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# Effect of different FSH/LH ratios on superovulatory response and embryo yield in goats

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**RIASSUNTO** – Effetto di differenti rapporti FSH/LH sulla risposta superovulatoria e sulla produzione di embrioni nella capra – È stata valutata la risposta ovarica e la produzione di embrioni su 50 capre di razza Derivata di Siria sincronizzate e suddivise in 4 gruppi sperimentali di superovulazione. Il gruppo controllo (A) ha ricevuto 250 UI di pFSH con rapporto FSH/LH=1:1, mantenuto costante durante il trattamento. I rimanenti 3 gruppi sono stati trattati con un preparato gonadotropico avente rapporto FSH/LH totale=2:1 (200 µg FSH puro:100 µg LH puro) e regime di somministrazione con rapporto FSH/LH giornaliero: costante = 2,0 (Gruppo B); decrescente=3,4-1,7-0,8 (Gruppo C); decrescente=5,0-1,0-0,3 (Gruppo D). L'aumento del rapporto FSH/LH totale e la sua variazione durante il trattamento non migliora la risposta superovulatoria. Il trattamento A) ha determinato una elevata risposta ovarica e la migliore produzione di embrioni trasferibili (8,5/capo).

**KEY WORDS:** superovulation, embryo yield, FSH/LH ratio, goats.

**INTRODUCTION** – Previous studies carried out in sheep (Chupin *et al.*, 1985) and in goats (Nowshari *et al.*, 1995; Martemucci *et al.*, 1996) have underlined the importance of both FSH and LH to induce a good superovulatory response, but the results on the LH amount necessary to give a higher ovulatory response and embryo production are rather contradictory. The aim of this study was to evaluate, in goats, the effect of 2 different FSH/LH ratios (1:1 vs 2:1) kept constant during the treatment, on ovulatory response and embryo production. Moreover, according to the FSH/LH ratio=2:1, the effect of modifying the daily FSH and LH ratio during the superovulatory treatment has been studied.

**MATERIAL AND METHODS** – The trial was carried out on 50 Derivata di Siria goats. Oestrus was synchronized by FGA (vaginal sponges; 45 mg, 11d) and prostaglandin F2 $\alpha$  (cloprostenol, 30 µg; at 9<sup>th</sup> d). The goats were subdivided into 4 groups corresponding to the experimental superovulatory treatments (Table 1). In all groups, the superovulatory treatment was performed following a regimen of administration in decreasing doses over 3 days (2 injections per day, 12 h apart), starting at the 9<sup>th</sup> d of FGA treatment. In Group A (Control) the goats were treated with a commercial porcine pituitary extract with a defined FSH/LH=1 ratio (total dose of 250 IU pFSH; Martemucci *et al.*, 1996). Groups B, C and D received a total dose of 200 µg pure FSH (20 mg Armour) and 100 µg pure pLH (Beckers's Laboratory; Liege, Belgium) (total FSH/LH=2:1), following different daily FSH/LH ratios (Table 1). The goats were checked for oestrus and hand mated. On the 7<sup>th</sup> d after oestrus surgical embryo collection was performed under general anaesthesia. The ovarian response was estimated recording the number of corpora lutea (CL > or  $\leq$  3mm) and large unruptured follicles (FL  $\geq$  4 mm) on each ovary. Ova were recovered by flushing the uterine horns and examined under a stereomicroscope (50x). The collected embryos were evaluated and clas-

sified (Martemucci *et al.*, 1988). Data were analyzed by least squares analysis of variance using the GLM procedure of Statistical Analysis System (SAS, 1987).

Table 1. Schedule of experimental superovulatory treatments.

Group	Goats		Daily FSH/LH ratio (doses of FSH: LH)		
			1 <sup>st</sup> day	2 <sup>nd</sup> day	3 <sup>rd</sup> day
A	13	Constant:	1.0 (IU 71.5:71.5)	1.0 (IU 35.7:35.7)	1.0 (IU 17.8:17.8)
B	14	Constant:	2.0 ( $\mu$ g 57.1:28.5)	2.0 ( $\mu$ g 28.5:14.3)	2.0 ( $\mu$ g 14.3:7.1)
C	14	Decreasing:	3.4 ( $\mu$ g 72.1:21.2)	1.7 ( $\mu$ g 36.0:21.2)	0.8 ( $\mu$ g 17.0:21.2)
D	12	Decreasing:	5.0 ( $\mu$ g 80.0:16.0)	1.0 ( $\mu$ g 16.0:16.0)	0.3 ( $\mu$ g 4.8.0:16.0)

**RESULTS AND CONCLUSIONS** – The onset of oestrus occurred earlier in A and C compared to B and D groups (25.2 and 25.4 *vs* 33.4 and 30.6 h;  $P < 0.05$ ) and all the subjects ovulated and exhibited a superovulatory response (data not shown). The ovulatory response, ova recovery and embryo yield were significantly affected by the treatment. Within the two constant FSH/LH daily regimens (Groups A and B), the FSH/LH ratio=1 tended to give more ovulations, less CL $\leq$ 3 mm, more FL $>$ 4 mm and total ovulatory response (CL+FL) (Table 2), and a higher ( $P < 0.05$ ) number of recovered and fertilized ova as well as transferable embryos (8.5-89.7% *vs* 3.6-54.2%) (Table 3). Considering the 2 decreasing regimens with FSH/LH=2:1, the daily FSH/LH ratio=3.4-1.7-0.8 (Group C) resulted in the best ovarian response ( $P < 0.05$ ) (Table 2) and transferable embryos tended to be higher (6.8 *vs* 3.7/goat) (Table 3). There were no significant differences between C and A groups with regard to all considered parameters. The treatments affected significantly ( $P < 0.05$ ) the percentage of goats producing embryos which resulted 92.3% and 76.9% (Groups A and C) and 57.1% and 60.0% (Groups B and D) (data not shown). Considering the total FSH/LH ratio=2:1, the daily decreasing regimen as 3.4-1.7-0.8 improved the superovulatory response in accordance with a report in sheep (D'Alessandro *et al.*, 1997). It may be supposed that this regimen is more near to the physiological decrease of FSH/LH ratio during the period from luteal regression to the preovulatory peak in LH (Cahill *et al.*, 1981). In Group D, the prevalence of LH on FSH from the second day of treatment could have caused a premature stimulation of the oocytes, preventing their normal ability to be fertilized and to develop further. The constant FSH/LH ratio=1(Control) proved to be effective on giving the highest embryo yield in goats (8.7/goat) and embryo quality (89.7% of transferable embryos). These findings confirm that in goats the increase of total FSH/LH ratio is not suitable to improve the superovulatory response, as reported by a previous study (Martemucci *et al.*, 1996).

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Table 2. Ovarian response (mean number).

Group	No. Goats	CL			FL	CL + FL
		>3mm	≤3mm	Total		
A	13	13.9ab	0.2	14.1ab	2.3ab	16.4ab
B	14	9.1b	2.7	11.8b	1.6ab	13.5bc
C	13	14.9a	1.8	16.7a	3.4a	20.1a
D	10	9.8ab	0	9.8b	1.0b	10.8c
RMSE		7.0544	3.9696	6.1344	2.6908	6.3914

On the row: a, b, c:  $P < 0.05$ .

Table 3. Mean number of ova recovery and embryo production.

Group	No. Goats	Ova recovery (%)	Embryo yield	Fertilization (%)	Transferable embryos (%)
A	13	11.1a (78.7)	8.7a	(82.8)	8.5a (89.7)
B	14	6.2b (43.0)	4.3b	(53.3)	3.6b (54.2)
C	13	11.1a (67.7)	7.5ab	(67.2)	6.8ab (70.8)
D	10	7.8ab (62.8)	4.0b	(44.2)	3.7b (57.3)
RMSE		6.7144 (33.4947)	5.3828	(42.4209)	5.0842 (41.8893)

On the row: a, b, c:  $P < 0.05$ .

**REFERENCES** – **Chupin**, D., Combarous, Y., Procureur, R., 1985: Theriogen. 23:184. **Cahill**, L.P., Saumande, J., Ravault, J.P., Blanc, M., Thimonier, J., Mariana, J.C., Mauleon, P., 1981. J. Reprod. Fertil. 62:141-150. **D'alessandro**, A., Martemucci, G., Colonna, M.A., Cafueri, C., Toteda, F., 1997. Anim. Repr. Sci. 47:91-98. **Martemucci**, G., D'alessandro, A., Colonna, M.A., Cafueri, C., Casamassima, D., 1996. Proc. 6<sup>th</sup> Int. Conference on Goats, 834-837. **Martemucci**, G., Gambacorta, M., Toteda, F., Manchisi, A., Bellitti, E., 1988. Zoot. Nutr. Anim. 14:379-386. **Nowshari**, M.A., Beckers, J.F., Holtz, W., 1995. Theriogen. 43:797-802. SAS, 1987. **SAS/STAT**<sup>TM</sup> Guide for Personal Computer, Vers. 6 Edition, p.1028, Cary, NC, SAS Institute Inc.