

Supplemental Winter Feeding

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Farmed wapiti are managed rather intensively for economical reasons (Renecker and Kozak 1987). Supplemental feeding is practiced to habituate and control stock, increase carrying capacity, and complement pasture forage. Taming is facilitated by the reinforcement of controlled daily feeding. Higher stocking rates can be maintained by changing the physical form or chemical composition of the feed. Concentrates may be offered where winter pasture is available but of low quality, whereas sun-cured forage may prove more practical when animals are simply maintained through lean periods (Kozak 1988, Cheeke 1991). This study was conducted to evaluate the physical form of supplemental feed on the performance, natural foraging behavior, and economics of winter feeding of wapiti on game farms.

Methods

Study Site

The study was conducted at the Ministik Wildlife Research Station located approximately 50 km SE of Edmonton, Alberta, Canada. The station is located in the Cooking Lake moraine within the southern fringe of the aspen-dominated boreal forest zone (Rowe 1972) and is comprised of approximately a 265 ha area surrounded by a 2 m high game-proof fence. The station is divided into a game ranch portion containing 194 ha and a game farm portion containing 65 ha.

Table 1. Formulation of the alfalfa/barley pellet used to supplement wapiti hinds at the Ministik Wildlife Research Station, Alberta, Canada.

Ingredient	Dry Matter Composition
	(%)
Dehydrated Alfalfa	26
Barley	31
Wheat Shorts	14
Beet Pulp	16
Soybean Meal	9
Molasses	4
Trace Min. Salt	<1
Vitamin A D E	<1
Permapellet	<1

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Wapiti grazing on native range without supplementation during winter at the Ministik Wildlife Research Station, Alberta, Canada.

Treatments

From November 1, 1984 to May 1, 1985, four wapiti cows were pastured on 194 ha of native aspen-parkland range without supplementation. Eight others were pastured on 65 ha and offered alfalfa/barley pellets (Table 1) free choice. From December 1, 1985 to May 1, 1986, six cows and two calves grazed 32 ha of native pasture and were supplemented free choice with grass/alfalfa hay. Seven cows and two calves were allowed to graze a similar pasture and



Wapiti being weighed during winter at the Ministik Wildlife Research Station, Alberta, Canada.

were supplemented free choice with an alfalfa/barley pellet. Seven cows and two calves were pastured on 194 ha of native pasture supplement. All animals were given access to trace mineral salt blocks. Animals were randomly placed in groups according to age and body size.

Measurements

Animals were weighed by-weekly. Supplemental feed was withheld for a period of 2 to 4 days prior to weighing to entice the animals into corrals, but forage and water were not restricted.

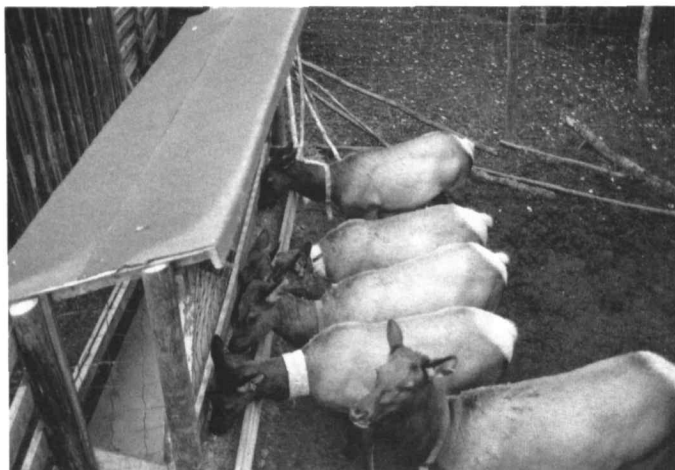
Daily feed consumption (kg/head/day) was calculated from average monthly feed consumption and the number of animals in each group corrected for the days feed was withheld. Feed was offered in specially constructed feed banks which minimized wastage. Random samples of each feed-stuff were collected monthly and analyzed for gross energy, protein, neutral detergent fiber, acid detergent fiber, and lignin (Goering and Van Soest 1970) (Table 2). Digestible dry matter was estimated using the in situ nylon-bag technique and a ruminally-fistulated adult female wapiti maintained on tame grass pasture (Hawley et al. 1981, Fargey and Hawley 1989).

Table 2. Chemical composition of feeds (dry matter basis) used to supplement wapiti hinds at the Ministik Wildlife Research Station, Alberta, Canada.

Item	Alfalfa/Barley Pellet	Alfalfa/Grass Hay
	X	X
Dry Matter (%)	87 ^a	85
Protein (%)	17 ^a	9
Gross Energy (kJ/g)	18	18
Digestibility Energy (kJ/g) ^b	15 ^a	13
Neutral Detergent Fiber (%)	32 ^a	57
Acid Detergent Fiber (%)	16 ^a	32
Lignin (%)	3 ^a	4

^aSignificant difference ($P > 0.05$) between means.

^bEstimated using in situ nylon-bag technique.



Wapiti supplemented with alfalfa/barley pellets during winter at the Ministik Wildlife Research Station, Alberta, Canada.

During January, February, and March 1986, dawn-to-dusk (10-hr) behavior scans were conducted on cows (accompanied by calves) in the alfalfa/grass hay- and pellet-supplemented groups. Time spent in behavioral activities was determined by instantaneous scan sampling by a close-observer at 10 min. intervals (Jacobsen and Wiggins 1982). Behavioral categories included: *feeding* (supplemental feed only), *browsing/grazing* (native pasture), *active* (non feeding), and *inactive*.

Results and Discussion

Voluntary intake declined from November to April (Fig. 1). Intake of hay was approximately 1 kg/head/day lower than

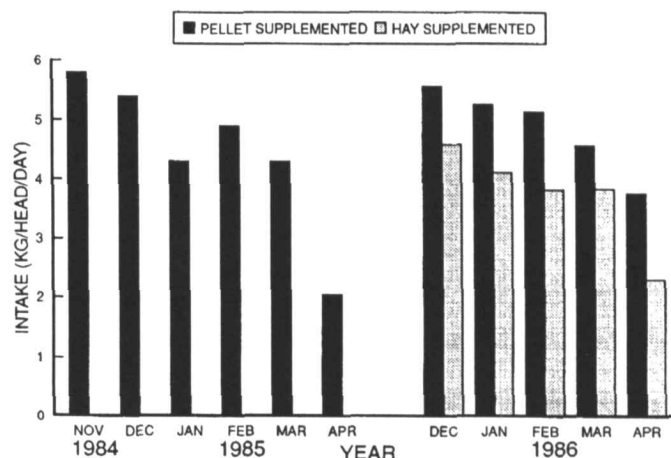


Fig. 1. Estimated daily voluntary intake (kg/head) of supplemental feed by wapiti hinds on 2 different rations during the winters of 1984-85 and 1985-86 at the Ministik Wildlife Research Station, Alberta, Canada.

that of the pellets in all months. The lower intake of pellets in 1984-85 compared to 1985-86 is unexplained since higher intakes might be expected under more harsh conditions. Higher intakes by the pellet- in comparison to the alfalfa/grass hay-supplemented group may be attributed to the greater density and faster rate of passage of the diet. Feeding pelleted alfalfa to penned wapiti has been observed to result in a 22% greater intake, 91% faster rate of passage, and 12% lower digestibility than if long alfalfa is fed (Thorne and Butler 1976).

During the harsh winter of 1984-1985, the monthly weights between the supplemented and pellet-supplemented groups were significantly different (Fig. 2). Unsupplemented animals underwent rapid weight loss (11% of the peak November weight) until February when they were given controlled quantities of supplement until spring green-up. The pellet-supplemented group gained weight until March. In the milder winter of 1985-86, there was no difference in weights between the pellet- and alfalfa/grass hay-fed groups (Fig. 2). Unsupplemented animals

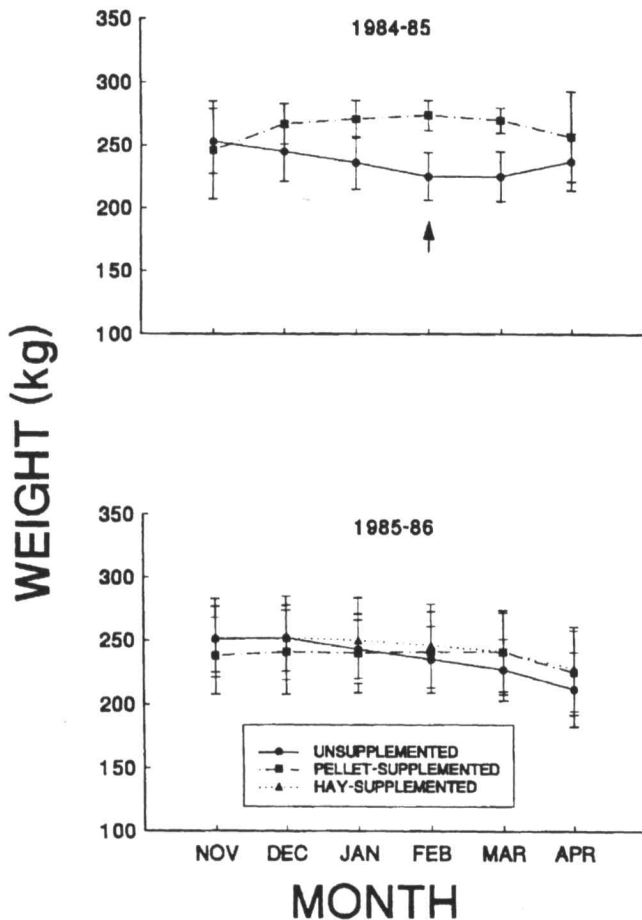


Fig. 2. Mean $\pm$ SD monthly winter body weights of unsupplemented, alfalfa/hay-, and pellet-supplemented wapiti hinds during the winters of 1984-85 and 1985-86 at the Ministik Wildlife Research Station, Alberta, Canada. The symbol $\uparrow$ indicates when the unsupplemented group was taken off of pasture and supplemented with alfalfa/grass hay.

lost 16% of their peak December weight, followed by the hay group (9% of their peak December weight), and the pellet-supplemented group (6% of their peak December weight).

Overwinter weight loss of up to 30% is common in wild populations of red deer (Mitchell 1972; Moore and Brown 1977). Free-ranging white-tailed deer lost 16-20% of their weight during winter while supplemented does lost 8% weight during this period (Ozoga and Verme 1982). High arctic wild reindeer on Svalbard Island lost up to 29% body weight overwinter (Tyler 1987). In the present study, pellet-supplemented wapiti hinds gained weight during winter which is what Dean et al. (1976) observed for wapiti in Wyoming.

A significant difference was found in the foraging patterns between wapiti that were fed the pellet supplement and those offered only alfalfa/grass hay. Alfalfa/grass hay-fed animals spent more time eating their supplement, little time foraging, and in February, more time resting (Fig. 3). Wapiti

supplemented with a pellet diet spent from 15% to 39% of their daytime activity foraging on native vegetation compared to the hay-supplemented wapiti which did not spend any time foraging on native range.

Thorne and Butler (1976) found that free-ranging wapiti fed pelleted alfalfa spend much more time foraging on native vegetation than do wapiti fed baled or cubed alfalfa. The overall higher levels of foraging exhibited by pellet-fed wapiti in our study may be a result of fiber deficiencies, either total fiber or fiber length, since protein and energy were not limiting in the diet. This was demonstrated by the maintenance of over-winter weight by the pellet-fed group. The lack of grazing/browsing behavior by the alfalfa/grass hay-fed group indicates the supplement met the dietary requirements. The pellet-fed wapiti possibly increased the fiber component of their diet through browsing and grazing.

Perinatal calf mortality and an abortion were both observed in this study (Kozak 1988). Chances for calf survival fall below 50% when birth weight is below 11.4 kg (Throne et al. 1976). It is possible that the abortion was a

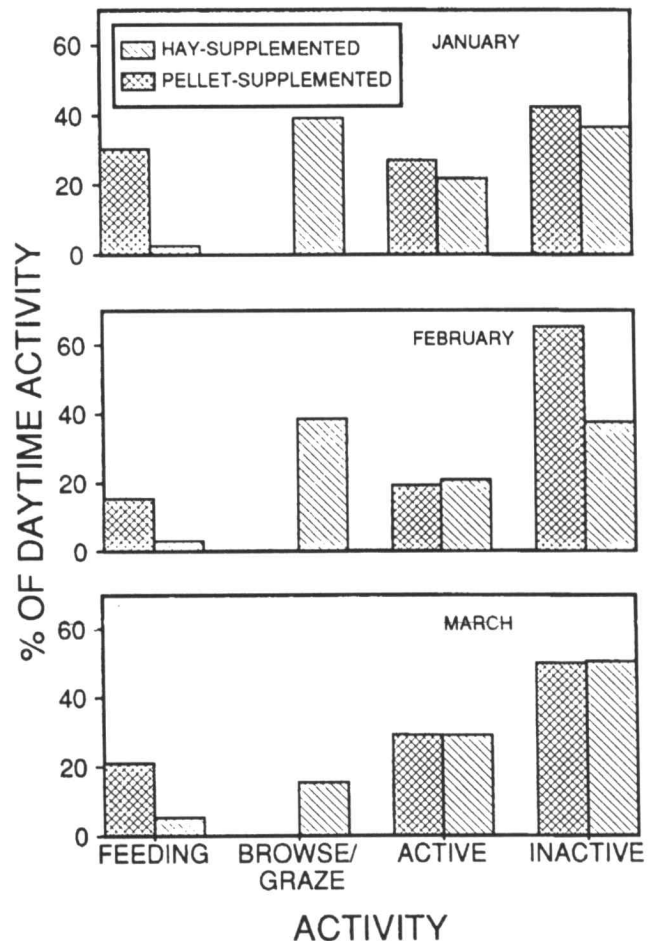


Fig. 3. Percent daytime winter activity of alfalfa/grass hay- and pellet-supplemented wapiti hinds from January-March, 1986, at the Ministik Wildlife Research Station, Alberta, Canada.

result of a loss in body condition, because the un-supplemented group underwent weight losses of 11% by February.

A major consideration of any winter feeding program is cost. The cost of pellets was approximately 2.5 times more than long alfalfa/grass hay, the pellet group cost US \$0.70 hd/day to feed in comparison to US \$0.23 hd/day for the alfalfa/grass hay group over the January to March period. Thorne and Butler (1976) calculated that pelleted alfalfa cost 21% more per tonne than baled long alfalfa, but about 15% less was required for maintenance of body weight (due to wastage of baled alfalfa on the feeding grounds). Pelleting alfalfa did not provide an economic advantage. In the present study, feed was supplied free choice and resulted in higher feed costs by feeding the pellet diet due to its higher consumption. In addition, practical nutritional management of over-wintering wapiti hinds recognizes the need for animals to lose some weight in order to avoid possible calving difficulty the subsequent spring (Fennessy et al. 1991; Fennessy and Milligan 1987). Of course, allowable weight loss always depends on peak autumn weight (condition) of the pregnant cow.

Conclusions

Concentrate diets which are low in fiber content can be used to increase the utilization of winter pasture. Conversely, a bulk diet which is high in fiber can reduce grazing pressure. Feeding a supplemental pelleted diet results in a rapid rate of gastrointestinal passage of solids (Uden 1988) which is advantageous in livestock feeding where quick gains are the objective and feed is relatively unlimited. When feeding wapiti for maintenance and successful gestation and parturition at minimal cost, rapid gastrointestinal passage rate and high intake characteristics of pelleted rations may be undesirable. Calving difficulties can occur in obese females. Under these conditions, roughage diets are more suitable.

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