

EFFECT OF AGE AT WEANING OF SHROPSHIRE LAMBS ON WEIGHT GAINS AND CARCASS SCORE

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ABSTRACT

Differences in the rate of gain from birth to 140 and 170 days of age for lambs weaned on grass-white clover pasture, at average ages of 10, 15 and 20 weeks, were not significant ($P < 0.05$) as measured by the linear and quadratic regressions. The average weights at weaning were 39, 54 and 66 pounds respectively. The rates of gain of the lambs were affected by type of birth, sex and year of rearing.

The age at weaning, type of birth and year of rearing had insignificant effects on the commercial grades of the carcasses from wether lambs.

None of the interaction effects for any of the response criteria studied reached statistical significance.

The results indicate that certain advantages from early weaning of lambs on pasture with ample immature forage were realized without adversely affecting the performance of carcass grades.

INTRODUCTION

Clarke (4) estimated that the efficiency of converting grass to lamb via ewe's milk was approximately 9 per cent (for lambs from 3 to 4 months of age) whereas the direct conversion of grass to lamb was about 30 per cent. Other possible advantages for early weaning of lambs have been reported (1, 3, 4, 13). Recent research (13) has shown that, at about 8 weeks of age, grazing lambs can digest forage with the efficiency of an adult. Baird *et al.* (1) found that most of the milk production of ewes had ceased by 15 weeks after lambing and Clark³ found that for ewes nursing twins the milk production of the first week of the lactation was approximately double the production of the eighth week. Dickson (6) has suggested that after 2 months of age grass becomes the dominant factor in the lamb's diet. The performance of lambs weaned at 6 weeks of age in drylot compared favourably with those weaned at 9 weeks in experiments reported by Hinds *et al.* (8). Conversely, Baird *et al.* (1) found that early-weaned lambs made slower gains than unweaned controls. Stage of maturity of the pasture growth is an important factor in the performance of early-weaned lambs (13).

The present paper records the rate of gain from birth to 140 and 170 days of age and the scores and commercial grades for the carcasses of purebred Shropshire lambs weaned on grass-white clover pasture at 10, 15 and 20 weeks of age.

MATERIALS AND METHODS

Animals

All the lambs born from 1956 to 1958 inclusive from approximately 60 mixed-age purebred Shropshire ewes each mated to open-faced British-type purebred Shropshire rams were used in this study. The flock was wintered indoors and fed good quality grass-legume hay and silage. Approximately 4 weeks prior to lambing one-half pound of a concentrate

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TABLE 1. — DESIGN OF THE EXPERIMENT

Year	Sex	Age at weaning (weeks)					
		10		15		20	
		Single	Twin	Single	Twin	Single	Twin
1956	M*						
	F						
1957	M						
	F						
1958	M						
	F						

*Males were castrated at 10-14 days old.

mixture (equal weights of whole oats and wheat bran) per ewe was added to the daily ration until the ewes and lambs were put out to pasture when the lambs were approximately 9 weeks old. The flock had ready access to mineral (equal weights of iodized-cobaltized salt and feeding bone meal) and water supplies. The ewes and lambs were run as a single flock until the lambs were weaned. All ewes were treated for internal parasites, using phenothiazine. At birth all lambs were weighed and identified, and allotted according to sex and type of birth in accordance with the experimental design shown in Table 1.

All lambs were docked and the male lambs were castrated when 10 to 14 days of age. The lambs were weighed and weaned on the Wednesday of the week nearest the age of weaning for each group and were weighed individually at 28-day intervals from weaning to the time of marketing.

All wether lambs were slaughtered when they reached a minimum live weight of 80 pounds and the degree of finish required for top carcass grade as estimated by handling of the animals. The carcasses were classified for conformation, finish and fleshing of the leg, loin, neck and shoulder, and for blockiness. Commercial grades were obtained for all carcasses. Numerical values from 1 to 3 were assigned for blockiness and commercial grade and 1 to 4 for all other carcass characteristics with 3 and 4 being the highest scores, respectively.

Pastures

The pastures consisted of a well-established sward of grasses and white clover. The weaned lambs rotationally grazed one 3-acre and one 1.5-acre adjacent fields. The ewes and unweaned lambs rotationally grazed two fields located in the same general area as those grazed by the weaned lambs. The larger field grazed by the weaned lambs received annual applications of 0-20-20 fertilizer and ammonium nitrate at the rate of 300 and 100 pounds per acre, respectively. All other fields received an annual application of 3-15-6 fertilizer at the rate of 300 pounds per acre. The excess forage was

TABLE 2. — MEAN BIRTH AND WEANING WEIGHTS AND WEIGHT GAINS, FROM BIRTH TO 140 AND 170 DAYS OF AGE, FOR SHROPSHIRE LAMBS WEANED AT 10, 15 AND 20 WEEKS OF AGE (Based on the mean of 4 lambs per cell)

Comparison	No. of lambs	Mean birth weight	Mean weaning weight	Mean weight gain/day	
				From birth to 140 days of age	From birth to 170 days of age
<i>All lambs</i>	144	lb. 7.9	lb. 53.0	lb. 0.39	lb. 0.38
Age at weaning					
10 weeks	48	8.1	38.8	0.37	0.37
15 weeks	48	7.9	54.2	0.39	0.38
20 weeks	48	7.8	66.2	0.41	0.39
Type of birth					
Singles	72	9.0*	57.0	0.41*	0.40*
Twins	72	6.9	49.1	0.37	0.37
Sex					
Wethers	72	8.3	55.9	0.41*	0.40*
Ewes	72	7.6	50.2	0.37	0.36
Year of rearing					
1956	48	8.1	53.4	0.36*	0.35*
1957	48	8.3	53.7	0.39	0.37
1958	48	7.4	52.0	0.42	0.42

*Significant ($P < 0.05$)

TABLE 3. — ANALYSIS OF VARIANCE PLANS AND MEAN SQUARES FOR AVERAGE DAILY GAINS, MARKET WEIGHT AND DRESSING PERCENTAGE FOR SHROPSHIRE LAMBS

Source of variance	Degrees of freedom	Mean square variance	
		Average daily gain	
		From birth to 140 days of age	From birth to 170 days of age
1. For lamb gains (4 lambs per cell)			
Total	35		
Years	2	0.0411*	0.0701*
Treatments	11	0.0135	0.0127
Weaning age—linear regression component	1	0.0173	0.0098
—quadratic regression component	1	0.0000	0.0006
Type of birth	1	0.0560*	0.0403*
Sex	1	0.0685*	0.0836*
Interactions	7	0.0068	0.0057
Remainder (years x treatments)	22	0.0037	0.0034
2. For carcass characteristics (4 wether lambs per cell)			
Total	17		
Years	2	138.01*	9.48
Treatments	5	38.79	23.11
Weaning age	2	4.50	25.93*
Type of birth	1	181.77*	58.32*
Interaction	2	0.80	2.69
Remainder (years x treatments)	10	18.78	4.17

*Significant ($P < 0.05$)

grazed by cattle when the growth of forage exceeded the needs of the ewes and/or lambs. When all lambs were weaned they received a concentrate mixture made up of 90 parts of oats and 10 parts of linseed oilmeal, by weight, at the rate of one-half pound per lamb daily. Water and iodized-cobaltized salt were supplied *ad libitum* on all fields.

Data Analysis

The data were subjected to analysis of variance according to the methods of Snedecor (12). The data presented are based on the mean of 4 lambs per cell. Tests of significance of the F values with 1 degree of freedom each for the data on birth weight and gains were made according to the sequential F test by Nair (10).

Carcass data of wethers only were used since the numbers of carcasses from ewes for each cell were so variable as to give different weighting effects to the means when included.

Statements with reference to statistical significance are made at the 5 per cent level of probability.

RESULTS AND DISCUSSION

Rate of Gain

The mean birth and weaning weights and main effects of age at weaning, type of birth (singles and twins), sex and year of rearing on the average daily gains of the lambs, from birth to 140 and 170 days of age, are presented in Table 2.

The analyses of variance data are shown in Table 3 with mean squares for gains, market weight and dressing percentage. No significant interactions were obtained for any of the response criteria studied.

There was no significant difference in weight gains, from birth to 140 and 170 days of age, between lambs weaned on grass-white clover pasture at average weights and ages of 39 pounds and 70 days, 54 pounds and 105 days and 66 pounds and 140 days, respectively, as measured by the linear and quadratic regression components (Table 3). These results are in agreement with the studies of Brothers and Whiteman (3) which indicated that lambs on wheat pasture and creep feed may be weaned when they reach both minimum weight and age of 50 pounds and 70 days, respectively, without adversely affecting their subsequent performance. Wardrop *et al.* (13) have also reported little difference in the performance of lambs weaned on immature pasture forage at 7, 10, 13 and 18 weeks of age.

There was no evidence of an adverse effect from early weaning of lambs during the immediate post-weaning period. The lambs weaned at 10 weeks of age made more rapid average gains in the first 2 weeks following weaning than during the remainder of the study, indicating that rumen function was developed sufficiently for the digestion of immature forage.

Age at weaning had no effect on death losses.

Single lambs made faster gains than twins, and wethers made more rapid gains than ewes. These results are in accord with numerous reports on the effects of type of birth and sex on the rate of lamb gains (2, 5, 7 and others).

TABLE 4. — MEAN MARKET WEIGHT, DRESSING PERCENTAGE AND SCORES FOR CARCASSES FROM SHROPSHIRE WETHER LAMBS, WEANED AT 10, 15 AND 20 WEEKS OF AGE (Based on the mean of 4 lambs per cell)

Comparison	No. of lambs	Mean market wt.	Mean dressing percentage	Mean score								
				Conformation	Blockiness	Finish	Fleshing	Leg	Loin	Neck	Shoulder	Commercial grade
<i>All lambs</i>	72	lb. 85.2	43.7	3.3	2.5	3.1	3.4	2.9	3.4	3.2	3.3	2.8
Age at weaning												
10 weeks	24	84.7	42.5*	3.2	2.3	3.0	3.1	2.7	3.2	2.9	3.0	2.7
15 weeks	24	85.4	44.3	3.3	2.6	3.2	3.3	3.1	3.4	3.3	3.5	2.8
20 weeks	24	85.4	44.3	3.5	2.7	3.2	3.6	2.9	3.5	3.4	3.6	2.9
Type of birth												
Singles	36	86.8*	42.8*	3.1	2.3	2.8*	3.1	2.7	3.1	3.1	3.1	2.7
Twins	36	83.6	44.6	3.5	2.7	3.4	3.6	3.1	3.6	3.4	3.6	2.9
Year of rearing												
1956	24	82.5*	43.5	3.1*	2.3	2.7*	3.1*	2.8*	3.1*	2.9	3.3*	2.8
1957	24	85.9	44.4	3.9	2.9	3.7	3.9	3.3	3.9	3.7	3.9	3.0
1958	24	87.1	43.1	3.0	2.3	3.0	3.0	2.7	3.1	3.2	2.8	2.6

*Significant ($P < 0.05$)

The age at weaning had little effect on the relative performance of single and twin lambs. Similar results for early-weaned single and twin lambs were obtained by Lewis *et al.* (9), however, Hinds *et al.** reported slower gains for twins than comparable single lambs weaned in drylot at 6 and 9 weeks of age.

The rate of gain was affected by the year in which the lambs were reared. This is in accordance with the work of Sidwell and Grandstaff (11), Blackwell and Henderson (2) and others, who have reported that the year of rearing lambs is an important source of variation in their body weight.

Carcass Characteristics

A summary of the effects of age at weaning, type of birth and year of rearing on the market weight, dressing percentage and carcass scores for wether lambs is given in Table 4.

Lambs weaned at 10 weeks had a lower dressing percentage than those weaned at 15 and 20 weeks of age. However, age at weaning had no significant effect on carcass scores. These findings are in general agreement with those reported by Baird *et al.* (1), Lewis *et al.* (9) and Wardrop *et al.* (13). However, Wardrop *et al.* (13) also reported that carcasses from early-weaned lambs were markedly inferior to those from late-weaned lambs when grazed on mature pasture forage.

Single lambs were heavier at market and had a lower dressing percentage than twins. The lower dressing percentage for single lambs was associated with a younger average age at slaughter and a significantly lower carcass score for finish, and lower average scores for all other carcass characteristics than those for twin lambs.

Year of rearing affected most of the carcass scores, however, these differences had no statistically significant effect on the scores for commercial carcass grade.

The results from the present experiment indicate that certain advantages from early weaning of lambs on pasture with ample immature forage were realized without adversely affecting the performance or carcass grades.

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REFERENCES

1. Baird, D. M., H. C. McCampbell, W. E. Neville, H. Ciordia, W. E. Bizzell, and O. E. Sell. Milk and forage consumption, growth, carcass characteristics and parasitism of early- vs late-weaned lambs on winter temporary pastures. *J. Animal Sci.* 19:1302. (Abstr.) 1960.

*Hinds, F. C., M. E. Mansfield, and J. M. Lewis, Univ. of Illinois. Early weaning of lambs: A comparison of the performance of lambs weaned at six and nine weeks of age. *Unpublished.*

2. Blackwell, R. L., and C. R. Henderson. Variation in fleece weight, weaning weight and birth weight of sheep under farm conditions. *J. Animal Sci.* 14:831-843. 1955.
3. Brothers, Don G., and J. V. Whiteman. Influence of early weaning on creep-fed milk lambs when weaned on weight or age. *J. Animal Sci.* 19:1217. (Abstr.) 1960.
4. Clarke, E. A. Early weaning of lambs on hill country. *New Zealand J. Agr.* 89: 471-476. 1954.
5. De Baca, R. C., Ralph Bogart, Lyle D. Calvin, and O. M. Nelson. Factors affecting weaning weights of crossbred spring lambs. *J. Animal Sci.* 15:667-678. 1956.
6. Dickson, G. R. The more efficient grazing of ewes and lambs. *J. Brit. Grassland Soc.* 14:172-176. 1959.
7. Harrington, R. B., J. V. Whiteman, and R. D. Morrison. Estimates of some sources of variation in the body weights of crossbred lambs at different ages. *J. Animal Sci.* 17:743-751. 1958.
8. Hinds, F. C., M. E. Mansfield, and J. M. Lewis. Early weaning of lambs: A comparison of the performance of lambs weaned at six and nine weeks of age. *J. Animal Sci.* 19:1306. (Abstr.) 1960.
9. Lewis, J. M., M. E. Mansfield, and F. C. Hinds. Systems of managing ewes and lambs to increase spring lamb production and to control parasites. *J. Animal Sci.* 19:1309. (Abstr.) 1960.
10. Nair, K. R. The studentized form of the extreme mean square test in the analysis of variance. *Biometrika* 35:16-31. 1948.
11. Sidwell, G. M., and J. O. Grandstaff. Size of lambs at weaning as a permanent characteristic of Navajo ewes. *J. Animal Sci.* 8:373-380. 1949.
12. Snedecor, G. W. *Statistical methods.* 5th ed. Iowa State Press, Ames, Iowa. 1956.
13. Wardrop, I. D., D. E. Tribe, and J. B. Coombe. An experimental study of the early weaning of lambs. *J. Agr. Sci.* 55:133-136. 1960.