



Biology of the elk calf, *Cervus Canadensis Nelsoni*
by Donald E Johnson

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Montana State University
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Abstract:

A study of elk calves was conducted in southern Gallatin County, Montana, and northwestern Yellowstone National Park in 1949 and 1950.

A general physical description of the calving grounds with reference to location, vegetation, topography and climate is given with a list of the associated mammals. The calves were found by covering the calving grounds on horseback. Weights, standard measurements and other biological data were obtained. One hundred thirty-two calves were tagged with numbered metal stock ear tags and colored plastic markers composed of a large outer symbol alone or combined with a smaller inner symbol of contrasting color. Combinations of shapes, colors, sizes and ear to which it was attached identified the individual and drainage where tagged. Following the calving period observations were made on the marked calves.

The range and peak of the calving period were May 21 to June 12 and June 9, respectively. Sagebrush types contained 77 per cent of the calves, timber 11 per cent and "edge" 4.5 per cent. Calves found in open types averaged 73±7 yards from timber, while those in timber averaged 10.0 yards from open areas, illustrating the importance of "edge effect". According to age classes, determined by physical characteristics, average weights of calves were: newborn-1 day, 32.5; 2-4 days, 36.08; 5-7, 44.71; and 8-over, 53.18 pounds. Average standard measurements for the same age classes were: 38.31-2.05-15.46-4.38; 39.98-2.23-15.7-4.42; 42.36-2.24-16.2-4.7; and 44.32-2.29-16.61-4.77 inches. Weights of male calves exceeded that of females, for the above age classes as follows: it. it I, .22\$ 2.62 and .3it pounds, respectively. The sex ratio for 155 calves was 96 males : 100 females. Descriptions of coloration, glands, odor, reactions and voice are discussed. Average daily weight and measurement increases for 16 wild calves were 2.0 pounds and .69-.01-.10-.03 inches respectively, for the "first two" weeks. " Average daily gain" for " 1 captive" calf was 1.0" pound with "measurement" increases of .21-.01-.05-.01" inches "per" day over a " 31" day "period: " Certain activities such as walking, swimming, nursing, grazing, etc. are discussed. The average monthly distance that marked calves were observed from the calving grounds illustrated the general pattern of elk migration in the Gallatin drainage. Observations of 1949 markers (celluloid) showed 4 negative results in 8 late observations, while the 1950 marker (plastic) showed no completely negative results for the same number of observations, although 2 markers were damaged. Predation observations were limited to 2 suspected bear attacks on calves during the study but 2 1948 bear kills are reported. Insects appeared to be a major nuisance factor in the summer. Hunter kills during the fall represented the greatest mortality factor. The average annual calf harvest for 10 years was 91 animals.

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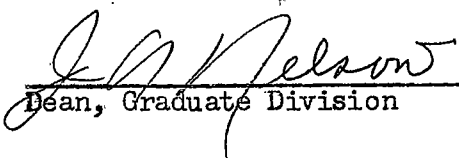
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ABSTRACT

A study of elk calves was conducted in southern Gallatin County, Montana, and northwestern Yellowstone National Park in 1949 and 1950. A general physical description of the calving grounds with reference to location, vegetation, topography and climate is given with a list of the associated mammals. The calves were found by covering the calving grounds on horseback. Weights, standard measurements and other biological data were obtained. One hundred thirty-two calves were tagged with numbered metal stock ear tags and colored plastic markers composed of a large outer symbol alone or combined with a smaller inner symbol of contrasting color. Combinations of shapes, colors, sizes and ear to which it was attached identified the individual and drainage where tagged. Following the calving period observations were made on the marked calves.

The range and peak of the calving period were May 21 to June 12 and June 1, respectively. Sagebrush types contained 77 per cent of the calves, timber 11 per cent and "edge" 4.5 per cent. Calves found in open types averaged 73.7 yards from timber, while those in timber averaged 10.0 yards from open areas, illustrating the importance of "edge effect". According to age classes, determined by physical characteristics, average weights of calves were: newborn-1 day, 32.5; 2-4 days, 36.08; 5-7, 44.71; and 8-over, 53.18 pounds. Average standard measurements for the same age classes were: 38.31-2.05-15.46-4.38; 39.98-2.23-15.7-4.42; 42.36-2.24-16.2-4.7; and 44.32-2.29-16.61-4.77 inches. Weights of male calves exceeded that of females, for the above age classes as follows: 4.41, .22, 2.62 and .34 pounds, respectively. The sex ratio for 155 calves was 96 males : 100 females. Descriptions of coloration, glands, odor, reactions and voice are discussed. Average daily weight and measurement increases for 16 wild calves were 2.0 pounds and .69-.01-.10-.03 inches, respectively, for the first two weeks. Average daily gain for 1 captive calf was 1.0 pound with measurement increases of .21-.01-.05-.01 inches per day over a 31 day period. Certain activities such as walking, swimming, nursing, grazing, etc. are discussed. The average monthly distance that marked calves were observed from the calving grounds illustrated the general pattern of elk migration in the Gallatin drainage. Observations of 1949 markers (celluloid) showed 4 negative results in 8 late observations, while the 1950 marker (plastic) showed no completely negative results for the same number of observations, although 2 markers were damaged. Predation observations were limited to 2 suspected bear attacks on calves during the study but 2 1948 bear kills are reported. Insects appeared to be a major nuisance factor in the summer. Hunter kills during the fall represented the greatest mortality factor. The average annual calf harvest for 10 years was 91 animals.

INTRODUCTION

Although considerable data concerning elk have been published, very little quantitative information pertaining to the individual calf is available. Rush (1932), Young and Robinette (1939), Schwartz and Mitchell (1945) and others have contributed much to our knowledge. The present paper attempts to supplement the available information particularly with reference to elk calves.

The Gallatin elk herd, which ranges in the upper West Gallatin river drainage of southwestern Montana and northwestern Yellowstone National Park, provided an excellent opportunity for concentrated study. It is one of the more important herds in the United States. The average winter count for the period 1939 through 1949 was 1,700 while the average annual harvest over the same period was 550 (Angstman and Gaab, 1950). These elk are roughly divided into two groups, migratory and resident. The migratory animals, comprising the larger segment of the population, summer in the high "back" country of Yellowstone Park at elevations up to 10,000 feet. They winter along the northwestern park boundary at an elevation of approximately 7,000 feet, and within the Gallatin National Forest at elevations between 6,500 and 7,500 feet. The resident animals are distributed within the Gallatin Forest and apparently do not take part in the extensive seasonal movements.

During the summer of 1949 and 1950 a study was made of the calves, particularly those of the migratory herd.

Thanks are extended to the Montana Fish and Game Department for permission to conduct the study, for financial support and equipment. Other members of the department, to whom acknowledgements are due, are: J. E. Gaab, R. L. Hodder, V. E. Sylvester, J. B. Angstman, and A. R. Brazda for aid in the field. The writer further extends his grateful appreciation to Dr. Don C. Quimby, Montana State College, who directed the study.

METHODS

To satisfactorily study the calves in the field a suitable marking technique for recognition of individuals is desirable. A review of the literature on animal marking (summarized by Manville, 1949) failed to reveal a liquid marking material which would be suitable for the study. An attempt was made to find such a material. Forty Hereford steers were experimentally marked with commercial house, auto and sheep branding paints, aniline dyes, inks and various bleaches. None exhibited all of the desired properties; color fastness, retention to the hair, ease of application and visibility.

Marking mammals and birds with plastic symbols has been recorded by Trippensee (1941) and Hosley (1942). Following their principles, colored plastic ear markers attached by livestock ear tags were used. (Howitt Plastics Company, Portland, Oregon supplied the material.) The color of the symbols indicated the year the animal was tagged; red and white for 1949 and blue and yellow for 1950. Manipulation of colors and shapes provided 48 combinations. Two inch squares, circles,

half circles or triangles either plain or with 1 inch inner symbols of the same shapes cemented by acetone were used (Fig. 1). Each symbol, when duplicated for attachment to the opposite ear, doubled the total number of possibilities. The shape of the outer symbol indicated the drainage where a calf was tagged while the inner symbol identified the individual animal, except when certain large symbols alone identified both individual and drainage (Fig. 1).

Locating the recently born calves was accomplished by searching the sagebrush slopes and timber edges during May and June (Fig. 2) on horseback and at the same time observing unusual actions of singles or small groups of females which occasionally indicated the presence of calves in the vicinity. By blowing across a blade of grass held taut between the thumbs and heels of the hands a tone, similar to the call of a calf, was created. This tone appeared to excite the female elk and many times their suspicious actions disclosed the location of their calves.

When located, the calves were tagged in both ears; one with a numbered metal stock tag only, the other with a numbered metal stock tag to which a plastic marker was attached (Fig. 3). Weights with a steelyard or spring scales (Figs. 4 and 5), standard measurements with a steel tape, dental observations and notes concerning physical characteristics were obtained.

Following the calving period, additional data were collected by observing the marked calves through 6 and 8 power binoculars and a

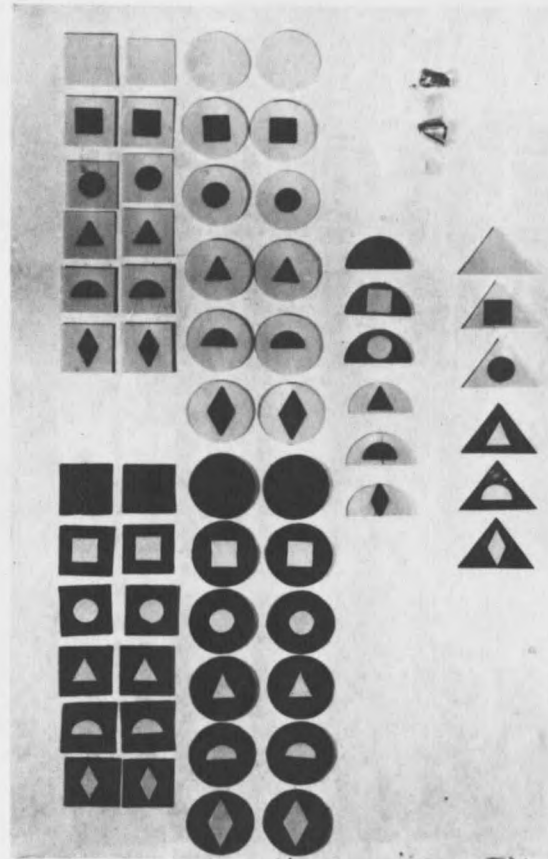


Fig. 1. Plastic ear markers showing all combination arrangements for two drainages (squares and circles). Total number of possibilities for half circles and triangles not shown. Two numbered metal stock ear tags are shown in upper right hand corner.



Fig. 2. Riders searching for calves in a sagebrush type on the calving ground, showing approximate interval used.



Fig. 3. An ear marker attached to an elk calf (note metal stock tag on opposite ear).



Fig. 4. Weighing a calf using a steelyard.



Fig. 5. Weighing a calf using a spring scale.

20 power spotting scope. To make these observations, it was necessary to follow the migrating herds to their summer range. This was accomplished with saddle horses and a pack outfit.

Some supplementary information was secured by observing a captive calf.

GENERAL DESCRIPTION OF CALVING AREA

The major part of this calving area is drained by a 19 mile segment of the West Gallatin River and 6 of its tributaries (Taylor Fork, Tepee Creek, Daly Creek, Sawmill Gulch, Lodgepole Gulch, and Fan Creek). The area is characterized by broad open slopes with open timber stands (Fig. 6). Big sagebrush (Artemisia tridentata) is the dominant plant in the open areas while Lodgepole Pine (Pinus contorta) is the dominant timber species. The timber stands, which often become very dense on north exposures, may be made up of mixtures of Douglas Fir (Pseudotsuga taxifolia), Quaking Aspen (Populus tremuloides), Engelmann Spruce (Picea engelmanni) and Lodgepole Pine. Other plants found in the calving area are as follows: grasses and sedges - Festuca idahohensis, Stipa spp., Koeleria cristata, Carex spp., Bromus carinatus, Agropyron smithii, A. spicatum, Calamagrostis rubescens, Elymus condensatus; shrubs - Artemisia cana, Dasiphora fruticosa, Chrysothamnus spp., Gutierrezia spp., Arctostaphylos uva-ursi, Salix spp.; forbs - Lupinus spp., Phlox spp., Antennaria spp., Aster spp., Achillea lanulosa, Potentilla spp., Eriogonum spp., Fragaria spp., Erythronium spp., Dodecatheon pauciflorum, Erigeron spp.



Fig. 6. A portion of the Gallatin calving grounds showing sagebrush slopes and open timber stands (mainly Lodgepole Pine).

Elevations within this area range from approximately 6,700 feet to 10,000 feet. Maximum calving elevations found during this study, however, did not exceed 9,000 feet, with the bulk of the calves found between approximately 7,000 feet and 7,400 feet.

Temperature and precipitation records were kept during the two calving periods included in this study. These records compiled on a weekly basis will be found in Table I.

Associated with this calving area are various mammals of which elk, moose, mule deer, coyote and black and grizzly bear can be included as major influents. In addition, porcupine, woodchuck, golden-mantled and armatus ground squirrels, chipmunk, red squirrel, beaver, muskrat, badger, pika, and snowshoe hare are encountered. On one occasion two buffalo were observed.

CALVING

Calving Period

By estimating the age of the calves when found, using physical characteristics (Table II), calculated birth dates were determined and the calving period delimited. Extremes were May 21 and June 12 with the peak of births for the two years occurring June 1 (Fig. 7). In northern Idaho, a June 1 peak was also reported (Rust, 1946). Rush (1932) found extremes on the northern Yellowstone herd of May 13 and June 10, while Schwartz and Mitchell's (1945) were May 14 and July 10, during their Olympic Peninsula study.

Table I

Average Weekly Temperature and Precipitation Record
During the Calving Period

Week of	Temperature (°F.)			Precipitation (inches)		
	High	Low	Mean	Rain	Snow	Total Ppt.
1949						
May 15-21	55	34	44.5 ^a	No record		
22-28	60	36	48	.12	T	.12 ^d
29-June 4	53	38	45.5	.70	T	.70
5-11	66	38	52	.28		.28
12-18	65	38	51.5	.89		.89
1950						
May 15-21	64	26	45 ^a	.41	.14	.55
22-28	57	28	42.5	.34		.34
29-June 4	55	30	42.5 ^b	.22	T	.22
5-11	62	35	48.5 ^b	.60	T	.60
12-18	67	30	48.5 ^c	.72		.72

^a for 6 days
^b " 4 days
^c " 2 days
^d " 1 day

