

Superovulatory response, embryo recovery and ovarian steroids in Jersey cows treated with different FSH preparations and their routes of administration

N.P.SARVAIYA^{1†}, D.M. PATEL, M.M. PHATAK, A.V. PATEL AND Y.G. DUGWEKAR²

Reproductive Biology Research Unit, Gujarat Agricultural University, Anand-388 110

Received: October 6, 2001

Accepted: November 14, 2002

ABSTRACT

A group of six regularly cycling Jersey cows were superovulated 18 times with (I) Folltropin-V 400 mg. NIH (Veterepharm, Inc. Canada) given in 8 equally divided intra muscular dose for 4 days, twice daily, (II) a single sub-cutaneous injection of Folltropin-V 400 mg. or (III) Super-ov 75 Units (Ausa Int.) in 8 divided descending intra muscular doses for 4 days. A luteolytic dose of PGF₂ α (PG) was injected 60 latter. The cows exhibiting estrus after 36-48 hrs. were inseminated 2-3 times at 12 h. intervals. All the cows were flushed on day 7 post-breeding using DBPS (Sigma) and SOV (superovulatory) response and embryo yield recorded. Blood samples collected before, during and after treatment, were analysed for Progesterone (P₄) and Estradiol-17 β (E₂) by standard RIA techniques. The results revealed that Folltropin and Super-ov treatment yielded 7.83 \pm 2.41 and 70. \pm 3.06 corpora lutea, (CL) and 12 and 9 transferable embryos, respectively, when administered intra muscularly in divided doses, whereas, single sub-cutaneous Folltropin V administration yielded 4.34 \pm 1.17 CL and 3 embryos, respectively. The serum E₂ levels were high (85.03 \pm 36.94, 35.00 \pm 6.10 and 21.97 \pm 9.17 in groups I, II and III, respectively) on the day of SOV estrus. P₄ levels elevated on the day of embryo recovery (5.57 \pm 1.39, 11.21 \pm 3.96 and 11.80 \pm 6.57), in groups I, II and III, respectively.

Keywords: Superovulation, FSH, Embryos, Progesterone, Estradiol-17 β

Superiority of FSH over PMSG as superovulatory gonadotropin in cows is well documented (Elsden, *et al.*, 1978, Monniaux, *et al.*, 1983, Dutta, *et al.*, 1992). However, its short half-life necessitates multiple injections over a period of 3-4 days. Single subcutaneous administration of FSH yielded promising results (Mishra *et al.*, 1992, Siddiqui *et al.*, 1996). Present investigation documents the results with two FSH preparations (Folltropin V and Superov) administered by single sub-cutaneous or intra-muscular route and one preparation (Folltropin V) by sub-cutaneous route.

MATERIALS AND METHODS

Six regularly cycling Jersey cows were superovulated 18 times using either Folltropin-V or Super-ov administered during their mid-luteal phase.

Group I: Folltropin-V 400 mg. NIH (Veterepharm Inc., Canada) in 8 equally divided dosages for 4 days, intra muscularly.

Group II: Folltropin-V 400 mg. NIH, single sub-cutaneous administration.

Group III: Super-ov 75 units (Ausa Int., USA) in 8 divided, descending dosages, twice daily for 4 days, intra muscularly.

A luteolytic dose of PGF₂ α (PG) was injected 60 h. later. The cows exhibiting estrus were inseminated 2-3 times during the estrus at 12 h. intervals. All the cows were flushed on day 7 post-breeding using DPBS (Sigma) with 0.1% BSA and moved to holding media (DPBS with 0.4% BSA) for morphological study. Blood collected before, during and after treatment were analysed for Progesterone (P₄) and Estradiol - 17 β (E₂) using RIA kits (DPC, USA). The data were analysed statistically as per the methods of Snedecor and Cochran (1971).

RESULTS AND DISCUSSION

The time required for exhibition of SOV estrus response and embryo recovery rate are presented in Table 1. The SOV response (No. of CL) was

¹Assoc. Research Scientist, ²Prof. and Head

[†]Corresponding author

Table 1: Superovulatory response and embryo yielded in Jersey cows treated with different routes of gonadotropin administrations.

Treatment Group	Time of onset of estrus (h)	SOV response		Embryo yield		
		CL	AOF	TOR	TER	TRE
I	26.00±6.51	7.83±2.41	1.17±0.60	9.00±2.80	18	12
II	40.00±5.93	4.34±1.17	0.66±0.42	5.00±1.46	6	3
III	34.00±7.84	7.00±3.06	0.83±0.54	7.83±2.84	18	9

TOR=Total Ovarian Response, TER = Total Embryo Recovery, TRE = Transferable Embryo Recovery

Table 2: Serum Progesterone (ng/ml) and Estradiol-17 β (pg/ml) levels in Jersey cows treated with gonadotropins by different routes.

Treatment Group	Hormones analysed	Experimental Days		
		Pre-treatment (D ₁₀)	SOV estrus (D ₀)	Embryo Recovery (D ₇)
I	P ₄	1.60±0.37	0.59±0.14	5.77±1.39
	E ₂	7.72±2.50	85.03±36.94	8.19±2.48
II	P ₄	4.51±1.46	0.66±0.22	11.22±3.96
	E ₂	12.26±4.64	35.00±6.10	8.19±3.70
III	P ₄	6.0±1.22	1.93±0.65	11.81±6.57
	E ₂	15.79±8.17	21.97±9.17	17.60±7.12

higher in cows treated with divided dose of FSH (Follitropin-V and Super-ov-7.83±2.41 and 7.00±3.06, respectively) as compared to single s/c inj. of Follitropin-V (4.34±1.17), and so was the embryo recovery (12, 9 and 3, respectively). The SOV response and embryo recovery observed in the present study were comparable with the earlier reports of Bevers and Diemen (1987), Mishra *et al.* (1992), Pawshe *et al.* (1992), Totey *et al.* (1992) and Ansari and Kumarsan (2001). However, lower SOV response and embryo recovery particularly in cows treated with single sub-cutaneous administration in the present study might be because of luteinisation of anovulatory follicles (AOF) or ovulations occurring over a longer period of times as it occurs in case of PMSG. Siddiqui *et al.* (1996) reported higher SOV response and embryo recovery with single subcutaneous injection of FSH dissolved in polyvinyl pyrrolidone (PVP) to ensure slow absorption of FSH from the site of injection.

Pattern of elevated levels of estradiol on the day of SOV estrus and 2-3 folds higher progesterone levels on the day of embryo recovery in all the three treatment groups (Table 2) in the present study confirmed multiple ovulations. Similar patterns of ovarian steroids were also reported in crossbred cows (Chauhan *et al.*, 1994).

REFERENCE

- Ansari, M.R. and Kumeresan, A. (2001). Efficacy of Folligon, Follitropin, Super-ov and FSH-P on superovulatory response and embryo quality of crossbred cows. *Indian J. Anim. Sci.* 71(2):140-42.
- Bevers, M.M. and Dielman, S.J. (1987). Superovulation of cows with PMSG. Variation in Plasma concentration of progesterone, estradiol, L.H., cortisol, prolactin and number of preovulatory follicles. *Anim. Reprod. Sci.* 15:37-52.
- Chauhan, F.S., Sarvaiya, N.P. and Mehta, V.M. (1994). Superovulation, endocrine profile and embryo recovery rate following treatment with FSH preparations in JJK crossbred cows. *Indian Vet. J.* 71:991-95.
- Dutta, T.K., Taneja, V.K. and Sanwal, P.C. (1992). Superovulatory response of Haryana cows with PMSG/FSH, *Indian J. Anim. Sci.* 62:720.
- Elsden, R.P., Nelsen, L.D. and Seidel, G.E. (1978). Superovulation of cows with FSH and PMSG. *Theriogenology*, 9(1):17-26.
- Mishra, A.K., Chaubal, S.A., Kishore, G.K., Rajeshwaran, S., Joshi, B.V. and Jaiswal, R.S. (1992). Superovulatory response to single s/c inj. of Follitropin in Holstein and Sahiwal cows. *Theriogenology*, 37:260 (abstr.)
- Monniaux, D., Chupin, D. and Saumande, J.C. (1983). Superovulatory response to cattle. *Theriogenology*, 19(1):555-81.
- Pawshe, C.H., Kadu, M.S., Fasihuddin, M. and Totey, S.M. (1992). Superovulation with FSH-P and PMSG hormones in crossbred cows and heifers. *Indian J. Anim. Reprod.* 13(1):18-20.

Siddiqui, M.U., Sharma, R.K. and Gorani, S. (1996). Superovulation of German Holstein X Friesian cows with single subcutaneous and multiple intramuscular inj. Of FSH under tropical conditions. *Indian J. Dairy Sci.* 49(7):465-68.
 Snedecor, G.W. and Cochran, W.G. (1971). *Statistical*

methods, 6th edn. The Iowa state Univ. Press, Ames, Low (USA).
 Totey, S.M., Singh, G., Taneja, M., Singh, G. and Chhillar, R.S. (1992). Effect of repeated superovulation and flushing on embryo recovery in crossbred cows. *Indian J. Anim. Reprod.* 13(2):117-20.

THE INDIAN JOURNAL OF ANIMAL REPRODUCTION

{THE INDIAN SOCIETY FOR STUDY OF ANIMAL REPRODUCTION}

(Regd. No.Bom. 153/78)

AUTHORS' DECLARATION CERTIFICATE

Article entitled

Authors

1. **The First author is life member of ISSAR.** His life membership No. is
 It is mandatory for the first author to be the lifemember of the ISSAR for the publication in IJAR.
2. The article has been seen by all the authors (signatures given below) who are satisfied with its form and content and are responsible for the technical details and ethical matters of the paper.
3. Due credit of authorship has been given to every scientist who has made a notable contribution to the paper and are satisfied with the sequence in which the authors names appear in the by line.
4. The by-line of the article does not include any name of the scientist who has not made a notable contribution to the paper.
5. The name of the Institute appearing below the by-line is that of the Institute where the research was conducted and not of the Institute where the first author (or the author who has sent the paper) is currently employed.
6. Two copies of the article along with two copies of tables and all illustrations have been submitted.
7. Article has not been published or sent simultaneously for publication to any other journal.
8. The article has not been rejected for publication in any other journal. Rejection elsewhere does not necessarily disqualify the paper for publication in *The Indian Journal of Animal Reproduction* but please attach a copy of the reasons given for rejection.

Signature of all Authors, their designation and present correspondence addresses.

Authors Name & Designation	Present Address	Signature
1.		
2.		

The I
 Farro
 trai
 depend
 interval
 perform
 within 1
 estrus an
 increase
 hormor
 adminis
 pregnan
 of first p
 group V
 day 56 v
 exhibitio
 farrowi
 calculat
 farrowin
 M
 Study
 amwort
 Pig Breed
 hundred t
 to differ
 randomly
 having tw
 Deputy Dir
 Associate F
 animal Bree
 Correspond