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E X T E N S I O N

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Reproductive Behavior of Crossbred Heifers Bred as Yearlings [1]

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Increased costs of capital resources and fixed expenses for beef production in Florida have resulted in the need for higher production. This economic pressure has increased the interest of the cow-calf producer in breeding heifers to calve at two years of age instead of three. Research in Louisiana showed the Angus breed attained puberty (first heat) at 433 days of age, Brahman at 816, and Brahman x Angus crossbreeds at 460 days of age. These wide variations in ages make it necessary to select breeds with the potential to conceive at an age appropriate to the established management system on a particular ranch. Calving at two years of age, if successful, could influence economic returns and also provide genetic improvement of a herd.

The concept of the genetic improvement of a herd was elaborated in a study on breeding heifers as yearlings at the Agricultural Research Center, Ona. The main purpose was to evaluate reproductive behavior of various European-Brahman F_1 crosses and backcrosses.

Experimental Procedure

Crossbred heifers similar to those commonly used in commercial production were exposed to Charolais bulls during a 100-day breeding season over a 4-year period. The breeding season began and ended approximately two weeks before the regular season for older cows, in accordance with commercial management in maintaining a regular breeding season. Breed groups of heifers studied included various combinations of the Angus, Brahman, Charolais, and Shorthorn breeds, with major emphasis on Brahman-European crosses. Heifers at the beginning of the breeding season averaged 580 pounds at an average age of 400 days. Age at conception was determined by subtracting a standard gestation period of 286 days from the date of calving.

Results and Discussion

Reproduction data by breed groups over a 4-year period are given in Table 1. All F_1 heifers had a relatively high calving rate, with the 1/2 Angus - 1/2 Brahman highest at 100% and the 1/2 Brahman - 1/2 Shorthorn at 85%. The 1/2 Charolais - mix breed group had a lower calving rate (71%) than the F_1's,

indicating a genetic variance relative to conception at this age.

Calving percentage of the backcross 3/4 Shorthorn - 1/4 Brahman was second to the 1/2 Angus - 1/2 Brahman heifers, with a 90% calving percentage, while the 3/4 Brahman - 1/4 Shorthorn heifers were lowest at 43%. These results demonstrate the potential of the European breeds for breeding at a young age and the apparent later sexual maturity of animals of predominantly Brahman breeding.

Weaning percentage based on both calving and survival rate showed the 1/2 Angus - 1/2 Brahman as highest, even though the calf survival of 90% was not highest in the experiment. The combined Charolais - Brahman females were next at 78%, due to a 100% survival rate. The 1/2 Shorthorn - 1/2 Brahman heifers weaned the same percentage of calves as the 3/4 Shorthorn - 1/4 Brahman at 77%, with calving and survival percentage differences balancing each other out. Small numbers in the Charolais x Brahman groups limited inferences by specific breeding, but a 100% survival rate is of interest and indicates these heifers were less subject to calving problems than other heifers in this study when bred to bulls of a large breed. Calf survival was low, averaging 88% and ranging from 57% to 100%. This could be partially corrected by selecting individual bulls or breeds of bulls that are known to combine well with young cows in producing small calves. However, management plays an important role in this practice. After conception and until the calf is weaned, management determines to a high degree the overall production in calving heifers at two years of age. An adequate nutritional level must be provided heifers after calving for the heifers to breed back and wean a heavy calf.

Data on ages of conception of various combinations of European -Brahman crosses are presented in Table 2. Average ages at conception during the 100-day breeding season ranged from 418 days for the 1/2 Shorthorn - 1/2 Brahman to 465 for the Charolais - mix group. Heifers breeding at the youngest ages were the F_1 Shorthorn x Brahman and Angus x Brahman followed by the Charolais - Brahman and 3/4 Shorthorn - 1/4 Brahman.

Variations in numbers of heifers conceiving within breed groups, except for the 1/2 Angus - 1/2 Brahman, made it necessary to make projections of age as if the breeding season had been lengthened until all heifers were bred (Table 2) . The projections magnified breed variations from 423 days at conception for the 1/2 Shorthorn - 1/2 Brahman to 528 days for the 3/4 Brahman - 1/4 Shorthorn heifers. The average projected ages at conception fit closely the results for age at puberty obtained in Louisiana for F_1 British - Brahman and 3/4 Brahman - 1/4 British. These data show that on a population basis, heifers of predominantly Brahman breeding do not reach sexual maturity as early as the F_1 European x Brahman or crossbreeds with predominantly European breeding and should not be expected to perform on the same relative basis when exposed as yearlings.

Summary

It has been shown in this study that certain crossbred heifers have potential for breeding as yearlings within a limited breeding system: F_1 Angus x Brahman and Shorthorn x Brahman heifers, followed by the 3/4 Shorthorn - 1/4 Brahman, as well as the Charolais x Brahman. The later sexual maturity of the 3/4 Brahman - 1/4 Shorthorn crossbreeds limits their ability to reproduce at an early age. However, predominantly Brahman heifers that have reached puberty can be bred during a short season (with the remaining individuals held for breeding until two years of age).

Table 1. Influence of breeding of crossbred heifers calving at two years of age on percentage calving, weaning, and calf survival.

Breeding of heifer	No. heifers exposed	Calving %	Calf survival %	Weaning %
1/2 A - 1/2 Br	20	100	90	90
1/2 Sh - 1/2 Br	47	85	90	77
3/4 Sh - 1/4 Br	31	90	86	77
3/4 Br - 1/4 Sh	30	43	92	40
1/2 Ch - 1/2 Mix[1]	24	71	82	58
1/2 A - 3/8 Br - 1/8 Sh	14	79	91	71
Ch - Br Crosses[2]	18	78	100	78
Ch - Sh Crosses[3]	12	83	90	75
Other Crosses	11	64	57	36
Totals	207	77	88	68

[1] 1/2 Ch - 1/4 A - 1/4 Br
    1/2 Ch - 1/4 Sh - 1/4 Br
[2] 1/2 Ch - 1/2 Br
    3/8 Ch - 1/4 Br
    7/8 Ch - 1/8 Br
    15/16 Ch - 1/16 Br
[3] 1/2 Ch - 1/2 Sh
    3/4 Ch - 1/4 Sh

Table 2. Breeding x age of conception of yearling heifers exposed to Charolais bulls for 100 days.

Breeding	No. Animals	Calving status[1]	Average age at first exposure	Range in age at conception	Average age at conception	Projected av. age at conception[2]
1/2 A - 1/2 Br	20	C	390	356 - 517	434	434
	0	O				
1/2 Sh - 1/2 Br	40	C	391	329 - 487	418	423
	7	O	396			
3/4 Sh - 1/4 Br	28	C	407	386 - 489	443	447
	3	O	396			
3/4 Br - 1/4 Sh	13	C	397	387 - 520	454	528
	17	O	401			
1/2 Ch - 1/2 Mix	17	C	423	412 - 497	465	482
	7	O	403			
1/2 A - 3/8 Br - 1/8 Sh	11	C	405	415 - 502	454	467
	3	O	388			
Ch - Br crosses	14	C	410	389 - 499	441	450
	4	O	405			
Ch - Sh crosses	10	C	402	385 - 487	447	456
	2	O	381			
Other crosses	7	C	414	410 - 496	461	488
	4	O	376			

[1] C = Calved. O = Open, did not calve.
[2] Projected age at conception = (total no. within breed group / no. conceiving) x (age at conception - age at first exposure) + age at first exposure.