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M.H. Hall

W.H. Smith

R.R. Schalles

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Abstract

Two inbred lines of Shorthorn beef cattle were established during 1950 to evaluate inbreeding. Analyses of postweaning production data for the first four generations of inbreeding indicate that inbreeding in calves depresses yearling type score, average daily gain, and weight per day of age, but not feed efficiency. The growth depression effects were relatively minor, however. Inbreeding in dams of the calves did not significantly affect any of those traits. Observations to date indicate that mild inbreeding will not cause fitness traits to deteriorate in beef cattle.

Keywords

Cattlemen's Day, 1976; Report of progress (Kansas State University. Agricultural Experiment Station); 262; Beef; Inbreeding; Performance; Production

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Effects of Inbreeding on Postweaning Performance of Shorthorn Beef Cattle

M. H. Hall, W. H. Smith, and R. R. Schalles

Summary

Two inbred lines of Shorthorn beef cattle were established during 1950 to evaluate inbreeding. Analyses of postweaning production data for the first four generations of inbreeding indicate that inbreeding in calves depresses yearling type score, average daily gain, and weight per day of age, but not feed efficiency. The growth depression effects were relatively minor, however. Inbreeding in dams of the calves did not significantly affect any of those traits.

Observations to date indicate that mild inbreeding will not cause fitness traits to deteriorate in beef cattle.

Experimental Procedure

The Wernacre Premier and Mercury inbred lines of Shorthorn cattle were established in 1950. Both have remained closed to outside breeding since then and have been maintained and developed by inbreeding. The first four generations of postweaning production data were analyzed for this study.

The postweaning production performance for all calves consisted of a 182-day individual feeding period on high concentrate rations. The average initial age at the start was 200 days or approximately 20 days after weaning. Average daily gain, TDN consumed per pound of gain, yearling weight per day of age, yearling type score, and coefficient of inbreeding[1] were measured for all calves. Inbreeding by dams of calves was included in the analyses.

Three hundred eleven calves, including 117 from repeat matings, were used in the statistical matrix of within-mating-type relationship in a weighted analyses to determine environmental (year) effects. Average annual inbreeding coefficients of calves ranged from 0 to 38% within lines with an overall average of 15.8%. The rate of inbreeding-increase has been approximately 1% per year or 4.5% per generation interval.

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[1] Coefficient of inbreeding estimates increased genetic homozygosity resulting from the mating of related parents. The offspring of half-sibs are 12.5% inbred and those of full-sibs 25% inbred. The amount accumulates with successive generations of practice.

Intensity of selection averaged 14% for bulls and 57% for heifers. Selection differences for production traits were appreciably higher among bulls.

Results and Discussion

Inbreeding of calf significantly depressed yearling score, yearling weight-per-day-of-age, and average daily gain during the postweaning performance period. Partial regression coefficient of inbreeding of calf revealed that a 10% increase in inbreeding reduced yearling type score -.350 point (1/9 of a grade), weight per day of age -.031 lb., and test average daily gain -.035 lb. It did not significantly depress feed efficiency.

Inbreeding of cow had no significant effect on any of the traits studied. The quadratic term for both the effects of inbreeding of calf and dam were not significant so inbreeding effects are linear. Results are summarized in table 6.1 .

Conclusions

1. Inbreeding possessed by calves causes moderate decline in yearling type score, weight per day of age, and postweaning average daily gain. It does not depress feed efficiency.

2. Inbreeding of dam has not significantly affected postweaning performance of their calves.

3. Inbreeding no higher than reported here may be practiced without deteriorating fitness traits in beef cattle.

4. Some inbreeding is essential in nearly all constructive selection programs.

Table 6.1 Partial regression coefficients per 10% increment of inbreeding (F) on performance of calves.

	F of Calf	F of Dam
TDN gain	.009 P<.67	-.001 P<.95
Type score	-.350** P<.002	-.058 P<.56
Test avg. daily gain	-.035* P<.054	.024 P<.14
Weight per day of age	-.031** P<.005	.004 P<.61

* P<.05 and ** P<.01