Adapting Bulls to Florida

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Introduction

- ~ 40% of the US cowherd resides in the Gulf Coast and Southeast.
- Large number of bulls used in natural service.
- Seedstock producers in the region but also in northern regions for temperate breeds in particular.
- Demand for bulls may necessitate the purchase of bulls from outside the Gulf Coast – Southeast region.

Introduction (cont'd)

- Bulls born and raised in a more temperate climate referred to as "introduced" or "unadapted" versus "local" or "adapted".
- Subtropics includes the Gulf Coast region and is a relatively stressful environment.
- Adaptation to, or tolerance of, a variety of stressors including heat, humidity, disease, parasite burden, and low quality forage are important.

Introduction (cont'd)

1) Review results of genotype by environment interaction (GEI) for Herefords exchanged between Miles City, MT and Brooksville, FL;

2) Describe results of a few studies that evaluated reproductive performance of bulls in the subtropics or tropics;

3) Discuss the importance of acclimatization and quarantine; and

4) Discuss multiple sire breeding and bull to female ratio.

Hereford bull GEI design – Phase 1 (Pahnish et al., 1985)

Location and Line	Origin of foundation	Replacement ♂ and ♀
Montana MT Line 1	Line 1 in MT	Line 1 in MT
Montana FL Line 6	Line 6 in FL	Line 6 in MT
Florida MT Line 1	Line 1 in MT	Line 1 in FL
Florida FL Line 6	Line 6 in FL	Line 6 in FL

Hereford bull actual and 205 day adjusted weaning weights Phase 1, born 1966 through 1973 (Pahnish et al., 1985)

Item	Weaning wt., lb.	205 day adjusted
Line 1 in MT	408	461
Line 6 in MT	386	434
Line 1 in FL	412	401
Line 6 in FL	456	443
Line significance	*	NS
Location (Loc)	**	**
Origin (Line x Loc)	**	**
Local – Introduced	33	33

Hereford bull postweaning final weight and daily gain, Phase 1, born 1966 through 1973 (Pahnish et al., 1985)

Item	End weight, lb.	Daily gain, lb.
Line 1 in MT	981	2.72
Line 6 in MT	897	2.43
Line 1 in FL	996	1.60
Line 6 in FL	1043	1.60
Line significance	**	**
Location (Loc)	**	**
Origin (Line x Loc)	**	**
Local – Introduced	66	0.15
Age at end of test in MT = 394 days and in FL = 586 days.		

Hereford bulls, Phase 1, (cont'd)

Item	Condition score	Conformation score	Forecannon circum., in.
Line	**	*	**
Location	**	**	**
Origin (Local – Intr)	** (0.4)	** (0.7)	** (0.2)

Hereford bull GEI design – Phase 2 (Pahnish et al., 1985)

Location and and Line	Origin of foundation	Replacements ♀	♂
Montana MT Line 1	MT Line 1 in MT	MT Line 1 in MT	MT Line 1 in MT
Montana FL Line 4	MT Line 1 in MT	FL Line 4 in MT	FL Line 4 in FL
Florida MT Line 1	MT Line 1 in MT	MT Line 1 in FL	MT Line 1 in MT
Florida FL Line 4	MT Line 1 in MT	FL Line 4 in FL	FL Line 4 in FL

Hereford bull actual and 205 day adjusted weaning weights Phase 2, born 1967 through 1974 (Pahnish et al., 1985)

Item	Weaning wt., lb.	205 day adjusted
Line 1 in MT	417	474
Line 4 in MT	408	456
Line 1 in FL	386	381
Line 4 in FL	408	399
Line significance	NS	NS
Location (Loc)	**	**
Origin (Line x Loc)	*	**
Local – Introduced	15	18

Hereford bull postweaning final weight and daily gain, Phase 2, born 1967 through 1974 (Pahnish et al., 1985)

Item	End weight, lb.	Daily gain, lb.
Line 1 in MT	988	2.71
Line 4 in MT	970	2.66
Line 1 in FL	954	1.56
Line 4 in FL	999	1.62
Line significance	NS	NS
Location (Loc)	NS	**
Origin (Line x Loc)	**	*
Local – Introduced	31	0.05
Age at end of test in MT = 394 days and in FL = 586 days.		

Hereford bulls, Phase 2, (cont’d)

Item	Condition score	Conformation score	Forecannon circum., in.
Line	NS	NS	NS
Location	**	**	**
Origin (Local – Intr)	* (0.2)	NS (0.1)	* (0.1)

Summary - GEI

- Hereford bulls from unrelated lines -

  Local bulls had a 33 lb advantage at weaning and 66 lb advantage at the end of test over introduced bulls.
- Hereford bulls from more related lines -

  Local bulls had an 18 lb advantage at weaning and a 31 lb advantage at the end of test over introduced bulls.

Body weight and testicular volume in Hereford bulls in Florida at ~16 and 20 months of age (Fields et al., 1979)

Item	Month	Florida Hereford	Montana Hereford
Body weight, lbs	April	888	833
	August	1060	992
	Difference	172	159
Testi. volume, cm^3	April	847	819
	August	822	764
	Difference	-25	-55

Semen traits in Hereford bulls in Florida at ~16 and 20 months of age (Fields et al., 1979)

Item	Month	Florida Hereford	Montana Hereford
Semen vol., mL	April	7.2	7.3
	August	6.8	6.1
	Difference	-0.4	-1.2
Sperm motility, %	April	83	77
	August	82	61
	Difference	-1	-16

Semen traits in Hereford bulls in Florida at ~16 and 20 months of age (Fields et al., 1979) (cont'd)

Item	Month	Florida Hereford	Montana Hereford
Sperm concentration, x 10^6/mL	April	569	452
	August	666	378
	Difference	97	-74

Change in body weight, back fat, and REA from June to September in Angus and Senepol bulls (Chase et al., 1993)

	Below maintenance		Above maintenance	
Change in	Angus	Senepol	Angus	Senepol
Body weight, lbs.	-60	9	104	183
Backfat thickness, in	-0.02	0.01	0.01	0.3
REA, in^2	-1.1	0.6	1.6	1.9

Change in scrotal measurements from June to September in Angus and Senepol bulls (Chase et al., 1993)

	Below maintenance		Above maintenance	
Change in	Angus	Senepol	Angus	Senepol
Scrotal circumf., in	0.2	0.4	0.6	0.9
Testicular volume, cm^3	0.0	27	15	74

Change in semen characteristics from June to September in Angus and Senepol bulls (Chase et al., 1993)

	Below maintenance		Above maintenance	
Change in	Angus	Senepol	Angus	Senepol
Individual motility, %	-11.4	13.9	-15.3	14.7
Total abnormal, %	+14.3	-0.3	+11.4	-2.7

Summary – semen characteristics during summer

- Florida Hereford bulls gained more weight, lost less testicular volume, maintained sperm motility, and increased sperm concentration in an ejaculate compared to Montana Hereford bulls (that decreased sperm concentration in an ejaculate).
- Senepol bulls gained more in growth and scrotal measures than Angus bulls. Sperm motility increased and abnormalities were maintained in the ejaculate from Senepol bulls whereas, sperm motility was decreased and total abnormalities increased in the ejaculate from Angus bulls.

In northern Australia, Fitzpatrick et al. (2002) evaluated 322 Brahman and Brahman derivative bulls for semen traits related to calf output

Concluded that-

1) Semen examinations including sperm morphology should be performed in bull selection and in premating exams with a threshold of 70% normal sperm,
2) Fertility recommendations should not be based solely on semen or sperm motility,
3) Assessments of semen heparin-binding protein profiles are unlikely to enhance bull fertility.

Acclimatization and quarantine of newly purchased bulls

Is an important process for several reasons-

1) Enables the bull to adapt to his new environment (temperature, feed, water, “germs and bugs”),
2) Enables the owner to quarantine new bulls and observe them for any signs of disease (as well as any other problems),
3) Provides an opportunity to get the new bull into the same health program as the rest of the herd (vaccinations, parasite control, etc.).

Relocation and associated adaptation problems

- Frequently are not diagnosed until bulls have resided on the property for some time.
- Then the problems are manifested by reduced pregnancy rates or delayed and strung-out calvings.
- Although the causes of such problems may be multiple and the effects both real and perceptual,
- Recommendations to minimize the risk of occurrence have been made (McCool and Holroyd, 1993) as follows:

Recommendations (McCool and Holroyd, 1993):

- Purchase locally produced bulls when possible.
- Purchase or transport bulls from afar when conditions are optimal at the new site (e.g., when pastures are good, parasites are on the decline etc.).
- Introduce bulls to their new environment gradually by holding and feeding them in pens initially then releasing them into smaller pastures.
- Purchase yearling bulls so that they have time to acclimate to the environment before maturity (also they will better adapt to one another socially).

Multi-sire breeding and bull-to-female ratio (BFR)

- BFR of 1:20 to 1:30 have traditionally been recommended.
- Compared single- vs. multiple-sire Hereford breeding herds at BFR 1:25, 1:44, and 1:60. (Rupp et al., 1977). Reported that fertility, libido, and mating ability of individual sires were more important than either BFR or single- vs. multi-sire breeding systems.
- No differences in reproductive rates between single- and multi-sire herds were reported over an 18 year period in Australia (Bamualim et al., 1984).

Multi-sire breeding and bull-to-female ratio (BFR) (cont'd)

BFR with estrus synchronized females:

- Yearling Hereford bulls pre-assessed for BSE and libido were compared at 1:20 and 2:40 BFR with estrus synchronized crossbred heifers (Farin et al., 1982). Overall, bull mating performance and pregnancy rates did not differ between BFR.
- A number of single-sire BFR from 1:7 to 1:51 were compared with estrous synchronized females (Pexton et al., 1990). BFR did not limit fertility even at the lowest BFR.

Multi-sire breeding and bull-to-female ratio (BFR) (cont'd)

- In northern Australia, no difference was observed in herd fertility when reproductively sound Brahman bulls were used at BFR of either 1:17 or 1:40 (Fordyce et al., 1998).
- Two studies conducted in different environments showed that bulls screened for BSE increased herd pregnancy rates at reduced BFR (1:20 to 1:33; Prince et al., 1987; McCosker et al., 1989).

Multi-sire breeding and bull-to-female ratio (BFR) (cont'd)

- Sound bulls that have passed a BSE can handle considerably more females during a breeding season than traditional recommendations would suggest.
- Most producers have yet to take advantage of these findings.
- US surveys indicate that cattle breeding operations overall use yearling bulls at 1:17.5 and mature bulls at 1:25 (USDA, NAHMS 1998).
- Cattle breeders in the Rocky Mountain region used a mean BFR of 1:21, with 25% of the herds using BFR of <1:18 (Sanderson and Gay, 1996).

Multi-sire breeding and bull-to-female ratio (BFR) (cont'd)

- More recent US recommendations for competent bulls of 1:40 for mature bulls and 1:15 to 20 for yearling bulls (Ewbank, 1996).
- Likewise in tropical Australia, there is evidence to support the lowering of bull percentages from the industry average of 5% (1:20) to one-half that number of bulls (2.5%; 1:40) without compromising herd fertility (McCosker et al., 1989; Holroyd et al., 2002).

Summary/Conclusions

- GEI studies demonstrated that both preweaning and postweaning growth were greater for local than introduced Hereford lines.
- During summer in Florida, both growth and semen traits were affected adversely in Montana line but not Florida line bulls.
- Importance of purchasing bulls born and raised in a similar region as they will be used.
- Semen traits were also affected adversely during summer in Angus but not Senepol bulls.
- A depression in semen traits can adversely affect reproductive performance.

Summary/Conclusions

- In the tropics, researchers concluded that bull selection and premating criteria should have a threshold of 70% normal sperm (BSE).
- Newly purchased bulls should go through a period of acclimatization and quarantine.
- Introduced bulls may require greater care premating and postmating to keep adequate condition scores on bulls.
- During summer, provide adequate shade and water.
- Selection of bulls based on EPDs, pedigree, structural conformation, and positive results from a breeding soundness examination (BSE) including analysis of semen traits is necessary.

Summary/Conclusions

- All bulls should be re-examined at least 60 days prior to the start of the breeding season.
- Any bulls with a deferred score can then be re-examined before the beginning of the breeding season.
- Trends are to use a lower BFR than in the past.
- Competent bulls passing a BSE should accomplish the job at 1:40 for mature and 1:15 to 20 for yearling bulls.