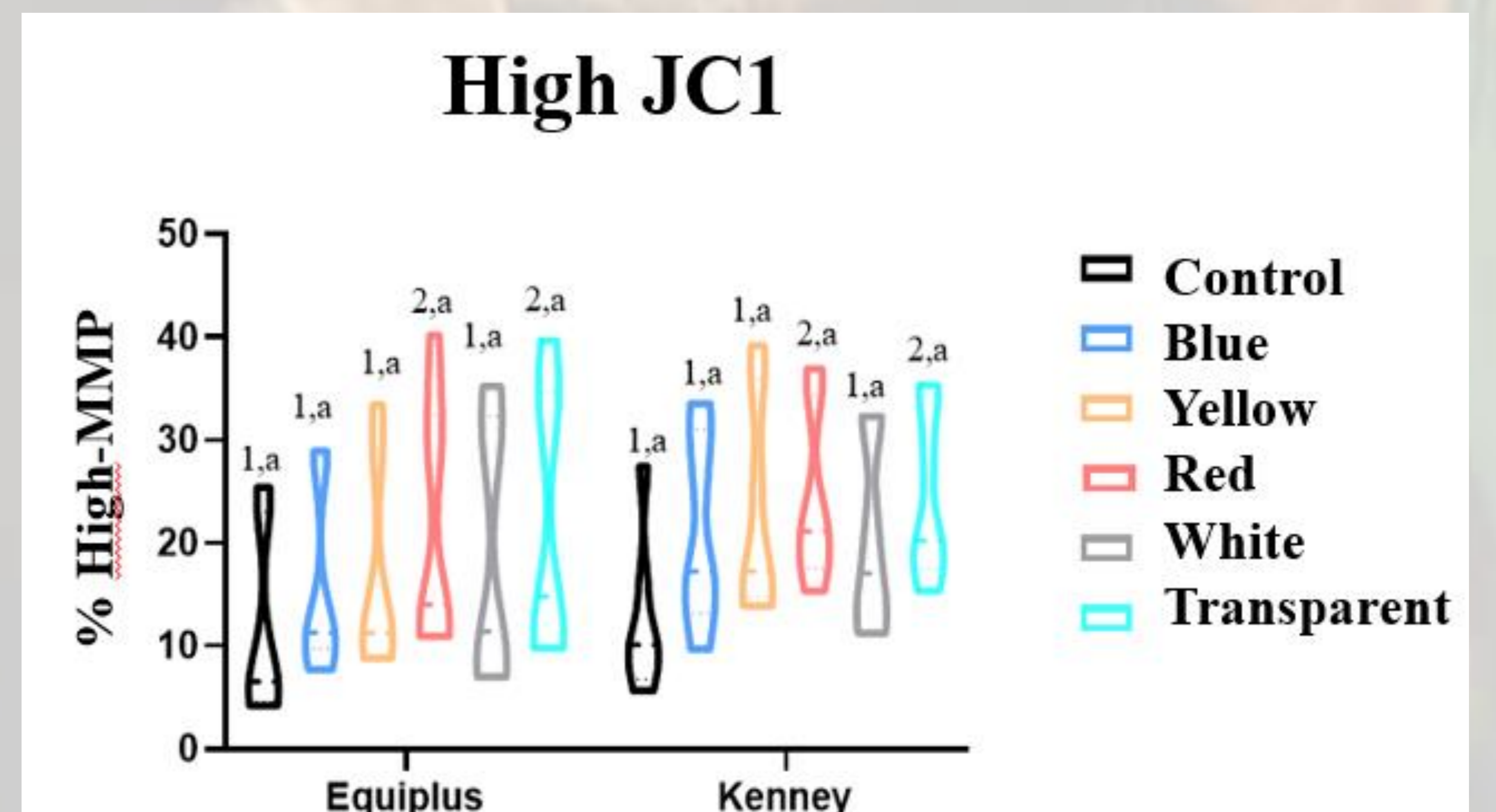


Figure 2. Percentage of sperm with a high mitochondrial membrane potential after photo-stimulation with red light, differentiated by extender and color of the straw. Different numbers (1,2) indicate significant differences ($P < 0.05$) and different letters (a,b) between the control and the different colors of the straws in the samples irradiated with light within each extender.

CONCLUSIONS

These results show that the effects of photo-stimulation with red light with waves of 620-630 nm on the horse sperm cell are associated with a mechanism related to the mitochondrial activation and these effects may vary depending on the color of the straw and the extender used, without affecting its viability, with the red and transparent straw and Equiplus extender showing the best results.