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USE OF BULLS WITH ESTROUS SYNCHRONIZATION
"Bull-Sync"

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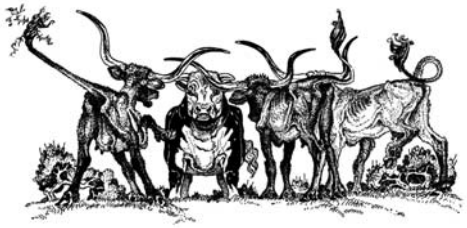
Introduction

Despite its potential for accelerating genetic progress, AI/Synchronization (AI/Sync) programs have been slow to be adopted by the beef industry. This relatively slow acceptance may be attributed to a number of factors, including the lack of acceptable procedures for appointment breeding. Also, producers may balk at the costs and effort of instituting an AI/Sync program, especially when good results are far from assured.

Early work with Bull/Sync programs was directed at a better understanding of the reproductive capabilities of bulls. With subsequent research, it became evident that Bull/Sync represented a viable management option in itself. Although natural breeding and estrous-synchronization may not appear to be natural bed-fellows, there are situations where this combination may be advantageous. For example, synchronization in conjunction with natural breeding (Bull/Sync) offers an interim alternative to AI/Sync with lesser demands on management, facilities, labor and expense. Here, a number of managerial aspects can be honed, and eligible female groups assembled, with less risk of disaster than which might occur with the sudden imposition of a full AI/Sync Program. Such programs can be successful using "normal" bull-to-female ratios (BFRs), providing the bulls employed are active and fertile (Pexton et al., 1990)

Another application of Bull-Sync is to concentrate breeding and calving periods in select groups, such as heifers. Here it can be advantageous both for replacement heifer selection, and for managing the calving period. Bull-Sync has also proven to be a useful management tool for mixed enterprises, which want to get both breeding and calving over within a manageable, predictable period.

Most of the earlier studies were conducted with the use of either PGF or SMB as estrus synchronization agents. Here, results showed little difference between these two methods in terms of pregnancy rates achieved. These, in turn, were generally comparable with results obtained in well-run AI programs (Pexton et. al., 1989). Bull-Sync has also been employed successfully with both MGA/PGF and Select Synch protocols. It is not recommended to be used with the CoSynch or OvSynch protocols, as, here, females do not show heat signs.



A number of advantages of Bull/Sync are indicated below:

Advantages of Bull/Synch

- ♂ **Synchrony of breeding /calving**
- ♂ **Interim step to AI/Sync**
- ♂ **Less effort than AI**
- ♂ **Less need for special facilities**
- ♂ **Les "risk" than AI "Sync**
- ♂ **Flexible (less management and facilities)**
- ♂ **Equal or better fertility than AI " Sync**
- ♂ **Possible "biostimulation" effects**

However, Bull/Sync also poses some disadvantages. Firstly, it requires additional managerial time and effort compared with natural breeding with non-synchronized females. This includes a higher level of management than that associated with normal natural breeding. Females need to be selected and synchronized. Bulls need to have passed a Breeding Soundness Exam. Some monitoring of the intensive breeding period (2-5 days initially) is recommended.

Secondly, Bull-Sync has less potential to create genetic progress than does AI when this is conducted using bulls of superior EPDs. However, if due care is taken, the results obtainable with Bull-Sync are comparable with those obtained with good, well-run AI programs, and sometimes better (Farin et al., 1989).

Disadvantages of Bull/Sync

- ♂ **Bull(s) ! (danger, facilities, inconvenience)**
- ♂ **Less potential genetic progress than AI**
- ♂ **Bull infertility/veneral disease**
- ♂ **Misadventure**

An example of a Bull/Sync program, using different combinations of PGF (1 and 2 injection) as well as the associated effect of biostimulation (using androgenized cows) is shown in Tables 1a and 1b. Here, in all synchronized groups, over 80% of "eligible" females (i.e. those considered to be cycling) became pregnant at the synchronized first cycle, compared with 50% of controls (non-synchronized). Prior biostimulation appeared to benefit heifer response to synchronization in this study by increasing net pregnancy rate (Chenoweth and Lennon 1984).

Table 1a. Breeding Group Data

Response	Group 1	Group 2	Group 3	Group 4	Overall
No. Heifers	***93***	***97***	***99***	***92***	***381***
Treatment	***1 x PGF***	***2 x PGF***	***2 x PGF Plus Biost****	***Control***	-
Weight (kg)	279	284	292	282	287 NS
BCS	4.0	3.9	3.8	3.8	3.9 NS
% "Active" ovaries+	81.6	71	71.9	80.0	76.1 NS

* "Biostimulation" = 5 androgenized cows for 14 day pre-breeding
+ Palpable follicle(s) and/or CL(s)
NS = non-significant.
BCS = body condition score (scale of 1 to 5)
PGF = prostaglandin $F_{2"}$

Table 1b. Responses in Heifer Groups

Response (%)	Group 1	Group 2	Group 3	Group 4	Overall
% with paint marks (5 d)*					
after 1 PGF	67.0^{a}	52.6^{b}	63.0^{a}	-	60.8
after 2 PGF	-	61.7^{a}	81.4^{c}		71.6
Control				15.8	
Gross PR (GPR)	64.5	71.1	61.1	64.1	65.4
GPR (cycle 1)	48.4^{a}	56.7^{a}	53.5^{a}	33.7^{c}	48.3
Net PR (cycle 1)	75.0^{b}	79.7^{c}	86.9^{d}	52.5^{a}	73.9
		80.5			

[a,b,c,d.] Superscripts in rows vary. [a,b] P<0.05, [a,c] P<0.01, [a,d] P<0.001
*Heifers with clear marks from chin-ball marker
PR = pregnancy rate.
GPR = gross pregnancy rate (# females pregnant/#females).
NPR = net pregnancy rate (# females pregnant/# cycling females).

In Colorado trials, comparisons were made of different BFRs (bull-to-female ratios) as well as different bull ages (Table 2) (Pexton et al., 1990). Here, yearling bulls obtained lower results than older bulls, despite exceeding breeding soundness standards, and despite comparable (if not higher) sexual activity with synchronized females. In these trials, BFRs were comparable across the different age groups.

Table 2. Mating Performance as Affected by Age of Hereford and Angus Bulls			
	Age (yr)		
	One	Two	Three
No. bulls	29	36	27
No. mounts	207.1	120.0[d]	85.8[d]
No. services	54.5	37.6	40.5
Mounts : services	6.6:1	5.4:1	4.5:1
Serviced/estrus	69.4	73.8	72.0
Pregnant/serviced	39.6[c]	59.4[d]	62.2[d]
Pregnant/estrus	30.2	40.3[d]	50.7[e]
Total pregnancy rate	30.9[c]	41.5[d]	49.9[e]

[c,d,e] Means differ (P < .05). Pexton et. al. (1990)

An empirical comparison of results obtained in different trials employing *Bos Taurus* or *Bos indicus* bulls showed some interesting differences (Table 3) (Williams et al., 1988; Pexton et al., 1989). Here, although *Bos indicus* bulls were apparently less sexually active than *Bos taurus* bulls (i.e. they completed less services), they achieved comparable results (such as females served and pregnancy rates in those females) during the synchronized breeding.

Table 3. Comparison of Different Bull Synchronization Trials with *Bos taurus* and *Bos indicus* Cattle			
	***Bos taurus*[a]**		***Bos indicus*[b]**
	SMB	**PGF**	**SMB**
No. groups	39	53	31
BFR[c]	1:7 to 51		1:15 to 20
Females in estrus (%)	90.8	78.3	77.2
Served/estrus (%)	73.3	70.4	72.0
Total females served (%)	66.1	55.1	55.7
Avg. services per bull	45.1		23.6
Pregnant/estrus (%)	42.4	41.0	40.6
Pregnant/served (%)	56.4	56.1	57.3
Pregnant/total (%)	41.3	42.7	32.6

[a]Pexton et. al. (1989)
[b]Williams (1988)
[c]BFR=bull to female ratio

Bull/Sync involves intense bull sexual activity within a contracted period. A number of considerations are pertinent to the success of such programs, as shown below.

Bull-Sync Guidelines:

- **Prior assess bulls**
- **Use young (2-4 years old), agile, active bulls**
- **Conduct breeding in small pen or yard**
- **Use "normal" BFRs (1:15-1:25)**
- **Use single-sires if possible**
- **Monitor breeding (2-5 days)**
- **Provide adequate R & R (2-3 weeks plus) before re-use**

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