

THE RAM MOUNTAIN ORPHAN LAMB EXPERIMENT

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Abstract:

During the hunting seasons of 1972-74 a total of 18 bighorn lambs were selectively orphaned. Their survival rates were not significantly different from non-orphans. However in some cases their growth rates were significantly less than non-orphans. The implications of orphaning are discussed on the basis of data from several "ewe" seasons in Alberta.

The following is a preliminary report on the orphan lamb experiment on Ram Mountain in Alberta and is approximately 2 years from completion. Some trends are becoming apparent, but sample sizes are not sufficient for conclusive statements. However, I have taken the liberty to make some speculative statements toward the end of this presentation for purposes of discussion.

In 1966 Alberta was able to capitalize on the bighorn die-off in British Columbia by introducing a long advocated permit season on "ewes". Our first two "ewe" seasons allowed the harvesting of any bighorn with horns less than 12 inches in length. In 1967 it became apparent that hunters were starting to select yearling rams. That year, yearling rams comprised over 20 percent of the kill.

In 1968 the "ewe" season regulations were changed to legalize the shooting of ewes and lambs only. Over the years an average of one permittee in three has been successful in harvesting a ewe or non-trophy sheep. Approximately 300 permittees harvest about 100 non-trophy sheep per year. This annual harvest rate is less than 3 percent of the total estimated population of 4,500 Alberta bighorns outside our National Parks. Since 1966 approximately 1,000 non-trophy sheep have been harvested by approximately 3,000 permit hunters.

The age composition of the non-trophy sheep harvested since 1968 appears in Table 1. Nearly 40 percent of the harvest are less than 3 years of age. The percentage of lambs, yearlings, and 2-year old ewes is in reverse to their normal occurrence in nature. There appears to be hunter selection against lambs, less selection against yearlings, and a heavy selection for 2-year ewes compared to 3-year ewes. In general, the aging data suggest that hunters are selecting against ewes with lambs.

In 1971 the Ram Mountain study was initiated and designed to select

Table 1. Age composition of harvested non-trophy sheep, 1966-74.*

Lambs	1½	2½	3½	Adults	Total
24	45	51	32	116	318
8%	14%	16%	10%	52%	
38% < 3 years			62% > 3 years		

* Age determined by jaw analysis

Table 2. Adult ewes and lambs on Ram Mountain 1971-75.

Year	Adult ewes > 3 years	Lambs	Percent ewes & lambs	Estimated population
1971	33	24	73	96
1972	38	24	63	115
1973	32	25	78	104
1974	36	15	42	106
1975	28	20	71	100
		Average	65%	+ 104

ewes with lambs to test the impact of orphaning on lamb development and survival. Ram Mountain is an outlying isolated mountain range in central Alberta described in Johnson (1975) that supports approximately 100 head of sheep (Table 2).

A trapping and marking program was started in 1971 and as of this date approximately 85 percent of the herd are marked. Several ewes and lambs were marked and matched (Table 3) and as of last fall 26 adult ewes had been collected. Orphan lamb survival is indicated in Table 4. A Chi square test of survival to the age of 1 year indicates that there is no significant difference between orphans and non-orphans (Table 5). However, early in the study there appeared to be evidence that some orphans were becoming stunted by the age of 1 year. Stunting was most apparent in young rams. Differences in horn sizes were most apparent in rams (Fig. 1 and 2) and to some extent in weights of yearling rams (Fig. 3) but not in weights of yearling ewes (Fig. 4).

Using a t test of a single observation versus a sample measured during the same time period, it was found that horn lengths of orphans were significantly smaller than non-orphans in three of five cases for yearlings, three of four cases when 2 years old, and one of two cases when 3 years old. Horn bases of rams were significantly smaller than non-orphans in one of five cases for yearlings, two of four cases when 2 years old, and one of two cases when 3 years old. Live weights of orphan rams were significantly smaller than non-orphans in one of three cases for yearlings, not in the one case when 2 years old, and one of two cases when 3 years old.

Live weights of orphan ewes did not differ significantly from live weights of non-orphans except in one case when a 2-year old orphan ewe was significantly heavier than the mean weight of three non-orphan ewes measured in the same time period. In summary, three of the four male orphans measured were stunted, and none of the four female orphans measured was stunted.

By applying the foregoing information on provincial harvest rates, Ram Mountain age structure and survival, and rates of stunting to a population of 1,000 ewes and lambs (Table 6) it was found that a 10 percent harvest in year one could result in 4 percent of the yearlings being stunted in year two. Based on an estimate of an annual population of approximately 3,000 ewes and lambs in Alberta in any one year it may be reasonable to expect that our annual harvest of 100 ewes is resulting in 8 out of approximately 600 yearlings being stunted the following year, i.e., about 1 percent. However, if our harvest rate is increased to 10 percent of the ewes and lambs, the present data predict that 4 percent of the lambs surviving to yearlings will be stunted, and if only rams are affected then 8 percent of the yearling ram population will be affected each year.

In conclusion, I believe when the study is completed there will be a significant difference in survival between orphans and non-orphans (a reduced survival factor will have to be used when calculating a population control program). I also believe there will be no significant difference in the stunting affect on males and females, i.e., both sexes will be

Table 3. Numbers of marked ewes and lambs that were matched and number of ewes collected.

	Ewes and lambs marked and matched	No. of ewes collected
1972	9	6
1973	12	5
1974	9	7
1975	13	<u>8</u>
		26

Table 4. Ram Mountain lamb survival to 3 years (orphans in brackets) 1972-75.

	Lambs	Yearlings	2 years	3 years
1972	24(6)			
1973	25(5)	14(4)		
1974	15(7)	18(3)	13(3)	
1975	20(8)	11(3)	14(2)	9(3)

Table 5. Chi square test on survival to 1 year.

	Non-orphan		Orphan		Total
	O	E	O	E	
Lived	33	31	10	12	43
Died	13	15	8	6	21
Total	46		18		64

$\chi^2 + 1.395$ Not significant at $P .10$

O is observed E is expected

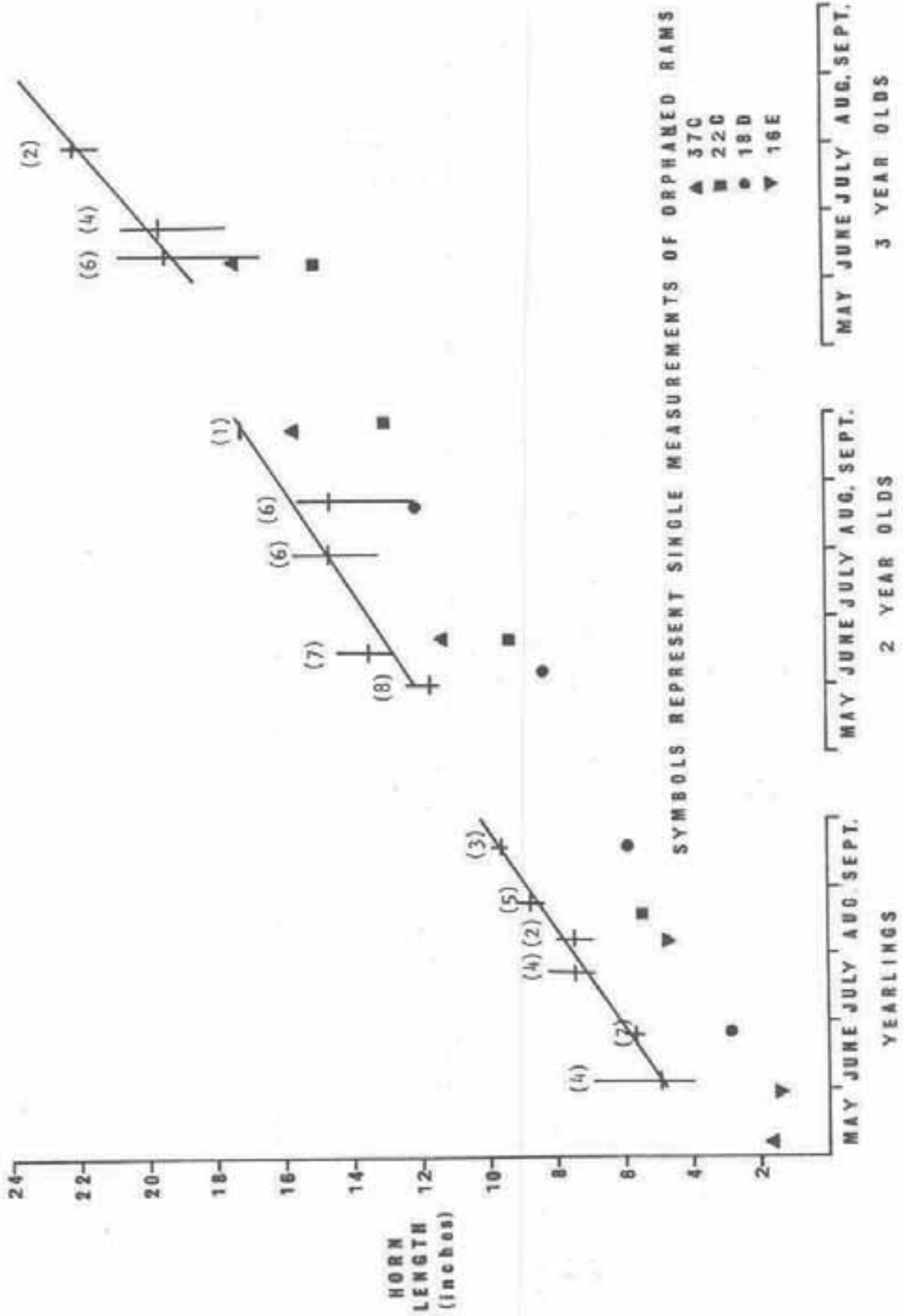


Fig. 1. Horn length measurements of bighorn rams at Ram Mtn., Alberta (1971-75). Vertical lines, horizontal lines, and parenthesized values represent range, means and numbers of non-orphaned sheep respectively (prepared by Kirby Smith).

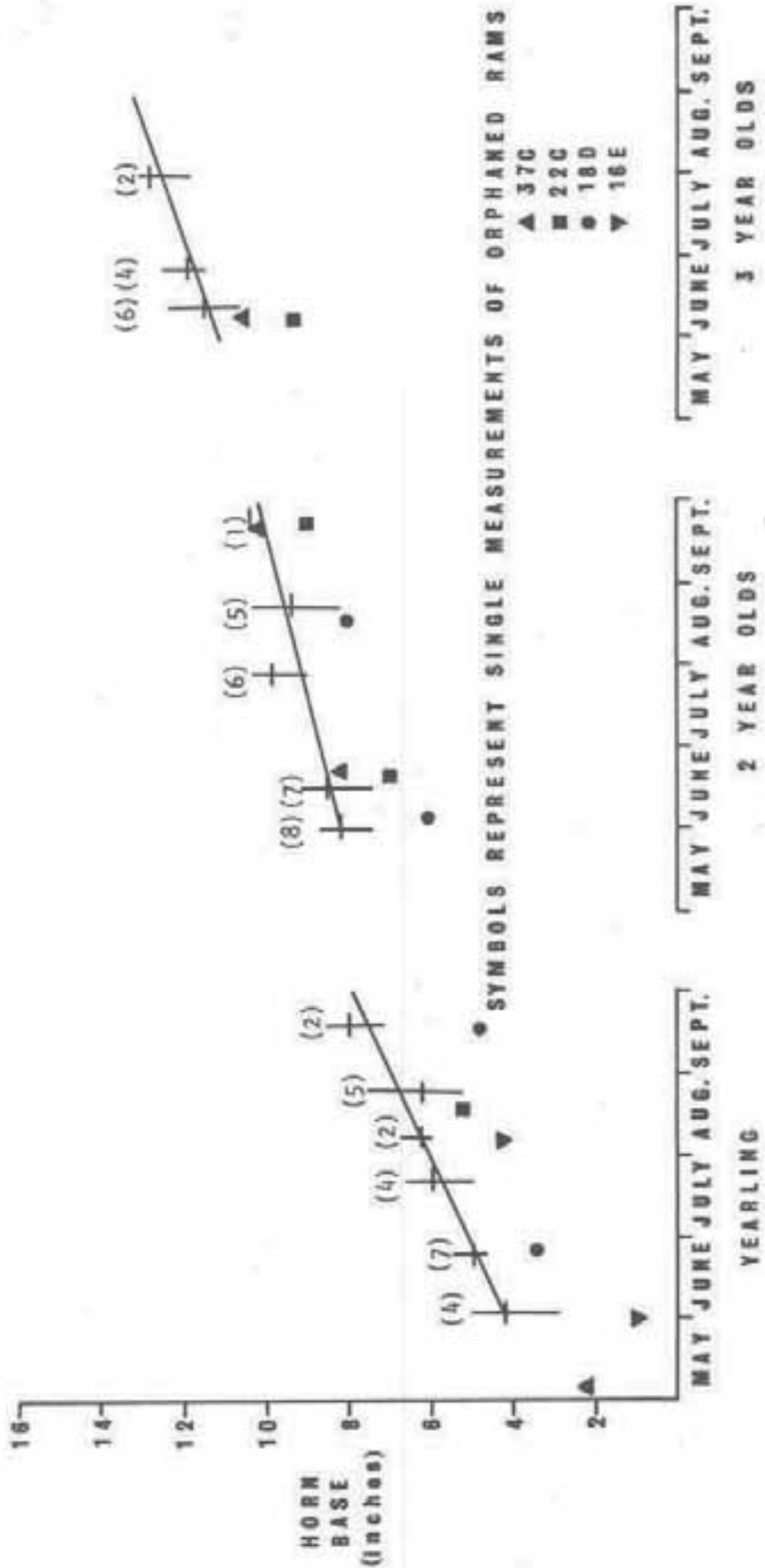


Fig. 2. Horn base measurements of bighorn rams at Ram Mtn., Alberta. Vertical lines, horizontal lines, and parenthesized values represent range, means and numbers of non-orphaned sheep respectively (prepared by Kirby Smith).

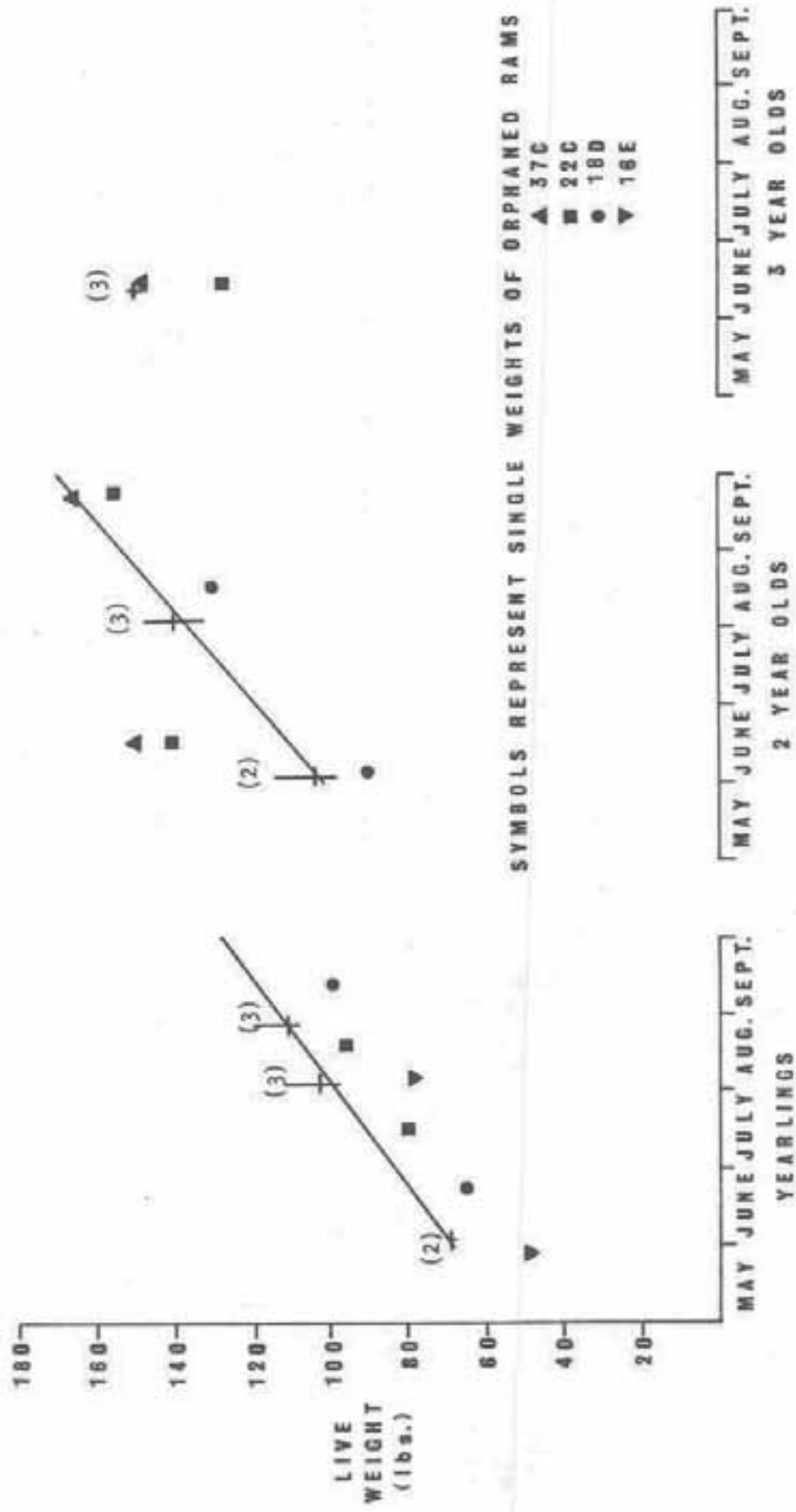


Fig. 3. Live weights of bighorn rams at Ram Mtn., Alberta. Vertical lines, horizontal lines, and parenthesized values represent range, means and numbers of non-orphaned sheep respectively (prepared by Kirby Smith).

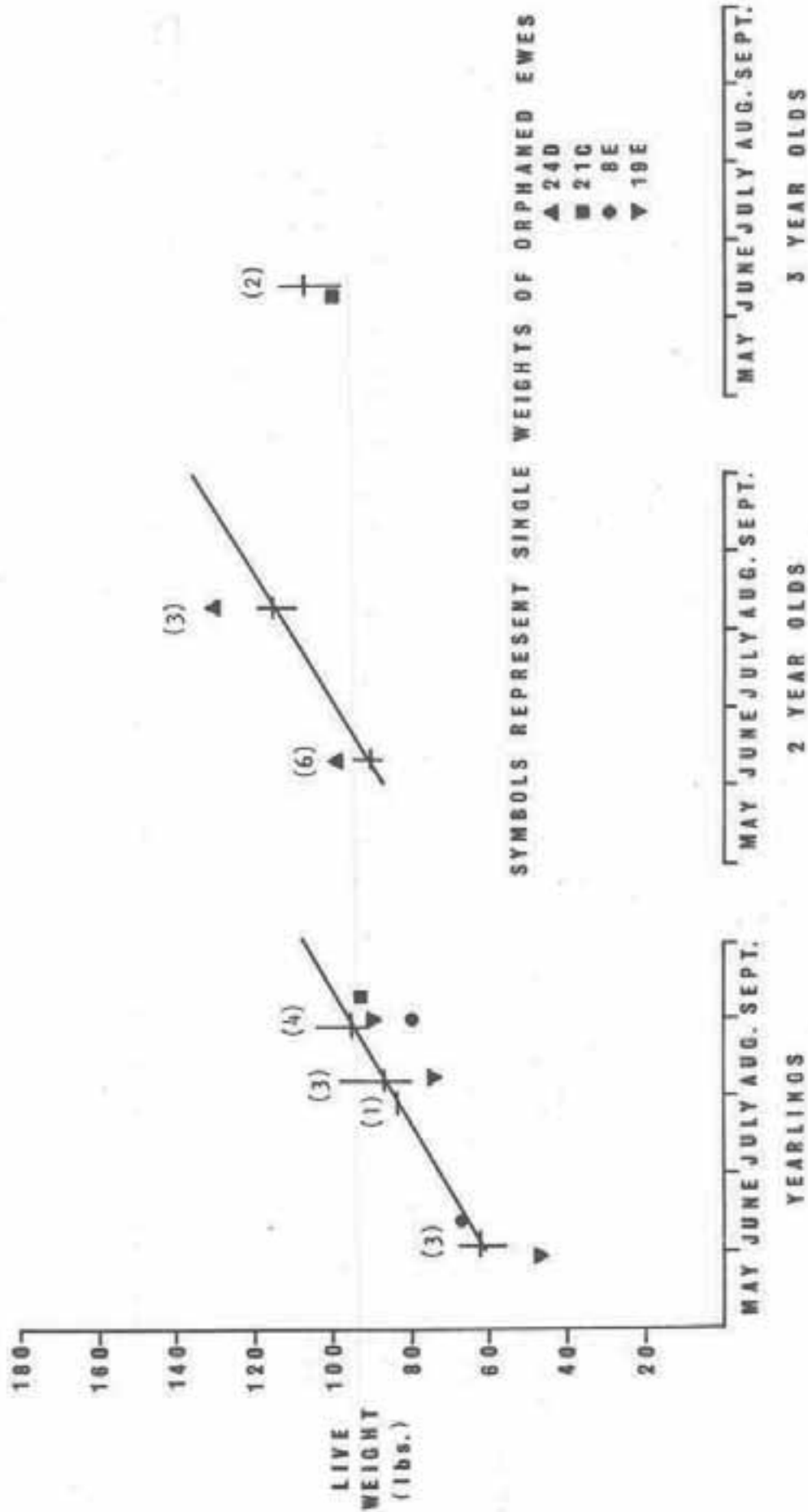


Fig. 4. Live weights of bighorn ewes at Ram Mtn., Alberta. Vertical lines, horizontal lines, and parenthesized values represent range, means and numbers of non-orphaned sheep respectively (prepared by Kirby Smith).

TABLE 6. IMPACT OF A 10% EWE HARVEST ON 1000 EWES AND LAMBS

Year	Age	No. ¹	Harvest ²
ONE	Lambs (M&F)	312	8 = 304
	Yrlg. (F)	108	14
	2 Yr. (F)	100	16
	Adult (F)	$\frac{480}{1000}$	$\frac{62 \times 0.65 = 40 \text{ Orphans}}{100} \times \frac{264 \text{ Normal}}{0.71 \text{ survival}}^3$ add
			$\frac{22 \text{ Yrlgs.}}{0.37 \text{ Stunting}} \times 187 \text{ Yrlgs.}$
			8 stunted Yrlgs. 201 Normal Yrlgs.

NET RESULT: 10% ewe harvest in year ONE = 4% yrlgs. stunted in year TWO

- 1 Ram Mtn. age structure
- 2 Average age composition of annual kill
- 3 See table 4

affected similarly. Finally, I don't believe that even up to 4 percent of a yearling population being affected by stunting is consequential when bighorn managers are regulating population numbers on critical winter ranges.

Literature Cited

Johnson, J. D. 1975. An evaluation of bighorn sheep range on Ram Mountain, Alberta. Prog. Rept. Alberta Fish and Wildlife. Edmonton. 53pp.