

## Food Consumption Patterns and Use of Country Foods by Native Canadians near Wood Buffalo National Park, Canada

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(Received 5 March 1990; accepted in revised form 19 November 1990)

**ABSTRACT.** This study examined food consumption patterns of native (Indian and Metis) Canadians living in a boreal forest area with good access to both store-bought and country foods (traditional foods from the land, such as wild animals, birds, fish and berries). Frequency of use by season of 48 country foods by 120 households was examined by interview with the female household head. Twenty-four-hour recalls of individual food consumption on four separate days over two seasons were obtained by interview with 178 persons (71 males, 107 females) age 13-86 years, and the mean values per person were used to represent their usual intakes. The mean reported household frequency of use (number of occasions per year) was as follows: all country foods 319, including large mammals 128, berries 63, fish 62, birds 32, and small mammals 27. The upper quintile of households used country food two and one-half times more often than the sample as a whole. Recalls of individual food consumption showed that country food was consumed on average 4.2 times per week and averaged 0.5 kg per week. Country meat, birds and fish accounted for one-third of the total consumption of meat, birds and fish. Young people consumed less country food than did their elders. Thus, country food constitutes an important part of the food supply, especially of meat and fish of many native people of this region.

**Key words:** country food, food consumption patterns, Indians, Metis, native Canadians

**RÉSUMÉ.** Cette étude se penche sur les schémas de consommation alimentaire des autochtones canadiens (Indiens et Métis) qui vivent dans une zone de la forêt boréale et possèdent un accès facile à la fois aux aliments achetés en magasin et aux aliments recueillis dans la nature (aliments traditionnels provenant de l'environnement même, comme animaux sauvages, oiseaux, poissons et baies). La fréquence saisonnière d'utilisation de 48 aliments provenant de la chasse, de la pêche et de la cueillette, dans 120 foyers a été déterminée lors d'interviews avec la maîtresse du foyer. Des données sur la consommation alimentaire individuelle recueillies sur 24 heures durant quatre journées non consécutives réparties sur deux saisons, ont été obtenues lors d'interviews avec 178 personnes (71 de sexe masculin, 107 de sexe féminin), âgées de 13 à 86 ans, et les valeurs moyennes par personne ont été utilisées pour représenter leurs consommations habituelles. La fréquence d'utilisation moyenne rapportée par foyer (le nombre de fois où l'aliment est consommé dans une année) était la suivante: tous les aliments provenant de la chasse, de la pêche et de la cueillette, 319 — ce qui inclut les gros mammifères (128); les baies, 63; le poisson, 62; les oiseaux 32, et les petits mammifères, 27. Le quintile supérieur des foyers utilisait des aliments provenant de la chasse, de la pêche et de la cueillette deux fois et demie plus souvent que l'échantillon en général. Les données de consommation alimentaire individuelle ont montré que les aliments provenant directement de la nature (chasse, pêche, cueillette) étaient consommés en moyenne 4,2 fois par semaine et avaient un poids moyen hebdomadaire de 0,5 kg. La viande, les oiseaux et le poisson provenant directement de la nature comptaient pour un tiers de la consommation totale de viande, d'oiseaux et de poisson. Les jeunes consommaient moins d'aliments provenant de la nature que leurs aînés. On en conclut que les aliments provenant directement de la nature constituent une part importante de l'apport alimentaire — surtout celui en viande et en poisson — de nombreux autochtones de la région.

**Mots clés:** aliments provenant directement de la nature, schémas de consommation alimentaire, Indiens, Métis, autochtones canadiens

Traduit pour le journal par Nésida Loyer.

### INTRODUCTION

During recent decades as oil and gas exploration and the building of roads and airports have brought many southern influences into the Canadian Northwest, the availability and variety of foods sold in stores in northern communities have increased. At the same time, various industrial development projects have contributed to a decline in the availability of country foods (traditional native foods obtained from the land, such as wild game, birds, fish and berries) (Peace-Athabasca Delta Project Group, 1972). The limited and often seasonal wage employment that may be provided to native Canadians (Indian and Metis) through such projects often does not compensate for the loss of traditional lifestyle activities such as trapping, fishing and hunting, and food purchased from northern stores may not be of comparable nutritive value to the country foods they replace (Mackey and Orr, 1988). Indeed, public health professionals have recommended an increased consumption of country foods as a means of improving nutritional health of native populations of the Northwest Territories (Schaefer and Steckle, 1980). As industrial developments such as pulp and paper

mills utilize more of the northern Alberta landscape, threatening the environment on which the native lifestyle depends, it is important to document the food consumption patterns of native Canadians living in such areas in order to identify changes in food patterns in the future.

The purpose of this study was to examine the food consumption patterns of native (Indian and Metis) Canadians living near Wood Buffalo National Park, with emphasis on the role of country foods. Use of country foods was examined both at the level of the household and at the level of three generational groups of individuals within these households. The objectives of the household component of the study were as follows: 1) to document the frequency of household use of country foods over a one-year period; 2) to show the seasonal pattern of country food use; and 3) to compare the frequency of use of various categories of country foods in two communities in this region. Objectives of the individuals component of the study were 1) to document the consumption of nine groups of food from all sources, and of country food separately, among three generational groups of native Canadians, namely, adolescents and young adults, middle adults and older adults; 2) to examine the distribution of

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dietary energy intakes as meals and snacks of these groups; and 3) to compare the consumption of food groups by frequent and infrequent users of country foods.

## METHODS

### Study Site

The study participants were Cree and Chipewyan Indians and Metis of Cree and Chipewyan descent living in two communities adjacent to the park (Fig. 1). Fort Smith, located on the Slave River, Northwest Territories (N.W.T.), at 60°N 112°W, is an ethnically mixed community of 2300 people, of whom about 45% are status Indians (Cree and Chipewyan) or Metis. Fort Chipewyan, located on Lake Athabasca in Alberta 150 km south of Fort Smith, is a predominantly native community of 1200, of whom 92% are status Indians or Metis. Each community has two or more stores that sell food. Fort Smith is serviced by an all-weather road, and a good variety of store-bought food is regularly available. Fort Chipewyan does not have an all-weather road. Staples are delivered by boat in summer and over an ice road in winter; perishables are delivered by air.

Wood Buffalo National Park is a large (44 000 km<sup>2</sup>) park located on the border of Alberta and the Northwest Territories. It provides terrestrial and aquatic habitat for a variety of wildlife species. Native people traditionally hunted, fished and trapped in the region and still have certain hunting and

trapping rights in the park (McCormack, 1984). Wildlife in areas adjacent to the park is also utilized. Thus it is a region where native Canadians have access to a variety of both country and store-bought foods. There is concern, however, that the quantity and quality of country food are at risk because of upstream petroleum and forest industrial development. For example, along the Peace and Athabasca rivers, a total of nine major pulp and paper mills are in operation, under construction or proposed (Edmonton Journal, 8 July 1989).

### The Sample

Native leaders in the study communities showed considerable interest in the research project and their approval and cooperation were readily obtained. Participating households were selected from band lists and Metis membership in an attempt to obtain equal representation of households categorized as users of country food and non- or light users, as indicated by local native informants who knew the community well. In order to obtain enough teenage participants to permit intergenerational comparisons, households with teenagers were identified through the school and likewise categorized as users/non-users. This initial categorization was not always consistent with observations from household interviews and was therefore not used in subsequent analysis. One hundred and twenty households consented to participate in the study, representing approximately 25% of native households in the two communities.

One hundred and seventy-eight individuals over 12 years of age in participating households agreed to take part in the individual food consumption study, representing approximately 10% of the entire native population in the communities. Individual participants were characterized as follows: Indians 58% and Metis 42%; females 60% and males 40%; adolescents and young adults 13-24 years of age 39%; middle adults 25-49 years of age 36%, and older adults 50-86 years of age 25%. Among the sample, 38% were employed at least seasonally, 35% were students and 14% were homemakers. The major occupational group was labourers (52% of those employed). Trapping as a primary occupation accounted for 3%. Many others were part-time trappers. In all, 40% of respondents reported the presence of a hunter, trapper or fisherman in the household. This serves as a rough indicator of access to country food.

### Household Frequency of Use of Country Food

Based on interviews with 12 native elders in the two communities, a country food frequency questionnaire specific to this region was developed. The questionnaire provided for the estimation of frequency of household use of 62 forms of wild animals, birds, fish and plants. Within each category, the use of any other species not already listed was also queried.

The female head of each household was interviewed to determine the frequency of household use by season over the preceding year (September 1985 through August 1986) of each country food item. A native interpreter assisted those respondents who preferred to use Cree or Chipewyan. Estimated frequency was reported by day, week, month or season, as the respondent preferred. Frequency of use of each food item was calculated as the number of occasions per season and per year for each household.

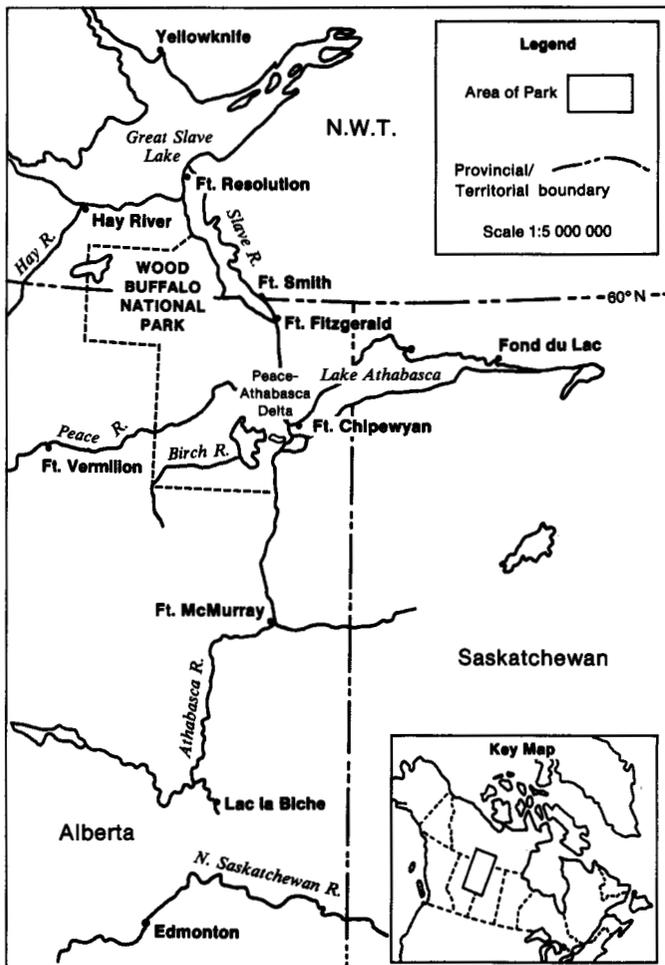


FIG. 1. Location of the study communities, Fort Smith and Fort Chipewyan.

The rank order of food use reported in the household data was later compared with the rank order of frequency of country food items reported by individuals during their 24-hour recalls (described below) as a check on the validity of the household food frequency method.

#### *Food Consumption Patterns of Groups of Individuals*

Food consumption data of individuals were obtained by repeated 24-hour food recalls, two in the fall-early winter (late August to mid-November 1986) and two in the spring-summer season (late April to mid-July 1987). The 24-hour recall is a standard dietary assessment method designed to elicit a complete list of all foods and beverages in their prepared form consumed by the respondent during the preceding 24 hours, along with the quantities of each food (Gibson, 1990). By systematic questioning, the respondent is directed to recall for each eating occasion the location, the approximate time of day, the specific foods consumed and the amount of each. The amounts described are the cooked, edible portions, i.e., the amounts on the individual's plate, less any plate waste. The interviewer, a dietitian, assisted in the recall by asking about common additions to foods, such as sugar to tea, lard to dry meat, etc., when the respondent mentioned a food where additions are commonly used. Food models were used to help describe the portion sizes. These consisted of colored food replicas, calibrated to weights of the actual food, graduated food models (diagrams of circles, wedges, squares and rectangles) and household measures. Volumetric descriptions of individual foods were converted to weights using standard food references (Sabry *et al.*, 1982).

Within one season, repeated recalls were taken several days apart on different days of the week. All interviews were conducted by the same researcher (EEW) in the respondent's home in the community, except for students who were more readily located at school.

The mean daily frequency of use (occasions per day) and the mean daily weight of foods consumed in nine main food groups that constituted the total diet (milk and milk products; meat, poultry, fish; eggs and legumes; vegetables; fruits; grains; fats; sweets; and miscellaneous), as well as three country food subgroups within the total diet (country meats and birds; country berries; country fish) were calculated for each individual. The groups are described in the footnotes of Table 3. Mixed dishes such as stews were categorized by the amounts of their individual components — e.g., the amount of meat in the stew was part of the meat, poultry, fish group, while the amount of potato in the stew was part of the vegetable group. Daily intakes of dietary energy (kilocalories) were also calculated. A computer program developed at the University of Guelph (Sabry *et al.*, 1982) was used for the above calculations.

Community differences in food consumption patterns were examined using three-way analysis of variance to control for differences due to the age and sex distribution of the sample in the two communities. Since very few differences due to community were found, data from the two communities were combined for examination of generational differences. Consumption of food groups and patterns of energy intake throughout the day as meals and between meals (snacks) were examined for three generational groups, namely, adolescents and young adults 13-24 years of age, middle adults 25-49 years of age and older adults 50-86 years of age.

#### *Other Aspects of Country Food Use*

The relationship of demographic variables to frequency and weight of consumption of country food was examined using Pearson correlation and multiple regression. Both the regression coefficients ( $b$ ) and the standardized regression coefficients ( $\beta$ ) were examined.

In addition, the overall food consumption patterns of two other groups, called frequent and infrequent users of country foods, were examined. The preliminary categorization of households as users/non-users of country foods was not consistent with the observation that almost all households used country foods to some extent, or with the observation that among individuals the frequency of consumption of country food during the four days of dietary recalls was a continuous distribution, ranging from 0 to 12. Thus this preliminary categorization was not used for purposes of data analysis. Instead, in order to examine contrasts in overall food consumption patterns between two groups who obviously differed in their frequency of country food consumption, the upper and lower thirds of the frequency distribution of country food consumption in the four days of recalls were selected as the two groups for this comparison. The upper third, designated as frequent users, consisted of those persons who reported country food three or more times in four days of recalls, while the lower third, designated as infrequent users, consisted of those who reported country food not at all or once in the four days of recalls. (The middle third of the distribution, i.e., those who consumed country food twice in four days of recalls, was omitted from this comparison, in order to allow any contrasts between the two extreme groups to be seen more clearly.) Food consumption patterns of frequent vs. infrequent users of country food were compared using three-way analysis of variance, controlling for age and sex differences within these groups.

Statistical analyses used the computer programs of Statistical Package for the Social Sciences (SPSS Inc., 1988).

## RESULTS

### *Household Frequency of Use of Country Foods*

Table 1 presents the country foods most often reported by households. Summed over all categories, the overall frequency of use was 319 occasions per year. (An occasion was any meal or snack at which the food was consumed.) Animal foods predominated, with a heavy reliance on large mammals and fish. Except for berries, plant foods were seldom used.

Household frequency data show that almost all parts of the large mammals, including bone marrow, fat and organ meats such as tongue, heart, liver and kidney, were used at least by some households (Table 2). Caribou tongue was considered to be a special delicacy.

The seasonal pattern of household country food use is shown in Figure 2. The autumn season was characterized by the greatest use of moose, berries, especially cranberries, waterfowl and upland birds. The winter season was characterized by the greatest use of large mammals, especially caribou and moose, and small mammals, especially hare, along with frequent use of berries and fish. In spring caribou dominated the large mammal use, while use of fish remained high. In summer, use of fish increased; however, except for berries, consumption of other categories was the least of any season.

TABLE 1. Use of country food in 120 native Canadian households (number of occasions per household per year, mean  $\pm$  standard error)

Species	Number of occasions per year	Species	Number of occasions per year
Large mammals	128 $\pm$ 13	Small mammals	27 $\pm$ 4
Moose	58 $\pm$ 7	Hare	18 $\pm$ 2
Caribou	53 $\pm$ 7	Muskrat	5 $\pm$ 1
Bison	15 $\pm$ 4	Beaver	3 $\pm$ 1
Bear	2 $\pm$ 1	Lynx	1 $\pm$ T
Berries	63 $\pm$ 10	Waterfowl	19 $\pm$ 3
Jam	32 $\pm$ 7	Duck	13 $\pm$ 2
Cranberry	16 $\pm$ 4	Goose	5 $\pm$ 1
Blueberry	7 $\pm$ 2	Swan	1 $\pm$ 1
Strawberry	2 $\pm$ T <sup>1</sup>	Upland birds	13 $\pm$ 2
Raspberry	2 $\pm$ 1	Spruce hen	5 $\pm$ 1
Saskatoon	1 $\pm$ 1	Ruffed grouse	4 $\pm$ 1
Fish	62 $\pm$ 9	Ptarmigan	2 $\pm$ T
Whitefish	32 $\pm$ 6	Sharptail grouse	1 $\pm$ T
Pickerel	9 $\pm$ 2	Leaves <sup>2</sup>	7 $\pm$ 2
Pike	9 $\pm$ 1	Mint	4 $\pm$ 1
Lake trout	6 $\pm$ 1	Labrador tea	3 $\pm$ 1
Goldeye	2 $\pm$ 1	All country foods	319
Sucker	2 $\pm$ 1		
Loche	1 $\pm$ 1		
Fish eggs	1 $\pm$ T		
Inconnu	1 $\pm$ T		

<sup>1</sup> T=trace.  
<sup>2</sup> Used as tea.

TABLE 2. Number of households<sup>1</sup> who reported use of bone marrow, fat and organ meats

Food type	Species				
	Caribou	Moose	Bison	Bear	Goose
Bone marrow	49	54	12		
Fat	5	14	1	12	6
Heart	39	53	14		
Tongue	38	53	14		
Liver	26	36	11		
Kidney	26	38	3		
Head	6	7			
Stomach & intestines	4	6		2	

<sup>1</sup> N = 120.

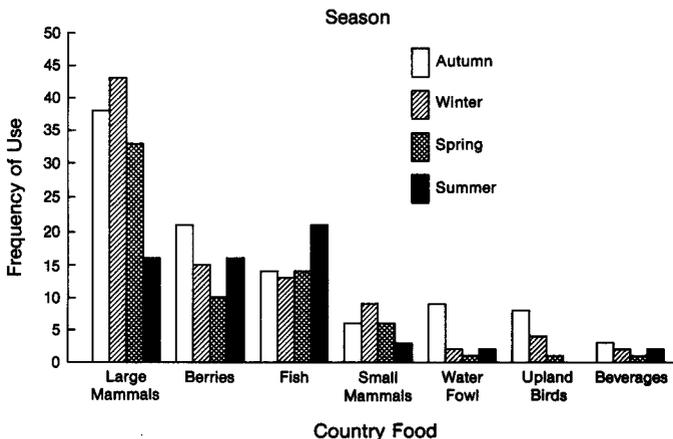


FIG. 2. Average frequency of use (number of occasions per household per year) of country food categories by season (N=120).

Household country food use differed somewhat between the two communities (Fig. 3). Large mammals were used more frequently in Fort Smith, while fish, berries, waterfowl and small mammals were used more frequently in Fort Chipewyan. Wild roots, leaves and birch sap were very seldom used and cannot be shown in the figure.

Data from the 24 households in the highest quintile of country food use were also examined separately (Fig. 3). These households represent the most frequent users and thus illustrate the maximum use of such food. Country food use in these households was two to two and one-half times higher than that of the entire sample and averaged twice daily. The distribution of use among the categories of foods, however, was very similar to that of the entire sample.

*Food Consumption Patterns of Individuals in Three Generational Groups*

The mean daily frequency of use (times per day) and the mean daily weights of nine main food groups that constitute the total diet and of country food subgroups consumed by individuals in two communities are presented in Table 3. The main food groups of the total diet include food obtained from all sources, both country and store bought, while the subgroups present only the country food component of the diet. Food consumption patterns were very similar in the two communities (Table 3). Sweets and foods in the miscellaneous group (coffee, tea and alcoholic beverages) were consumed more often ( $p < 0.05$ ) in Fort Smith than in Fort Chipewyan, but the quantities were not statistically significantly different.

Table 4 presents an overview of the main food groups comprising the total diet of three generational groups from the two communities combined. Generational differences in food patterns are apparent. For example, young people consumed milk less often but in greater amounts than did their elders. Young people were more likely to drink fluid 2% milk as a beverage, whereas middle and older adults used evaporated milk in coffee and tea throughout the day. Evaporated milk was the most commonly used form of milk; cheese and fresh fluid milk were much less frequent. Males consumed more meat, poultry and fish than females did. Moose meat, pork chops, bacon, ground beef, stewing beef and luncheon meat were commonly used. Wild duck and locally caught fish (whitefish, northern pike, pickerel) were less frequently used. Middle adult men consumed the most eggs. (Since legumes were rarely reported, values in the eggs and legumes group

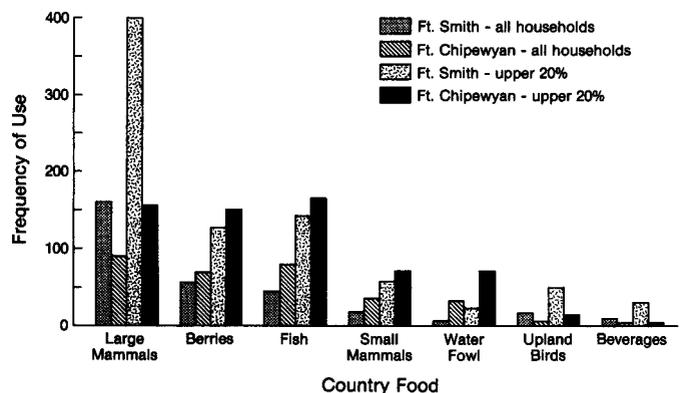


FIG. 3. Average frequency of use (number of occasions per household per year) of country food categories in two communities among all households (N=120) and among the upper 20% of households (n=24).

are due almost entirely to eggs.) Vegetable consumption differed more between the sexes than among the age groups. Potatoes were by far most commonly used, followed by carrots and rutabagas. Fruits, fruit juices and fruit drinks were consumed more often and in larger amounts by young people, especially females, than by their elders. In this food

TABLE 3. Mean daily frequency and weight of consumption of food groups that constituted the total diet and of country food subgroups by individuals in two communities

Food group	Fort Smith (n = 87)		Fort Chipewyan (n = 91)		p <sup>1</sup>	
	Freq <sup>2</sup>	Wt <sup>3</sup>	Freq	Wt	Freq	Wt
<b>Main food groups of the total diet<sup>4</sup></b>						
Milk & milk products	2.03	166	1.96	177	NS	NS
Meat, poultry, fish	1.89	206	1.84	200	NS	NS
Eggs & legumes	0.48	46	0.46	41	NS	NS
Vegetables <sup>5</sup>	2.84	245	3.31	271	NS	NS
Fruits <sup>6</sup>	1.26	216	1.53	299	NS	NS
Grains <sup>7</sup>	3.61	268	3.84	288	NS	NS
Fats <sup>8</sup>	3.41	36	2.65	30	NS	NS
Sweets <sup>9</sup>	3.66	221	3.18	302	*	NS
Miscellaneous <sup>10</sup>	3.93	678	2.68	427	*	NS
<b>Country food subgroups</b>						
All country foods	0.56	76	0.60	73	NS	NS
Country meats & birds	0.38	58	0.41	52	NS	NS
Country berries	0.09	7	0.09	4	NS	NS
Country fish	0.09	11	0.11	16	NS	*

<sup>1</sup> F-test from three-way ANOVA, main effect of frequency only, controlling for differences due to age and sex. \*p < 0.05; NS not significant.

<sup>2</sup> Number of times per day.

<sup>3</sup> Grams of prepared edible portion consumed per day.

<sup>4</sup> Includes food from all sources (store-bought and country).

<sup>5</sup> Includes potatoes.

<sup>6</sup> Includes fruit juice and fruit drinks.

<sup>7</sup> Includes bread, bannock, breakfast cereals, pasta, rice and baked goods.

<sup>8</sup> Butter, margarine, oil, shortening and lard.

<sup>9</sup> Includes sugar, jam, candies, soft drinks and beverage powders.

<sup>10</sup> Includes coffee, tea and alcoholic beverages.

group, fruit beverage crystals enriched with vitamin C were the most commonly used item. Fruit juice, canned fruit and fresh oranges were used to a lesser extent.

Consumption of grain products varied little among the age groups. White bread, bannock (a type of baking powder biscuit usually made with lard) and oatmeal porridge were the most commonly used grain products. Fats such as lard, butter and powdered coffee whitener were used more often by middle and older adults than by young people, but not in greater amounts. Sweets, particularly soft drinks and unenriched beverage powders and candies, were widely used, especially by young people. Sugar added to coffee and tea accounted for most of the sweet consumption among adults. Sweet baked goods were eaten occasionally.

#### Country Food Use by Three Generational Groups of Individuals

In the four days of dietary recalls, the total frequency of country food consumption by the 178 study participants was as follows: large mammals 180 (moose 105, caribou 61, bison 13, bear 1), fish 57 (whitefish 22, pike 17, pickerel 11, lake trout 5, inconnu 2), wild berries 51 (cranberries 42, blueberries 6, raspberries 2, black currants 1), waterfowl 45 (ducks 35, geese 10), small mammals 17 (hare 13, beaver 3, muskrat 1), upland birds 7 (ruffed grouse 6, sharptail grouse 1), and other wild plants 4 (mint tea 2, wild onions 1, dandelion greens 1). Thus, the rank order of the individual frequency data was similar to that of the household data shown in Table 1.

The frequency and weight of country food subgroups consumed by individuals of the two communities are shown in Table 3. Country fish was consumed in slightly larger amounts (p < 0.05) in Fort Chipewyan than in Fort Smith, but the frequency of consumption was not statistically significantly different. The greater consumption of fish in Fort Chipewyan is consistent with household estimates (Fig. 3), which show that, on an annual basis, fish is used to a greater extent in Fort Chipewyan than in Fort Smith.

Weights and frequencies of country food subgroups consumed by three generational groups of individuals are shown in Table 5. On average, country food was consumed 0.6 times daily (4.2 times per week) and amounted to 74 g per day (0.5 kg per week). Country meat and birds accounted

TABLE 4. Mean daily frequency and weight of consumption of nine main food groups<sup>1,2</sup> that constituted the total diet of individuals of three generational groups

Age and sex group	n	Milk and milk prod		Meat, poultry, fish		Eggs and legumes		Vegetables		Fruits		Grains		Fats		Sweets		Misc.	
		Freq <sup>3</sup>	Wt <sup>4</sup>	Freq	Wt	Freq	Wt	Freq	Wt	Freq	Wt	Freq	Wt	Freq	Wt	Freq	Wt	Freq	Wt
All	178	2.0	172	2.0	204	0.5	44	0.5	258	1.5	258	3.8	278	3.0	33	3.5	262	3.2	549
Adolescents and young adults																			
M	27	1.8	215	2.0	263	0.5	48	0.8	324	1.2	349	4.0	350	3.0	45	3.8	495	2.0	304
F	42	1.8	234	1.8	169	0.5	33	0.5	260	2.0	407	3.8	280	2.0	25	3.0	368	1.2	200
Middle adults																			
M	26	2.2	141	2.0	280	0.8	86	0.5	318	1.0	186	3.8	355	3.8	49	4.8	336	5.0	916
F	38	2.2	126	1.8	164	0.5	36	0.2	198	1.2	194	3.2	216	3.2	29	3.2	112	4.2	379
Older adults																			
M	18	2.0	115	2.2	257	0.5	46	0.5	262	1.0	131	4.2	268	4.2	39	4.2	165	4.8	879
F	27	2.5	163	1.8	144	0.2	23	0.2	215	1.5	182	4.0	223	3.0	20	2.5	72	4.0	1006

<sup>1</sup> Food groups include both store-bought and country foods.

<sup>2</sup> See footnotes to Table 3 for description of food groups.

<sup>3</sup> Number of times per day.

<sup>4</sup> Grams of prepared edible portion consumed per day.

TABLE 5. Mean daily frequency and weight of consumption of country food subgroups by individuals of three generational groups

Age and sex group	All country foods		Meat and birds		Berries		Fish		Country meat, birds & fish as % of total meat, birds & fish	
	Freq <sup>1</sup>	Wt <sup>2</sup>	Freq	Wt	Freq	Wt	Freq	Wt	Freq <sup>3</sup>	Wt <sup>4</sup>
All	0.60	74	0.40	55	0.10	5	0.10	14	26	32
Adolescents and young adults										
M	0.55	78	0.45	67	0.05	4	0.05	7	28	29
F	0.32	38	0.25	29	0.05	2	0.05	7	16	19
Middle adults										
M	0.72	114	0.52	89	0.15	15	0.05	10	26	34
F	0.69	57	0.42	46	0.10	3	0.08	8	24	31
Older adults										
M	0.97	127	0.52	82	0.22	9	0.20	36	34	42
F	0.70	77	0.42	45	0.08	3	0.20	28	37	46

<sup>1</sup> Number of times per day.  
<sup>2</sup> Grams of prepared edible portion consumed per day.  
<sup>3</sup> Frequency expressed as a percentage of the total frequency.  
<sup>4</sup> Weight expressed as a percentage of the total weight.

for 74% of the total weight of country food, local fish for 19% and wild berries for 7%.

Young people consumed country food less often and in smaller amounts than did their elders (Table 5). The oldest adults consumed much more fish than either middle adults or young people. Among the oldest adults, over 40% of the total weight of meat, poultry and fish consumed came from country sources. Females consumed country foods less often and in smaller amounts than did males.

*Eating Patterns throughout the Day*

The daily eating pattern typically consisted of three main meals with between-meal eating. The percentages of daily energy consumed in meals and between meals (snacks) are presented in Table 6. The morning meal provided about one-sixth, the noon meal about one-fourth and the evening meal about one-third, while between-meal eating provided about one-fifth of the daily energy intake. Adolescents and young adults and middle adult males consumed a higher proportion of daily energy between meals than did middle adult females and older adults. Snacking was particularly prevalent among those middle adult males who were employed in sedentary occupations and those who were unemployed at the time of

TABLE 6. Percentages of daily energy intakes (kilocalories) consumed as meals and snacks<sup>1</sup> among three generational groups (N=178)

Age and sex group	Morning		Afternoon		Evening		Total snacks <sup>2</sup>
	Meal	Snack	Meal	Snack	Meal	Snack	
All	16	2	27	7	36	12	21
Adolescents and young adults							
M	17	1	26	10	31	15	26
F	13	2	26	10	36	13	25
Middle adults							
M	13	3	25	8	37	14	25
F	15	2	27	4	40	10	17
Older adults							
M	20	3	30	5	33	10	17
F	19	1	29	4	37	9	14

<sup>1</sup> Food eaten between main meals.  
<sup>2</sup> Total percentage energy from snacks does not always equal the sum of three snacks due to rounding error.

interviewing. All groups consumed the largest part of the energy from snacks in the evening, although young people and middle adult males also consumed a substantial proportion in the afternoon.

*Other Aspects of Country Food Use*

Among the demographic variables, the frequency and weight of consumption of country food was correlated most strongly with the presence of a hunter, trapper or fisherman in the household (Table 7). Age and sex also showed moderate correlations with frequency and weight of country food consumption. Educational level, occupation of the household head and employment status of the household head were not correlated with either frequency or weight of country food consumption (Table 7).

Multiple regression analysis (Table 8) showed that the presence of a hunter, trapper or fisherman in the household was the factor that explained the largest part of the variability in both the frequency and weight of country food consumption. Controlling for all the other independent variables in the regression equation, the presence of a hunter, trapper or fisherman increased the frequency of country food consumption by .38 times per day. Similarly, presence of the hunter accounted for an increase of 56.95 g per day in the

TABLE 7. Pearson's correlation of country food consumption by individuals with demographic characteristics (N=178)

Demographic variable	Frequency of country food consumption		Weight of country food consumed	
	r	p <sup>1</sup>	r	p
Presence of a hunter, trapper or fisherman in the household	.39	**	.42	**
Age	.28	**	.18	**
Sex	.17	**	.31	**
Education	.06	NS	.08	NS
Occupation of the household head	.07	NS	.00	NS
Employment of the household head	.04	NS	.02	NS

<sup>1</sup> \*\*p<0.01; NS not significant.

TABLE 8. Regression of selected demographic variables on individual consumption of country foods (N=175)

Demographic variable	R <sup>2</sup>	Regression coefficient (b)	Standardized regression coefficient (beta)	t value	p <sup>1</sup>
<b>Frequency of country food consumption<sup>2</sup></b>	.23				
Presence of a hunter, trapper or fisherman in the household <sup>3</sup>		.38	.34	4.80	**
Age <sup>4</sup>		.01	.28	3.50	**
Sex		-.14	-.13	1.82	NS
Occupation of household head		.02	.04	.58	NS
Education		.02	.04	.51	NS
Employment status of household head		.01	.03	.32	NS
Constant		.12		.72	NS
<b>Weight of country food consumed<sup>5</sup></b>	.26				
Presence of a hunter, trapper or fisherman in the household <sup>3</sup>		56.95	.36	5.19	**
Sex <sup>6</sup>		-43.80	-.27	4.01	**
Age <sup>4</sup>		.64	.16	2.12	*
Employment status of household head		1.98	.06	.73	NS
Occupation of household head		-2.46	-.05	.64	NS
Education		-.19	-.00	.05	NS
Constant		54.23		2.34	**

<sup>1</sup> t-test, two tailed; \*\* p < 0.01; \* p < 0.05; NS not significant.

<sup>2</sup> Times per day.

<sup>3</sup> Code values: 0 = absent, 1 = present.

<sup>4</sup> Age in years, range 13 to 86.

<sup>5</sup> Grams per day.

<sup>6</sup> Code values: 0 = male, 1 = female.

weight of country food consumed. Age was also a variable explaining the frequency and weight of consumption — i.e., for each additional year of age, the frequency of consumption increased by a factor of .01, while the weight of country food consumed increased by a factor of .64. For weight of country food consumed, sex accounted for more of the variability than age — i.e., female sex accounted for a decrease of 43.80 g of country food per day, controlling for the other independent variables (Table 8).

The food consumption patterns of frequent vs. infrequent users of country foods are presented in Table 9. Frequent users consumed meat, poultry and fish from all sources more often and in larger amounts than did infrequent users. Frequent users also consumed more foods in the miscellaneous group, i.e., coffee, tea and alcoholic beverages, than did infrequent users. These differences were statistically significant (p < 0.01) in analysis controlling for differences in consumption due to age and sex.

## DISCUSSION

### Household Frequency of Country Food Use

Use of country food is influenced by resource availability and food preference (Kuhnlein, 1989). Heavy dependence

TABLE 9. Mean daily frequency and weight of consumption of food groups by frequent vs. infrequent users of country foods

Food group	Frequent users <sup>1</sup> (n = 61)		Infrequent users <sup>1</sup> (n = 75)		p <sup>2</sup>	
	Freq <sup>3</sup>	Wt <sup>4</sup>	Freq	Wt	Freq	Wt
<b>Main food groups of the total diet<sup>5,6</sup></b>						
Milk, milk products	2.0	162	2.2	202	NS	NS
Meat, poultry, fish	2.1	242	1.8	187	**	**
Eggs, legumes	0.6	48	0.5	44	NS	NS
Vegetables	0.5	278	0.5	243	NS	NS
Fruits	1.4	244	1.5	294	NS	NS
Grains	4.0	287	3.8	277	NS	NS
Fats	3.4	35	2.8	32	NS	NS
Sweets	3.6	212	3.4	321	NS	NS
Miscellaneous	3.9	824	2.9	363	NS	**
<b>Country food subgroups</b>						
All country foods	1.2	153	0.1	15	**	**
Country meat, birds	0.8	117	0.1	10	**	**
Country berries	0.2	12	0.0	1	**	**
Country fish	0.2	24	0.0	4	**	**

<sup>1</sup> Frequent and infrequent users are the approximate upper and lower thirds of the distribution of frequency of individual consumption of country food in four days of dietary recalls per person.

<sup>2</sup> F-test from three-way ANOVA, main effect of frequency only, controlling for age and sex; \*\*p < 0.01; NS not significant.

<sup>3</sup> Number of times per day.

<sup>4</sup> Grams of prepared edible portion consumed per day.

<sup>5</sup> Includes store-bought and country foods.

<sup>6</sup> See footnotes to Table 3 for description of food groups.

upon large game is characteristic of the pattern of country food use among Indians living in the northern forest (see, for example, Hedican, 1985; James Bay and Northern Quebec Native Harvesting Research Committee [hereafter JBNQNHRC], 1982; Jarvenpa, 1979); however, use of bison is unique to the Wood Buffalo National Park region. This park was created for the protection of this species (McCormack, 1984) and only native hunters are permitted to harvest bison outside the park boundaries. In spite of the recent concern about disease in the bison population in and around the park (Edmonton Journal, 23 January 1990), native people have utilized the bison as a food source for many decades (McCormack, 1984) and continue to consume them.

The proportions of species used (large mammals 40%, berries 20%, fish 19%, small mammals 8%, waterfowl 6%, upland birds 4% and beverages 2%) differ slightly from those of other native groups of the boreal forest, probably reflecting regional differences in species availability. For example, groups living near a large lake use more fish (Rushforth, 1977), those located on a major flyway for migratory birds, such as the James Bay Cree, use more waterfowl (JBNQNHRC, 1982) and those located inland use more large mammals (Jarvenpa, 1979).

The use of almost all parts of the large mammals, including organ meats, at least by some households may reflect a tradition of utilizing resources to the fullest. This practice has nutritional, as well as economic, benefits, since many organ meats contain higher levels of iron and

B vitamins than muscle meats (Health and Welfare Canada, 1987).

The seasonal pattern of country food use reflects the seasonal harvesting and the cultural norm of sharing food within the extended family. Nevertheless, the availability of freezer storage and cold weather storage extends the period of use beyond the harvesting season. Fish are caught throughout the year, since nets are set under the ice. Some households still dry and smoke small quantities of meat and fish in the traditional way, because these are very popular snack foods.

Overall there appears to be about equal reliance on country foods within the two communities. The greater use of large mammals in Fort Smith is due largely to the greater availability of caribou, which is harvested on the Precambrian Shield to the northeast by the local hunters' and trappers' association and distributed within the community. There is also more frequent use of bison in Fort Smith, since the bison herd regularly wanders outside the park in this area and can be taken by native hunters in the N.W.T. The location of Fort Chipewyan on Lake Athabasca, with easy access to the biologically rich Peace-Athabasca Delta, accounts for the greater use of fish, waterfowl, berries and aquatic mammals (muskrat and beaver).

The frequency of country food use among the upper quintile of households may illustrate the maximum use of country food feasible at the present time. Several of these households lived a good part of the year in the bush and engaged in trapping, hunting and fishing. Others who lived primarily in town had one or more avid hunters in the family.

Almost all respondents expressed a strong preference for country foods, especially for caribou, moose and berries (Wein *et al.*, 1989). Many claimed they would have used more, had it been available. Respondents claimed that access to country food depended largely upon the presence of a skilled hunter in the family who had adequate economic resources for hunting, including a means of transportation.

#### *Total Food Consumption Patterns of Three Generational Groups*

Use of the food models in the dietary interviewing created much interest among the participants, who in turn took much care in describing the portion sizes they consumed. Compared to interviews conducted without food models, use of food models has been shown to increase accuracy in portion size estimation (Guthrie, 1984; Kirkcaldy-Hargreaves *et al.*, 1980). Also, interviewer assistance in probing for common additions has been shown to increase accuracy in recall (Guthrie, 1984). The dietary methods used in this study have been shown to produce estimates of portion size within the same range of accuracy reported in the dietary literature (Wein *et al.*, 1990).

In contrast to harvest studies among native Canadians of the boreal forest (Hedican, 1985; JBNQNHRC, 1982; Jarvenpa, 1979; Mackey and Orr, 1987; Rushforth, 1977) that report weights of animal food species harvested and hence available for consumption, the present dietary study follows other dietary studies of native food consumption patterns (Health and Welfare Canada, 1977; Kuhnlein, 1989; Kuhnlein and Moody, 1989; Szathmary *et al.*, 1987) in reporting actual consumption of prepared (usually cooked) edible portions of food, minus any plate waste.

As pointed out by Usher and Wenzel (1987), the term "harvested" is rarely defined in the literature and may be used to refer to number killed (including those killed and lost), number struck and retrieved or number used for human purposes (including dog food, clothing and domestic food). It is obvious, however, that quantities harvested include inedible waste, such as bone and skin, and do not account for the loss in weight (about 25%) that occurs on cooking of meat and fish. Thus the lower weights of food consumed by individuals in the present study compared to the harvest studies above are due in part to differences in methodology.

The similarity in individuals' food consumption patterns between the two communities is not surprising. A similar variety of store-bought and country foods is available in each community, and the people have similar ethnic backgrounds and food traditions. Since the sample included a wide range of ages and both sexes, food consumption patterns were expected to differ more among the physiological groups than by community.

Consumption of several food groups was higher than that by the general Indian population of Canada, as reported in the Nutrition Canada survey of 1970-72 (Health and Welfare Canada, 1977). The Nutrition Canada data, however, are not broken down by geographic region and cover six major cultural groups of status Indians living in both urban and rural areas of the country. In the present study, consumption of meat, poultry, fish, wild game, eggs, vegetables and fruit were all higher, while consumption of milk and milk products, grain products and fats was similar to that of Nutrition Canada Indians. It is difficult to compare the consumption of sweets and miscellaneous foods, including tea and coffee, since these food groups were defined differently in the two studies.

#### *Country Food Consumption by Three Generational Groups of Individuals*

The similarity in rank order of country foods between the household estimates and the individual recalls of consumption provides confidence in the validity of the data. Country food was consumed in considerably larger amounts than the 7-30 g of wild game reported for Nutrition Canada Indians (Health and Welfare Canada, 1977). In particular, older women consumed much more country food than the 7 g per day of wild game reported for elderly women in Nutrition Canada. These data on country food consumption support statements by anthropologists (Feit, 1982; Hedican, 1985; Rushforth, 1977) regarding the importance of country food in northern native diets.

Although the weight of country food consumed appeared lower than the weight of traditional foods reported for Dogrib Indians of the Northwest Territories (Szathmary *et al.*, 1987), these two food groups are not really comparable, since country foods refer only to wild game, birds, fish and berries, while Szathmary *et al.* (1987) defined traditional foods to include tea, sugar, soup, bannock, lard and flour in addition to wild game, birds, fish and berries. The water content of such foods as tea and soup can elevate the total weight of food in a group, making comparison difficult. However, the high proportion of the total protein intakes obtained from traditional foods by Dogrib people suggests that a large part of the weight of the traditional food group was due to meat and fish.

Thus consumption of country food by native Canadians near Wood Buffalo National Park exceeded that of the general Canadian Indian population but was less than that of Dogrib Indians.

The observation that young people consumed less country food than did their elders (Table 5) suggests that other foods are becoming more important to the younger generations. These young people have been exposed during their formative years to a wider variety of foods than their elders were. While this might be interpreted to imply that the bush economy will decline in importance for future generations, the authors do not believe that the bush economy of the North will disappear. The seasonal nature of much of the wage employment available in the North allows many native people to continue traditional pursuits in other seasons. For example, fire fighting in the summer is combined with trapping in the winter. Indeed, cash from wage employment is necessary in order to purchase hunting supplies and equipment (Feit, 1982). Among those employed year round, it is not uncommon to take time off during the prime hunting period, as well as to hunt on weekends. Thus there are many indications of a continuing interest in obtaining country foods. Furthermore, many country foods are preferred over store-bought foods (Wein *et al.*, 1989). In regions where traditional foods are still available, their use as part of a mixed diet may even increase under certain circumstances, as was demonstrated recently for a coastal Indian group (Kuhnlein and Moody, 1989).

#### *Eating Patterns throughout the Day*

The high proportion of daily energy obtained from between-meal eating by adolescents and young adults is consistent with food consumption patterns of adolescents in other populations (Truswell and Darnton-Hill, 1981). Middle adult males exhibited a meal and snacking pattern very similar to that of adolescents and young adults. The most common snack foods among adolescents and young adults were soft drinks, potato chips and candy, while among middle adult males sweetened coffee and soft drinks were most common. The selection of foods eaten between meals could substantially influence the nutrient quality of the diet. Use of traditional native snack foods, such as dried meat and dried fish, which subjects rated higher in preference than modern snack foods, such as chocolate bars and potato chips (Wein *et al.*, 1989), could enhance the total intake of many nutrients.

#### *Other Aspects of Country Food Consumption*

Country food was used by people of all socioeconomic levels, including those who were unemployed, those employed seasonally and those employed full time. Country food was used by people with no formal education as well as those who had graduated from high school. The factors most likely to account for country food use by individuals were 1) the presence of a hunter, trapper or fisherman in the household, i.e., a rough indicator of household availability of country food, 2) age, i.e., older people used more country food, and 3) sex, i.e., males consumed more country food than females. Socioeconomic indicators such as occupation, employment status and education showed no relationship to country food use.

The greater consumption of meat, poultry and fish from all sources by the frequent users of country foods may be

attributable to differences in food preference and to differences in the cost of obtaining country vs. store-bought flesh foods. Country meats, birds and fish are preferred to store-bought ones (Wein *et al.*, 1989). Flesh foods purchased in northern stores are expensive. For example, during the study period, the cost of pork loin chops in the two study communities was \$6.99 and \$7.84 per kg respectively, while chicken thighs cost \$5.69 and \$5.97 per kg respectively. The cost of obtaining country food was not measured; however, it would include the cost of supplies and maintenance of hunting equipment and of a means of transportation such as a truck or boat for hunting.

The greater consumption of the meat, poultry and fish groups by frequent users of country foods results in higher intakes of certain nutrients such as protein, iron and B vitamins (Wein, 1989).

The greater consumption of the miscellaneous group of foods by the frequent users was due largely to the large volumes of store-bought tea consumed by many of these individuals.

#### CONCLUSIONS

Among native Canadians near Wood Buffalo National Park, country foods are frequently used. In the households studied, country food was used on average more than 6 times per week, while individual consumption averaged 0.5 kg per week and occurred 4.2 times per week. Animal foods from the land constituted, on average, one-third of the total flesh food consumption. Furthermore, country foods were consumed by individuals of all three generational groups studied.

Despite the fact that young people consumed less country food than the older generations, there are numerous other indications of a continuing interest in pursuing traditional activities, at least on a seasonal or part-time basis, among the younger generations. Given the strong interest in hunting, trapping and fishing, the progress in land claims negotiations and the preference for country foods, the authors believe that country foods will continue to be an important component of northern native diets for many future decades. Policy decisions regarding environmental issues, land use, public health and education should recognize the important contribution of country foods to northern native diets and take steps to ensure the continued long-term availability of these foods.

#### ACKNOWLEDGEMENTS

This work was conducted at the University of Guelph and supported by an NHRDP grant from Health and Welfare Canada and by Northern Scientific Training Program grants from Indian and Northern Affairs Canada. The Boreal Institute for Northern Studies, University of Alberta, provided office and computing assistance. The cooperation of all the study participants and the support of the native leaders are sincerely appreciated.

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