Another way to show this is to use the "average miss" concept. The basis for this concept is that each time information about an animal is added to what is known, then the estimate (or guess) of the pounds of FFL in that animal should miss by a fewer number of pounds. The group of cattle in this study had an average of 228 pounds of FFL. Since the standard deviation (average deviation) was 18 pounds, each animal could have been estimated as having 228 pounds and the average miss would have been 18 pounds. If the weight of the animal was known, one could estimate on the basis of the relationship between weight and FFL. The average miss would have been 15 pounds. Knowing both weight and count permits one to use both in predicting. When this was done the average miss was reduced to 9 pounds. This indicates that the K^{40} count increased the ability to estimate pounds of fat free lean in the live animal. How this would compare to prediction based upon body weight and the estimate of a good judge is not known.

Sire-Sex Interactions and Sex Differences in Growth and Carcass Traits of Cattle and Carcass Traits of Lambs

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Story in Brief

This study was designed to investigate the consistency of differences in performance of progeny of different sexes by different sires. A differential sex performance of the progeny of different sires is measured as a sire-sex interaction. The bull, steer and heifer progeny of 24 Angus sires over a 3 year period were analyzed for various growth and carcass traits. Preweaning gain and weaning weight analyses involved 487 individuals and postweaning performance and carcass data were analyzed on 394 individuals. Sire-sex interactions were investigated for various carcass traits of 120 lambs involving equal numbers of ram, wether, and ewe progeny of 18 sires studied over a 2 year period. Estimates of differences between bulls (rams) and steers (wethers) and between steers (wethers) and heifers (ewes) are presented.

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There were no significant sire-sex interactions for beef growth or carcass traits and the only one of thirteen lamb carcass traits analyzed in which there was an indication ($P < .10$) of an interaction was percent carcass lean. These results suggest that differences between the sexes for the various traits are similar for different sires and sires evaluated on the basis of progeny tests involving one sex would be ranked in a similar manner if evaluation were based on the performance of a different sex. This study indicates that reliable progeny tests of bulls and rams can be based on performance of different sexes or unequal proportions of a particular sex if adequate adjustment factors are available.

Introduction

Sire evaluation based on the performance of offspring (progeny test) is an effective means of measuring genetic worth. Although the time and expense involved in progeny testing sires has limited its practical use in many breeding programs, progeny testing may be advisable in situations where selected sires can be used extensively as in artificial insemination or where selection is for those traits that are not directly measurable on the animal being evaluated.

Sex differences have been demonstrated to exist in many important growth and performance traits of cattle and sheep. A possible problem may arise in progeny testing if sex differences are not similar among the progeny of different sires. This differential sex response could be in the form of large sex differences in performance among the progeny of some sires and relatively small differences among the progeny of other sires. A more extreme example would be a case in which the performance of male progeny exceeded that of female progeny of certain sires while the performance of female progeny of other sires was superior to that of the male progeny. A differential sex performance is measured statistically as a sire-sex interaction.

If sire-sex interactions are important, the estimated breeding value of a sire would depend on the sex of the progeny involved in the evaluation. This would indicate the necessity of evaluating sires on the performance of a given sex or equal proportions of different sexes. If sire-sex interactions are not important, sire evaluation could be based on the records involving different sexes providing sex adjustments were available.

The purpose of this study was to investigate the importance of sire-sex interactions in growth and carcass traits of bulls, steers and heifers and carcass traits of ram, wether and ewe lambs. Estimates of sex differences were also obtained.

Materials and Methods

The cattle used in this study were Angus calves raised during a 3 year period in the Experiment Station herd at Lake Blackwell Range, Stillwater. Calves were the progeny of 24 different sires, 8 used each year. There were 139 bulls, 121 steers and 227 heifers involved in the analysis of preweaning average daily gain and weaning weight. The analyses of feedlot gain, yearling weight and carcass traits included 126 bulls, 113 steers and 155 heifers.

About one-half of the male calves from each sire group were randomly selected for castration at an average age of 3 months. Calves were weaned at an average age of 205 days and shipped to the Fort Reno Livestock Research Station where they were fed for a 168 day period. After completing the feeding period, all animals were shipped to a commercial packing plant where they were slaughtered and carcass data obtained.

One-hundred twenty lambs from the Fort Reno Station, consisting of equal numbers of ram, wether and ewe progeny for each of 18 sires involved in the analyses of lamb carcass traits. All lambs were out of grade Rambouillet or Dorset x Rambouillet ewes and Dorset, Hampshire or Suffolk rams. All lambs were raised as twins on wheat pasture with access to creep feed. Lambs were weaned at approximately 70 days of age and weighed every two weeks until reaching a minimum full weight of 100 lb., at which time they were transported to Stillwater for slaughter and carcass evaluation.

Statistical analyses for testing sire-sex interactions were conducted separately for each year and the results pooled or combined over all years. Previous Feeders' Day reports contain sex means for the first two years of the cattle data (Okla. Agr. Exp. Sta. MP-79, page 31) and for the lamb data (Okla. Agr. Exp. Sta. MP-80, page 16), consequently sex means have been omitted from this report.

Results and Discussion

The existence of a possible sire-sex interaction for each trait was tested statistically by the analysis of variance. The results of the tests for sire-sex interactions in beef growth and carcass traits are presented in Table 1. The ratio (F value) obtained from the comparison of mean squares is expected to be one (1.0) if the interaction truly does not exist, with an equal likelihood of deviating slightly above or below the expected F value due to chance. None of the traits analyzed exhibited significant evidence of sire-sex interactions. This would indicate that sex differences were similar for the progeny of different sires. These results do not support the belief that some bulls tend to sire better progeny of one sex than they do of the other.

Table 1. F Values Obtained in Tests of Significance for Sire-Sex Interactions in Beef Growth and Carcass Traits

	Interaction F Value[1]
ADG[2] (birth to weaning), lb.	0.86
Adjusted weaning weight, lb.	0.80
ADG[2] (feed lot), lb.	0.73
Adjusted yearling weight, lb.	0.96
Trimmed round percent[3]	0.88
Carcass wt./day of age	0.89
Rib eye area, in.[2]	0.94
Rib eye area/100 lb. carcass	0.92
Average fat thickness at 12th rib, in.	0.87
Single fat thickness/100 lb. carcass	0.76
Estimated percent kidney fat	0.98
Carcass conformation	1.05
Marbling score	0.75
Carcass grade	0.96
Cutability percent[4]	0.84

[1] All F values were nonsignificant; if the interaction truly does not exist, the F value should be near 1.0.
[2] Average daily gain
[3] Percent of hot carcass weight
[4] Estimated percentage boneless retail cuts from round, loin, rib and chuck

Estimates of sex differences between bulls and steers and between steers and heifers are presented in Table 2. Bulls had a small but nonsignificant advantage over steers in gain from birth to weaning and weaning weight, while steers were superior to heifers in these traits. The 7.7 lb. advantage of bulls over steers in weaning weight is less than that generally reported, but should be a realistic difference since calves to be castrated were randomly selected from each sire group. Bulls gained more rapidly in the feedlot than steers and had a significant advantage in carcass weight per day of age. Bulls had leaner carcasses than steers, less marbling and a lower carcass grade. Heifer carcasses had more kidney fat than steer carcasses, while there was little difference in carcass grade or marbling score. Bulls were significantly higher than steers in estimated carcass cutability, while there was no difference between steers and heifers. The values contained in Table 2 can be used to adjust for sex differences.

Table 3 contains the F values for statistically testing for the existence of sire-sex interactions for each of the lamb carcass traits. Six of the F values were less than 1.0 and seven were greater than 1.0 which is the expected result due to chance variation about the expected F value of 1.0 when there are no sire-sex interactions. The only trait which gave any indication of a sire-sex interaction was percent carcass lean, which was significant at the 10 percent level of probability. This provides some evidence, although not strong, of an interaction. However, considering the number of traits analyzed, it would not be unusual to obtain at least

Table 2. Differences Between Bulls and Steers and Between Steers and Heifers in Growth and Carcass Traits.

	Bulls-Steers	Steers-Heifers
ADG (birth to weaning), lb.	0.038	0.107**
Adjusted weaning weight[1], lb.	7.7	25.7**
ADG (feed lot), lb.	0.376**	0.466**
Adjusted yearling weight, lb.	68.10**	100.11**
Trimmed round percent	0.59**	0.38**
Carcass wt./day of age	0.108**	0.165**
Rib eye area, in.[2]	1.67**	0.44**
Rib eye area/100 lb. carcass	0.133**	—.149**
Av. fat at 12th rib., in.	—.19**	—.05**
Single fat/100 lb. carcass	—.037**	—.001
Estimated percent kidney fat	—.86**	—.38**
Carcass conformation[3]	0.04	0.67
Marbling score[3]	—1.59**	—.12
Carcass grade[2]	—2.08**	0.23
Cutability percent	2.49**	0.00

** Differences were significant ($P < .01$)

[1] Adjusted to 205 days and for age of dam.

[2] Converted to the following numerical designations: low prime-13, high choice-12, average choice-11, low choice-10, high good-9, average good-8.

[3] Marbling score equivalents: moderate-7, modest-6, small-5, slight-4.

Table 3. F Values Obtained in Tests of Significance for Sire-Sex Interactions in Lamb Carcass Traits.

	Interaction F Value[1]
Percent carcass bone	1.04
Percent carcass fat	1.18
Percent carcass lean	1.60*
Carcass wt./day of age	0.75
Percent trimmed wholesale cuts	1.32
Percent trimmed leg	0.64
Loin eye area, in.[2]	1.09
Carcass conformation grade	0.74
Carcass quality grade	0.85
Carcass grade	0.54
Fat thickness at 5th rib, in.	1.18
Fat thickness at 12th rib, in.	1.12
Specific gravity of carcass	0.80

*Significant ($P < .10$)

[1] If the interaction truly does not exist, the F value should be near 1.0.

one significant interaction due to chance. Consequently, the slight indication of a sire-sex interaction for percent carcass lean probably should not be taken too seriously. It seems more likely from considering all data analyzed that sire-sex interactions are not a significant factor. Furthermore, the Hampshire, Suffolk and Dorset sires used in this study probably represented larger gentic differences among sires than those normally found within a breed, and consequently should have enhanced the likelihood of detecting sire-sex interactions if they exist.

Estimates of sex differences in lamb carcass traits are given in Table 4. The only significant differences between wether and ewe carcasses were in fat thickness, with wethers having slightly less fat cover at the 5th and 12th ribs. When making sex comparisons it should be kept in mind that lambs were killed on a weight constant basis rather than following a constant feeding period. Definite differences were obtained between rams and wethers in body composition based on chemical analysis of bone free tissue. Ram carcasses were significantly lower in percent fat and higher in percent bone and lean than wether carcasses. Ram carcasses had less fat cover than wether carcasses. Ram carcasses tended to grade lower than wether carcasses and wether carcasses lower than ewe carcasses, although the differences were nonsignificant. The sex differences in Table 4 can be used as adjustment factors in situations similar to those in this study.

In view of the number of traits analyzed for sire-sex interactions in beef cattle and lamb data and the similarity of the results, it does not seem probable that sire-sex interactions are of major concern in sire evaluation. These results suggest that differences between the sexes are similar for different sires and that observed discrepancies can be attributed to random variation. This means that sires evaluated on the basis of progeny tests involving one sex would be ranked in a similar manner if evaluation had been based on the performance of a different sex. This study indicates that reliable progeny tests of bulls and rams could be conducted in which sires were represented by different sexes, or unequal numbers of a particular sex providing adequate adjustment factors were available.

Table 4. Differences Between Rams and Wethers and Between Wethers and Ewes in Carcass Traits.

	Rams-Wethers	Wethers-Ewes
Percent carcass bone	0.85*	— .23
Percent carcass fat[1]	—6.42**	—1.82
Percent carcass lean[2]	4.43**	0.86
Carcass wt./day of age	0.029**	0.011
Percent trimmed wholesale cuts	— .28	— .04
Percent trimmed leg	0.77**	0.17
Loin eye area, sq. in.	0.09	0.03
Carcass conformation grade[3]	0.35	0.20
Carcass quality grade[3]	0.22	0.13
Carcass grade[3]	0.19	0.59
Fat thickness at 5th rib, in.	— .16**	— .09**
Fat thickness at 12th rib, in.	— .08**	— .04**
Specify gravity of carcass	0.0023	0.0012

*Differences were significant ($P < .05$)
**Differences were significant ($P < .01$)
[1] Determined from chemical analysis of bone free tissue
[2] Calculated by difference using percent bone and fat
[3] Converted to the following numerical designations: high prime-0, average prime-1, low prime-2, high choice-3, average choice-4

Observations on Certain Aspects of Preconditioning Calves

Robert Totusek and Dwight Stephens

Story in Brief

Three trials to compare various weaning management practices and rations for weaned calves were conducted. Total lb. gain per calf for the 28-day experimental period by treatment in each trial were as follows: Trial I: Unweaned on pasture, 26; weaned on pasture, 14; weaned in a pen, 25. Trial II: High concentrate ration, 7; high concentrate plus roughage, 41; all roughage, 40. Trial III: Unweaned on pasture with creep, 34; weaned in trap, 32; weaned in drylot, 34.

In this experiment, (1) a high roughage ration was much superior to a high concentrate ration for newly weaned calves, (2) calves weaned in a pen performed better than calves weaned on pasture, but there was little difference between pen weaned and trap weaned calves, and (3) unweaned calves in the pasture, with or without creep, returned more above feed cost than weaned calves.

Introduction

Because of poor performance, excessive sickness, and high death loss of many newly arrived cattle in the feedlot, there has been much interest in preconditioning cattle previous to their transfer to the feedlot.

Preconditioning is not a clearly defined term. Some of the practices implied by preconditioning include, (1) weaning calves previous to shipment, (2) teaching calves to eat a grain ration, (3) conditioning calves to a confined environment with water and feed facilities similar to a feedlot, (4) treating for grubs, (5) treating for internal parasites, (6) immunizing against various diseases such as blackleg, IBR, BVD, parainfluenza and pasteurella, (7) castrating, and (8) dehorning.

Some of these jobs, such as castrating and dehorning, are done routinely by good operators. Certain of the jobs, such as treating for grubs, treating for internal parasites, and immunizing against certain diseases, can undoubtedly be done most economically and efficiently by the feedlot operator, who is well equipped to perform many of the operations, and buys supplies in large quantities at a lower price than most ranchers.

The most important preconditioning jobs which can be performed on the ranch are weaning calves and teaching them to eat. This involves labor, feed, capital and risk. These added costs must either result in a

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