

FSH SUPEROVULATION & ESTRUS CONTROL

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The uses of follicle stimulating hormone (FSH) in the beef cow vary tremendously. A few of the more common uses are to aid in specific infertility diagnosis, determine specific trait carriers, Oocyte harvesting , and to produce multiple offspring through Embryo Transfer.

The exogenous use of FSH, or FSH/LH combinations, given to a beef cow overrides the internal negative feedback mechanisms that normally allow only one follicle to mature and ovulate. This overriding allows the cow to release multiple eggs that can then be retrieved for experimental, diagnostic, or commercial use.

Early hormonal regimes used to induce multiple ovulations in the cow involved compounds with superovulatory properties such as Human Menopausal Gonadotropin (HMG), and Pregnant Mare Serum Gonadotropin/Equine Chorionic Gonadotropin (PMSG/ECG). These products were effective in causing multiple follicular ovulations in the cow, but had the disadvantages of, a long half life, were difficult to obtain, and were extremely expensive. PMSG and ECG are still available but since the introduction of commercially available Follicle Stimulating Hormone (FSH) these three disadvantages of hormonal therapy, in the cow, have disappeared.

The Follicle Stimulating hormone (FSH) preparations readily available to the practitioner are derived from animal pituitary glands. A chemical extraction/precipitation process is used to obtain and purify the hormone for use in the cow. Porcine pituitaries are most commonly used but Ovine and Bovine origin derived FSH products are also available.

The units used to measure the amount of active FSH in the commercial preparations differ. The following is a list of the products (and their units of measurement) that has been readily available in the United States over the past 10 years.

Schering-Ploughs' F.S.H.-P. TM (50mg Armour Standard/vial)
AUSA Internationals' SUPER-OV[®] (75 NIH-FSH-S1 units/vial)
Sioux Biochemicals' Oocyte Media Supplement (50 NIH-FSH units/vial)
Immunochemical Products' OvagenTM (17.6 NIADDK-oFSH-17 std./vial)
Vetrepharms' Folltropin [®] (400 mg NIH-FSH-P1 /vial)
Laboratorios Caliers' Pluset [®] [500 International Units /box (2 vials)]

My initial experience in the mid 1980's with commercially available follicle stimulating hormone was Schering-Ploughs' preparation F.S.H.-P. TM. Since then the other commercial preparations that I have used with success are Super-OV [®], Ovagen TM, Oocyte Media Supplement FSH from Sioux Biochemical, and Folltropin [®].

When the donor response, to the FSH extracts available (as related to a percentage of the total dehydrated FSH powder provided) are compared, the stimulatory response (per

rectal palpation) and the number of embryos/ova obtained using the available FSH products are similar.²

The Shering-Plough product based its measuring of active FSH per vial as 50mg. Though F.S.H.-P. TM is no longer available its vial dose of 50 mg/vial has remained a vital part of my consistency to clients in programming beef cows. No matter which of the commercial FSH products that are given to the client the 50mg/vial measurement is used on the stimulation sheet. This lessens the confusion to the clients, and to me, when using the different products. A 50mg program uses 100% of the vial whereas a 20mg program uses only 40%. Because of this dose/volume consistency over the available products, every client knows that a donor on the 16mg program is very sensitive to ovarian stimulation and requires less than half of the vial to complete the four day BID treatment. Whereas, a donor on a 50mg program is on an exceptionally high dose of FSH and will use an entire reconstituted vial of FSH to complete her program. If the different units for each product were used on the stimulation sheets the possibilities for dosage errors would increase.

The amount of FSH used for superovulation in the beef cow and the regime of administration varies according to each practitioner's experience. One single injection vs. multiple injections of FSH ¹, constant daily dose vs. decreasing daily dose, and high total doses of FSH vs. low total doses of FSH ² are only some of the many variations of hormonal protocols that are used. A well accepted protocol for superovulation is administration of FSH in twice daily injections for four days with prostaglandin administered on day three. The total dose of FSH is given as a decreasing daily dose.

An Example of a 28mg program is:

	AM	PM
	FSH mg	FSH mg
Day 1	5	5
Day 2	4	4
Day 3	3 + PGF2a	3 + PGF2a
Day 4	2	2
Day 5	estrus	AI

The variations in response to FSH administration can be attributed to many factors. These differences can be categorized by age and by breed but there are as many variations within breeds as there are with any other category.

The following table is a summary of beginning doses that I use for FSH administration. It is only a starting point for obtaining a consistent number of total ova from a donor with the highest percentage of viable embryos possible.

INITIAL FSH DOSE IN DIFFERENT BREEDS OF BEEF COWS FOR SUPEROVULATION

<u>Mg dose</u>	<u>% of vial</u>	BREED	
		<u>Adult</u>	<u>Virgin Heifer</u>
50	100		
44	88		
40	80	CA, MA, SS, RN	
36	72		
32	64	AN, BU, CH, GV, HH, KB, LM, AR, SM	
28	56	BR, BO, BN, NE, SI	CA, MA, SS, RN
24	48	RB, BM	AN, BU, CH, GV, HH, KB, LM, AR, SM
20	40		BR, BO, BN, NE, SI
18	36		RB, BM
16	32		
14	28		
12	24		

The two general differences in FSH levels needed for satisfactory stimulation are for breeds with Brahman influence and virgin heifers. Both of these groups require smaller total doses of FSH. The breeds that usually require the most FSH are the Chianina (CA), Maine-Anjou (MA), and Short Horn (SS) with the least FSH usually needed in the Beefmaster and the Red Brangus. Each cow within a breed has its own level of FSH requirements for optimal stimulation and these levels are only guidelines to begin.

References:

1. Hill K, McFarland C, Rorie R, Viker S, Godke R. A Single 50mg Injection of Follicle Stimulating Hormone (FSH) for Superovulation of Embryo Donor Cows. Therio: 23: 196 (1985)
2. Pawlyshyn V, Lindsell C, Braithwaite M, Mapletoft R. Superovulation of Beef Cows with FSH-P: A Dose-Response Trial. Therio: 25: 179 (1986)

3. Larocca C, Fernandez A, Gonzalez A, Carbo A. The Efficiency of Different Gonadotropin Preparations on the Superovulatory Responses of Holstein Cows. *Therio* 43:261 (1995)