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EAST AFRICAN MEDICAL SURVEY

Monograph No. 2

A HEALTH SURVEY IN BUKOBA DISTRICT, TANGANYIKA

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CHAPTER I.—INTRODUCTION

NECESSITY FOR A SURVEY IN THE BUKOBA DISTRICT

Methods and techniques have been fully discussed in Monograph I of this series.

By East African standards the Bahaya are passing rich: their coffee crop alone yields an average of £40 per annum per taxpayer. They have very efficient social services, e.g. educational facilities, Mission and Government, on the east plateau of Bukoba district are the most concentrated in Tanganyika, and the medical facilities are equally good with a large well-staffed general hospital at Bukoba with a second European medical officer available for work throughout the district. The climate is equable and the rainfall high and well distributed through the year.

In spite of the favourable conditions the Bahaya are not reproducing themselves: this downward trend in family size is now so well marked as to be obvious to the people themselves who are becoming seriously disturbed. The moral standards of the Bahaya are low: one inevitable consequence of this is the high incidence of venereal disease among the people and the general belief was that the latter explains the former to a great extent, i.e. that the low reproduction rate is a consequence of the high venereal disease rate.

At the request of the territorial authorities a health survey was undertaken to investigate the above problem, i.e. to obtain reliable vital statistics showing reproduction rates, and to ascertain what are the important causes of the downward trend in population if such were truly the case.

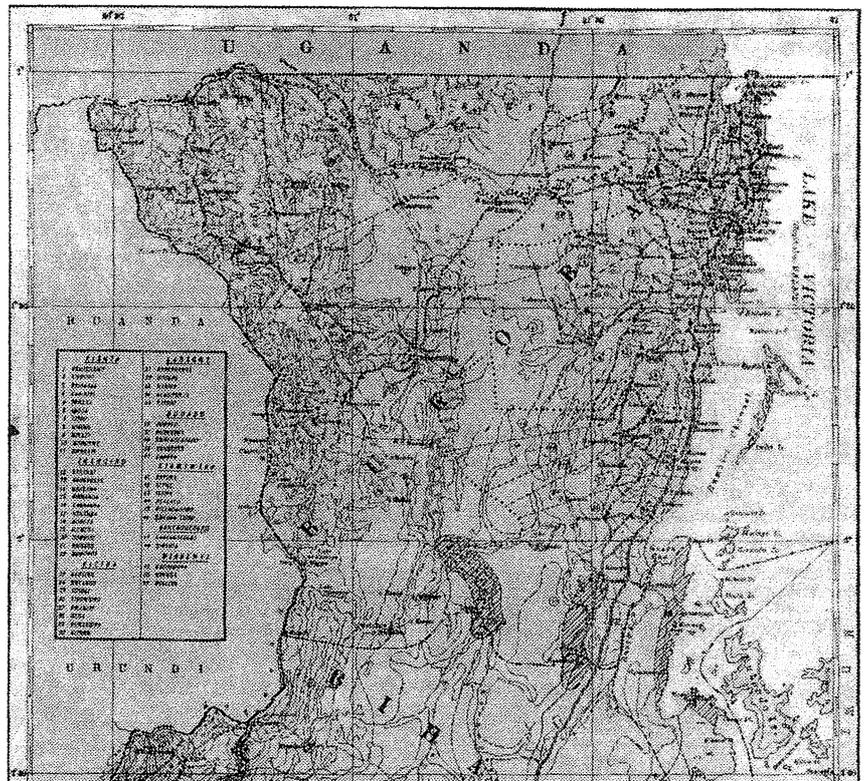
THE DISTRICT TO BE SURVEYED

The Bukoba District of Tanganyika Territory is that administrative unit occupying the north-west corner of the Territory. The division is less artificial than are such administrative arrangements usually in that the boundaries are well demarcated, with Uganda forming the northern boundary, the Ruanda Urundi part of the Belgian Congo to the west, Lake Victoria to the east and to the south a barrier of tsetse fly bush separating Bukoba district from the adjacent Biharamulo and Ngara districts.

In shape Bukoba district is a rough oblong, measuring 110 miles long by 80 miles wide, with the long axis running north-south, between parallels 1°S and 2°15' S. and between meridians 30°30' E. and 31°50' E. Plate I illustrates this. The area of the district is 9,693 square miles of which 3,787 are water. The soil catena is in general uncomplicated, running down from non-laterized red earths to black or grey clay. The red earths are well drained, moderately leached soils free from calcium carbonate, neutral or acid in reaction: the black clay is the familiar "black cotton soil, dark and ill drained, cracking deeply when dry". (Atlas of the Tanganyika Territory, Survey Department, Dar es Salaam.)

From Plate I it will be seen that all along the east boundary of the district the land rises steeply from the Lake Victoria shore (3,700 ft.) to a height averaging 5,000 ft.; this high plateau runs the length of the district and extends inland for about 20 miles. The land then falls to a lower plateau, about 4,000 ft. high, this also running the whole length of the district and being about 30 miles in width. Further to the west the land rises over a distance of 25 miles, reaching 7,000 ft. in places at the western barrier of the district where there begins the Ruwenzori Mountains of Ruanda Urundi.

PLATE I



The choice of the Bukoba district was dictated by necessity, but the nature of the country and the distribution of the people, discussed below, were such that a true random choice of areas for survey work inside the district would have given a false picture. Eighty per cent of the people live on the east plateau bordering Lake Victoria and the problems of Bukoba district are the problems of the people of that strip. Accordingly survey work was limited to areas on the east plateau: the randomly chosen sub-areas on the plateau in which work was done were Muruka and Gera both to the south of Bukoba township, and Nyakato to the north of Bukoba. In one respect the choice of Nyakato was not truly random: at the time of our health survey the East African Institute of Social Sciences was engaged in an anthropological study in the Nyakato area and it was felt that by combining surveys we should gain more than would be lost by non-randomization.

In Nyakato 100 per cent of the people were examined; in Gera the figure comes near to this; and in Muruka randomization was observed as far as possible.

PHYSICAL CHARACTERISTICS OF THE AREAS SURVEYED

The character of the country plays a great part in determining the distribution of man, of his cattle and of the pests that plague him. The central depression at 4,000 ft. is swampy, and both it and the higher land to the west are covered with *miombo* bushland inhabited by *Glossina morsitans* and *G. pallidipes*, the result is that with the exception of isolated settlements in the "fly country", the human and cattle populations are squeezed on to the high eastern plateau which is only one quarter of the total available land area. Of the human population of 300,000 in Bukoba district 80 per cent live on the east plateau, and of the total

cattle population of 60,000 almost 90 per cent are to be found on the eastern plateau. The climatic conditions to the east also explains to some extent the maldistribution of human population and of cattle. In the central area and to the west the rainfall resembles that found over much of Tanganyika namely between 30-40 in. per annum with long dry periods. Over the east plateau conditions are very different, with heavy rainfall spread equally over the year, and with a temperate climate. Details are given below (from "Collected Climatological Statistics for East African Stations", Pub. East African Meteorological Department, Nairobi, 1950). For purposes of comparison we include climatic statistics from Musoma, a small town in Tanganyika situated on the East shore of Lake Victoria, directly opposite Bukoba which lies on the west shores of the Lake.

Recording Station	Position			(1) Dry Season Daily Range Temp. °F.	(2) Wet Season Daily Range Temp. °F.	(3) Rainfall	
	Lat. S.	Long. E.	Alt. <i>ft.</i>			Average Annual	Max. Monthly
Bukoba	1° 20'	31° 49'	3,753	59°-79° F.	62°-79° F.	<i>in.</i> 80	<i>in.</i> 13·7
Musoma	1° 30'	33° 48'	3,764	63°-82° F.	66°-82° F.	30	6·3

(1) "Dry Season" = month of lowest rainfall.

(2) "Wet Season" = month of highest rainfall.

(3) Rainfall averages from a period of over 25 years.

MEAN RAINFALL PER MONTH IN INCHES

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Bukoba ..	5·94	6·63	10·37	13·35	12·97	3·56	1·54	3·21	3·89	4·82	6·31	7·13	79·72
Musoma ..	2·11	2·70	4·54	6·28	4·09	0·81	0·45	0·85	0·97	1·42	2·86	2·53	29·61

The climatic conditions shown above were found through the three areas in which the survey work was carried out.

The marked climatic differences set Bukoba in a class apart from almost all other areas of Tanganyika: one important direct result of such differences is seen in the income from cash crops. Bukoba district exports were valued at over £3,000,000 in 1953, twice as much as the total from all the other ten districts in the Lake Province of Tanganyika. This is discussed at length in later chapters.

THE PEOPLE

The people of the Bukoba district are the Bahaya, of the Haya tribe; they form 86 per cent of the total population of the district, the remaining 14 per cent being made up of small groups from neighbouring territories, e.g. Congo and Uganda.

The Bahaya are the indigenous population, a Bantu people practising agriculture: there is a small admixture of blood from the Bahanda, a pastoral tribe of Hamitic origin; this second people came in about 300 years ago originally as rulers, bringing with them their cattle. In habits and in stature, etc., their descendants no longer can be distinguished from the Bantu in general although some attempt has been made particularly recently, to keep the distinction alive by the formation of a society aimed at preserving ancient privileges. This has been bitterly opposed by the so-called "commoners".

It should be noted that in diet, in agricultural practises, in their high level of intelligence, and in other ways, the people of Bukoba are much more akin to the Wachagga of Mount Kilimanjaro or to the Baganda of Uganda than they are to the neighbouring people of Tanganyika.

ENVIRONMENTAL FACTORS

Reference has been made above to the high income accruing to the people from cash crops and to the excellent climatic conditions. The rainfall is sufficient to ensure that the water supplies are adequate. There are no large urban areas: Bukoba township is a tiny trading centre with a total African population of only 2,400. Even individuals employed by Government and private traders have "one foot in the *shamba*", i.e. grow much of their own food. The great majority of the people rely wholly on their own produce and their fishing. The question of diet and crops is discussed in Chapter II, but it may here be said that the Bahaya staple diet is plantain, i.e. green bananas, cooked in one form or another with beans as an important secondary dish. Due to the high income from coffee at present a considerable amount of animal protein is purchased for consumption.

The Haya house is among the best in Tanganyika: it is beehive-shaped with the basic structure made by a complex weaving of reeds and an outer thatch of grass. The floors are covered with dried grass which is replaced every 1-2 weeks. In addition to the public room, subdivisions include kitchen, sleeping quarters and stabling for animals: the animals share the rear portion of the house with the human occupants at night. In spite of heavy rainfall the houses are dry inside and well-suited to the area: construction is not easy or cheap: one such house built in recent years, admittedly for a chief, cost £500.

Bukoba district has been a centre of mission activity for 60 years: there is a resident bishop at the cathedral in Bukoba township. It has been pointed out that in their level of intelligence the Bahaya rank high among East African tribes: and the educational facilities available to them are among the best in Tanganyika. Furthermore, the people have had prosperity thrust upon them by the world shortage of coffee. In spite of those material and spiritual advantages enjoyed by them the behaviour of the Bahaya leaves a great deal to be desired and may prove to be the key to the puzzle of the tribe's decline.

A good indication of the low standards of behaviour is that of the treatment of the women of the tribe. It is the opinion of missionaries many years resident in the area that it is true to say even to-day that the woman is little better than a slave. One missionary, a Mhaya by birth, sums up the situation, "the man wishes to keep to the old regime of masculine superiority and to live in selfish idleness, while the woman does the work and remains in subjection": he quotes as an example of this the custom, still practised, which forbids women to eat any food in the absence of the husband, even though the reason for the absence is a drunken debauch, which is extremely common. At present by tribal custom the duties of the man are very light: he is responsible for fencing-in the banana plantations and cutting down and composting old banana trees, the latter task being done only twice yearly. He is responsible also for breaking new ground. Although the husband may help occasionally the woman is in fact responsible for all the field work: she hoes the ground for ground-nuts and two months later she tills the ground again and weeds it before sowing the nuts one month later: this is very tedious work, with each nut placed separately in a raised bed. She is responsible for the coffee cultivation from which all the money comes, and for the banana *shamba* from which almost all the food comes: she plants beans: she raises a separate sweet potato crop: she cuts grass twice monthly for the floor of the house; carries water; attends to the children; does the cooking; and cleans the house and its surroundings. In spite of all the work

of the coffee crop being the responsibility of the women, the cash goes to the husband and it is probable that this sudden prosperity instead of helping to cement marriages, has probably proved the last straw. The women see very little of all the money they have earned: this is spent by the husband on himself and on prostitutes. In extreme cases the woman of the house may not even have a bed to lie on or clothes to wear.

One grave result of the above state of affairs is the rapid growth of prostitution among the Haya women. Although the root causes go deeper the immediate precipitating factor has been the desire of the women for emancipation, and the only possible escape at present is by becoming a prostitute: in one small village, Gera, there are 35 known prostitutes. Bahaya women travel far and wide through East Africa to ply their trade and on their return to Bukoba their outward signs of prosperity stimulate the sisters to go and do likewise, so accelerating the breakdown of home life.

The main cause of discontent on the part of the women is the burden of their labours, but one other important factor is that of over-indulgence in alcohol on the part of the husband. Drinking to excess is the rule and legislation framed to control this has only succeeded in teaching the men the habit of indulging in debauches at other peoples' houses. In addition to the ill-treatment the woman receives when the husband is drunk, she is often left alone for days on end while he squanders the money she has earned. One elder of another tribe recently remarked "the Haya man is like the motor-car; he must fill up twice a day".

One other factor playing an important part in the lives of the people is that of witchcraft: it is difficult to throw off the beliefs and superstitions of centuries and, as is the case in almost all East Africa, even the seemingly educated and in some cases also the professing Christians at heart are governed by fear of witchcraft. In some parts of Tanganyika, e.g. Ukara, the influence of the witch-doctor may be beneficial on the whole, but such is not the case in Bukoba: there the witch-doctors, or at least that important section known as the "Embandwa" practice only black magic and their influence is wholly evil.

CHAPTER II— FOOD AND FOOD SOURCES

INTRODUCTION

The sources on which the Bahaya can draw for food are: their own areas of cultivation yielding bananas and beans as staples: the cattle which they own: fish from the great lake on which they live: purchases of foodstuffs such as sugar, using money obtained from the sale of coffee: and such seasonal gifts of nature as grasshoppers and other edible insects. The part played by each of the above contributions is discussed more fully below.

AGRICULTURAL SURVEY

It has already been stated that from the point of view of agriculture Bukoba differs in several respects from the other ten districts of the Lake Province, being more akin in agriculture practices to Uganda than to Tanganyika. This is a basic fact of much importance and well illustrates the axiom that health surveys carried out in any one area will give information and teach lessons applicable only to like areas inhabited by populations of like stock. Table 1 (from "Sample Census of African Agriculture, East African Statistical Department, 1950") illustrates this point: for comparison we have included Zone XII of Sukumaland (Kwimba district) a nearby area of the Lake Province in which we have also carried out a health survey which will be the subject of Monograph

No. 3 of this series. The differences are further emphasized by Table 2 (from 1953 Annual Report of the Regional Assistant Director of Agriculture, Lake Province), in which are compared products of the 11 districts comprising the Province.

From Tables 1 and 2 it will be seen that the staple diet of the Bahaya is plantain, supplemented by beans, whereas in the remainder of the Province the cereals and cassava are the staples. Also, the Bukoba district alone depends on coffee as a cash crop compared with cotton, tobacco and other crops from the remaining ten districts. Lastly, as will be discussed below, although the number of cattle (60,000) in the Bukoba area may seem impressive this only represents 0.6 cattle per taxpayer compared with eight cows, plus three goats, plus four sheep per head which are the ratios in Kwimba district.

TABLE 1—RATIO OF PERSONS, STOCK, TREES, AND CROP ACREAGES PER TAXPAYER

	BUKOBA				KWIMBA ZONE XII Buhungukira	
	ZONE I Gera		ZONE II Nyakato and Maruku		Ratio	Standard Error
	Ratio	Standard Error	Ratio	Standard Error		
PERSONS	3.14	0.12	3.05	0.09	4.49	0.31
STOCK—						
Cattle	0.63	0.05	0.46	0.15	8.40	2.55
Sheep	0.33	0.06	0.10	0.03	3.03	1.30
Goats	0.03	*	0.04	*	4.27	0.78
TREES—						
Bananas	543	43.0	504	30	—	—
Arabica coffe	5.7	*	35.5	7.2	—	—
Robusta coffee	63.8	3.3	35.8	4.0	—	—
CROPS—						
Maize	0.002	*	—	—	0.154	*
Ground and Bambara nuts	0.077	0.015	0.052	0.010	0.160	*
Sorghum	0.057	0.008	0.015	0.003	1.137	*
Millet	0.011	0.004	0.014	*	0.231	*
Cassava	0.014	*	0.003	*	0.047	*
Rice	—	—	—	—	0.059	*
Sweet potatoes	0.051	0.007	0.020	*	0.358	0.071
Cotton	—	—	—	—	0.008	*
Tobacco	—	—	—	—	0.041	0.012
Pulses	0.009	*	—	—	0.243	*
Beans (amongst banana trees)	0.787	0.056	0.652	0.039	—	—
TOTAL ACREAGE ..	1.008	0.048	0.795	0.026	8.884	1.219

* = Standard error more than one-third of mean.

TABLE 2—PRODUCE MARKET STATISTICS—LAKE PROVINCE (1953)

NOTE:—Tons of 2,240 lb.

DISTRICTS	Cotton	Coffee	Paddy	Rice	Chickpea	Groundnuts	Beans	Grains	Cowpeas	Sunflower	Gum	Tobacco
	<i>Tons</i>	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
Mwanza ..	1,790	—	142·2	—	679	1·4	—	—	—	·8	—	—
Maswa*	3,368	—	—	—	—	—	—	—	—	—	—	—
Geita ..	6,509	—	·1	—	942	·5	—	72·6	—	310·5	—	—
Musoma†	2,681	—	113·8	—	—	·8	—	2·2	—	—	—	—
North Mara ..	—	—	—	—	—	—	—	1,036	—	—	—	—
Kwimba ..	2,681	—	399·4	—	1,417·8	5	—	—	7·7	42·5	80·3	—
Shinyanga ..	1,643	—	2·4	10·4	284	4·4	1·3	—	7·6	53	152	—
Ukerewe ..	2,398	—	491·2	—	—	6·9	—	·83	—	—	—	—
Bukoba ..	—	9,278	—	—	—	—	—	—	—	—	—	—
Ngara ..	—	66·2	—	—	—	—	—	—	—	—	—	—
Biharamulo ..	—	15	—	—	—	—	—	—	—	2·0	—	41·0
TOTAL ..	21,070	9,359·2	1,149·1	10·4	3,322·8	18·4	1·3	1,110·91	15·3	408·8	232·3	41·0

*Maswa markets were not opened because of the food shortage.

†Musoma had a nil return for seven months.

The use made of animal products are discussed later but it will be seen that, for their food, essentially the Bahaya are dependent on the products of cultivation and there are indications that not enough attention is being paid to this. A typical report is that made by the Bukoba District Agricultural Officer following a visit in 1952 to the Nyakato area (quoted in the Survey Annual Departmental Report, 1952)—“Conditions there may be said to be fairly typical of the eastern Lake littoral areas . . . the individual plots are by comparison smaller than those normally held farther to the south. This is due to fragmentation of inheritance down the ages and affects the maintenance of the plot, the smaller holding demanding less in physical energy. . . . In an inspection of 11 plots I found only one unoccupied. All plots were mulched with grass and banana trash but the condition of the bananas varied very considerably from good healthy stands that had the advantage of cattle manure and household residues to debilitated stands that were producing meagre if any fruit. Judged on the conditions of the bananas and general soil conditions, a rough classification of the eleven plots visited was—

Good 4, medium 3, poor 2, very poor 2.”

The same warnings have been given by successive Assistant Directors of Agriculture responsible for control of the Lake Province Agriculture, e.g. A.D.A. Annual Report, 1952:—

“The Bahaya seem to have lost all interest in crops such as oranges, onions and potatoes . . . banana supplies grow less each year although the surplus money tends to mask this. As there is only an average of one beast to every four plantations the supply of organic manure is quite inadequate to support bananas . . . in spite of the terrific circulation of cash the only commodity which seemed to be really popular with the African was bicycles . . . this build-up of surplus cash, together with a growing awareness of their strength as units of growers has resulted in some disrespect for authority.”

The same serious warning is repeated in the 1953 Annual Report, A.D.A., Lake Province:—

“Due to poor conditions bean crop was negligible. . . . Food has been in short supply throughout the year . . . high prices received for coffee have put the Bahaya in a position where they can afford to purchase imported food . . . but their exceptional purchasing power is not expected to last much longer and they will then be obliged to face up to the problem that will confront them.

The cattle population is unequal to the task of maintaining the standard of fertility required by the bananas which are yielding less and less as year follows year. The bananas are getting smaller and smaller and the average clump no longer produces a bunch every nine months as it did previously. . . . Due to absence of any soil conservation yields in the grass lands are much less than they were particularly in regard to the bambara nut crop.”

SOIL ANALYSES

In the course of his survey in the Nyakato area the Agricultural Officer, Bukoba, reported that the soil profile consists of a sandy top soil and subsoil with a large increase of clay at 18 in. persisting (except on steep slopes) to 11 ft. or more with impeded drainage. A number of samples were taken at different parts of the area and were submitted to the Government Chemist, Tanganyika.

TABLE 3—SOIL ANALYSES, NYAKATO AREA, BUKOBA
(W. M. Calton, Government Chemist, T.T.)

SAMPLE NO.	Depth (ins.)*	pH	Conductivity	Ca Me	Avail P ppm	Org. C %
61	T 0-6	6.4	236	10.6	215	2.1
	M 6-12	6.5	100	1.2	40	1.8
	B 12-18	6.2	95	1.1	10	0.6
5	T 0-6	6.4	500	18.9	705	3.6
	M 6-12	6.2	400	11.7	585	2.9
	B 12-18	6.6	300	5.3	342	2.8
129	T 0-6	6.0	102	6.7	158	2.2
	M 6-12	6.2	95	5.2	171	1.9
	B 12-18	6.2	90	4.7	73	1.5
149	T 0-6	5.8	380	2.0	133	0.4
	M 6-12	6.0	205	1.6	133	1.8
	B 12-18	6.0	288	1.5	171	0.8
33	T 0-6	6.8	90	0.8	69	1.1
	M 6-12	6.2	150	0.9	70	1.4
	B 12-18	5.5	135	0.6	20	0.8
X Open Grassland West Buhembe—	6-12	5.5	130	2.1	65	2.3
	?	5.5	110	1.4	41	1.9
	12-18	6.4	100	1.5	18	1.3
	T 0-6	6.1	320	3.9	84	1.7
43	M 6-12	6.2	100	1.7	58	1.4
	B 12-18	6.3	115	1.0	16	0.7
	T 0-6	6.6	142	1.9	57	2.0
	M 6-12	6.6	92	1.1	58	1.8
	B 12-18	6.2	152	1.4	43	0.3
Open Grassland Bet. Buhembe and Kyasha Villages—	T 0-6	6.5	60	1.8	87	1.8
	M 6-12	6.5	135	2.3	57	1.7
	B 12-18	6.5	55	2.3	52	0.7
Kyasha Open Grassland East X.1—	T 0-6	6.0	245	2.0	70	2.0
	M 6-12	6.5	140	2.5	53	2.5
Kyasha Open Land X (2) ..	B 14 (rock)	—	—	—	—	—
	T 0-6	6.2	135	6.1	562	6.1
No. 36	M 6-12	6.4	102	2.7	262	2.6
	B 12-18	6.0	125	2.2	166	2.2
No. 42 (a) M	6-12	0.2	450	2.3	70	2.3
No. 2 (b) T	0-6	6.4	170	2.9	109	2.8

* T = top sample. M = middle sample. B = bottom sample.

Table 3 gives the findings in detail, and the Government Chemist sums up as follows:—

“Phosphorus status throughout is quite good, poor soils in this respect usually containing less than 10 parts per million. This may be due to hut refuse or (cultivation on) old living sites or to local parent material of the volcanic type. Exchange calcium figures are variable; this element which is of a major significance nutritionally will, in a first class soil, amount to

10 Me% or more: below 1 Me% is very low. Adequate Ca levels so far as crop growth is concerned usually means that other nutrients are adequate.

Agricultural improvement of these soils might be difficult because, though in many cases short of Ca, even if lime were available liming would throw minor element nutrition out of gear due to lack of buffer capacity in the clay complex. The safest procedure is to build up base reserves by the use of organic materials."

VETERINARY SURVEYS

The Agricultural Reports quoted above show that the crops are not being cared for: the report of the soil analysis shows that the soil is being neglected. The same is true of the animals owned by the Bahaya: their animal husbandry is poor: in the latter half of 1953 when rinderpest threatened the area many stockowners refused to allow vaccination of the stock. The result was that out of a total population of 63,000 cattle no less than 10,078 died in a few months. Prior to the rinderpest epidemic of 1953, the stock population was estimated to have been—cattle, 63,904; sheep, 38,552; and goats, 65,691. Due to the present income from coffee the Bahaya are in a position to purchase meat: the demand cannot be met from the small local resources and the importation of stock reached a record level in 1953: the 1953 Annual Report of the Assistant Director of Veterinary Services shows that in 1953 sales of cattle in the Bukoba district reached 10,237 head, compared with 5,804 in 1952 and 1,625 in 1951. Small stock brought into Bukoba totalled over 5,000 sheep and goats; many of these animals were for breeding purposes, however.

In 1952 at the request of this department, J. P. D. Ross, Veterinary Officer, Bukoba district, kindly reported on important matters affecting animal husbandry as practised in the Nyakato sub-area. His report follows:—

"(a) General

Buhembe and Kyasha are two of eight villages making up the Gombolola of Nyakato. They lie adjacent to one another on the northern tip of the Kyamtware Chiefdom of Bukoba district four and a half miles from Bukoba Township. They may be regarded as being fairly typical of the coastal high-rainfall coffee-producing area in which the bulk of the population of the district is concentrated. Like most villages lying near the township many of their inhabitants are town workers and commute each day by bicycle, lorry and on foot.

The livestock population of the villages is:—

	174 Head of cattle.
	93 Head of goats.
	6 Head of sheep.
Total cattle owners	70
Total taxpayers	248
Total population	750

From these figures the following table may be calculated:—

STOCK	Average Number per Owner	Average Number per Taxpayer	Average Number Total Population
Cattle	2,486	·740	·232
Goats	—	·375	·124

Sheep are only used for ceremonial purposes and may be disregarded as they are so few.

(b) *Vital Statistics*(a) *Differential Census*

(1) Calves up to 18 months old:

Heifers	..	..	..	..	..	..	31
Bulls	..	..	..	..	..	..	11
							— 42

(2) Older calves, 18 months till puberty:

Heifers	..	..	..	..	..	..	43
Bulls	..	..	..	..	..	..	10
							— 53

(3) In-calf heifers 12

(4) Milking cows 28

(5) Dry cows (including in-calf cows) 30

(6) Old cows 4

(7) Prime bullocks 2

(8) Mature bulls 3

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(b) Calves up to 18 months have been grouped together as this is the average age that they join the main herd in the communal grazing lands around the village. Up to five months old, calves are usually confined completely to the house. Between 5 and 18 months they are tethered and grazed within the *shamba* limits.

This count shows a remarkably small number of male stock. Among the adults the ratio of cows to bulls is almost 25:1 and in the calves 25:7. The 1951 census figures for the whole Gombolola was 5:1 and the district 6:1. This may well be a recent trend due to the high prices that butchers are willing to pay for slaughter stock and has been noticed more obviously in other parts of the district, e.g. Karagwe.

The production of the cows is very low due to poor husbandry and malnutrition. Lactation and pregnancy rarely occur together and there is usually a long recuperative period between. If oestrus does intervene during lactation and pregnancy result, lactation ceases very soon after, consequently the average time between calvings is two to two and a half years which together with the disease aspect make the normal rate of increase very slow. This state of affairs is reflected in the high proportion of dry to milking cows 30:28.

Because of malnutrition in early life calves are late in maturing and it is common for heifers to be five and a half to six years old before producing their first calf.

The average number of calves produced in a cow's lifetime is five or six. Old cows are slaughtered only when they become senile and it is fairly obvious that they will not breed again.

(c) *Mortality Rates*

(i) In calves up to five months about 15 per cent are estimated to die, the causes are mainly due to malnutrition, worms, calf scours resulting usually from bad husbandry.

(ii) In older calves up to about 18 months old about 30 per cent to 35 per cent do not survive. This rise in mortality coincides with the calves being allowed to graze near the *shamba* environs, becoming tick infested and developing East Coast fever. This high rate of loss from East Coast fever is not surprising considering the poor start the calves get in early life.

(iii) Over 18 months the mortality is lower although there is a steady depletion of male stock by slaughtering for meat. Sporadic cases of anthrax and black-water do occur, also accidents account for a few, e.g. two cattle were burned to death during the survey.

(d) *Replacement Rate*

It was found impossible to get reliable figures from owners, numbers given being so contradictory. The differential census is also a poor source of information as the numbers are so relatively small. It is obvious, however, from the previous Gombolola census that the replacement rate is small but nevertheless sufficient to produce a small annual increase. In the past, however, with periodic epizootic or rinderpest, these increases have been swallowed up leaving deficits which could barely be made up between outbreaks.

(c) *Tribal Customs Connected with Stock*

(a) *Housing*.—Cattle are housed in the traditional dwelling or "*musonge*" which also serves the owner and his family. This close cohabitation very often in overcrowded conditions is conducive to the spread of tuberculosis. It was with this idea in mind that it was planned to carry out tuberculin tests of the cattle in these villages. Unfortunately in spite of two rather heated *barazas* (native meetings) it was not possible to get the owners to allow this test to be carried out in time for inclusion in this report.

Tuberculosis has long been suspected in these local cattle which are of the Ankole type. Unfortunately meat inspection statistics refer to the Sukumaland Zebu and it is only rarely an opportunity is presented for the post-mortem of a local beast.

All stocks are housed from dusk to 10 or 11 a.m. or even later in inclement weather. Calves up to five months old are housed all day and night.

(b) *Feeding Policies*.—The main herd goes out to graze in the late morning, sometimes as late as midday. This custom, which is general in the Bukoba district, is a tradition which is proving very difficult to break. It is most desirable, as three or four hours of the best and coolest grazing time is lost as the cattle are forced to graze during the heat of the day when flies are at their worst. Reasons for this custom have been given as follows:—

- (i) The morning rains which are usually very heavy and the susceptibility of the Ankole to chills and pneumonia.
- (ii) In the absence of the rains, the heavy dews, which are common in Bukoba, are 'bad for worms'.

Be this as it may the custom persists when there is no rain or dew, and even throughout the dry season from June till October.

Calves from birth to about five months old, being housed all day, are fed from the mother before going out to, and after returning back from, grazing. A little cut grass may also be fed to them during this age-period, but this is the exception rather than the rule.

In the event of the mother producing little or no milk, and this is fairly common, the owner first attempts to obtain milk from a more productive cow or from one whose calf has died. If he is successful, payment may be effected by giving a proportionate share of the calf, depending on the amount of milk the calf is estimated to have consumed.

If, as is more usual, no arrangement can be made, owners feed banana juice, chopped banana stems and a little green grass. This is never a substitute for milk and the calf, if it lives, is unthrifty and falls an easy prey to East Coast fever later on.

- (iii) Calves over five months old and under 15 to 18 months old do not usually graze with the main herd. They usually are tethered to the environs of the *shamba* where there may be a patch of grazing. They are tethered to prevent damage to the banana and coffee crops or to the beans by trampling.
- (iv) Adult cattle feed on the communal pastures only; no extra feeding is given, such as elephant grass, food residues, cassava or banana leaves and stems.
- (v) With regard to minerals in which the pastures generally appear to be deficient, there is usually one portion of the grazing which the cattle particularly relish, even to the extent of licking the soil in that region. These patches of salty soil are rare in this part of Bukoba but are common to the west and south.

(c) *Herding*.—Ownership, as already stated, is usually of small groups, single or even fractional. There is a village herdsman whose position, which is hereditary, is of some standing in the community. It is through him that orders are passed to the owners concerning cattle, e.g. inoculations, castrations, etc. He does not herd himself, but is responsible for electing a daily herder from the cattle owners in rotation. He also selects periodically which part of the pasture land, surrounding the villages, must be grazed.

The daily herdsman collects the cattle from owners who bring their cattle to the roadside or pathways. After collection he is in sole charge of the cattle and must report all accidents, illnesses, calvings, etc.

(d) *Bride Price*.—*Amakula* is very rarely paid in cattle, and nowadays is only done by people of the Royal Clan or the larger cattle owners of whom there are none in the villages of Buhembe and Kyasha. Money is commonly paid and very often in addition cloth, blankets and pots of banana beer. A sheep or a goat may be included depending on the wealth of the bride's parents.

(e) *Lending of Cattle*.—There is also a custom of lending cattle which is very interesting but most complicated and cannot be discussed at length here. A large cattle owner may distribute his cattle to various people in the form of a loan. These loans vary in degree from very temporary arrangements (sick person requiring milk) to contracts which are virtually transference of ownership in all but name. A payment is usually prescribed and the owner may require some of the milk to be delivered daily. In another form he is entitled to the milk for the first month following parturition and the cow and calf are temporarily returned to him so that payment can be conveniently made."

Dietary Survey, Bukoba

INTRODUCTION

The methods used for carrying out a dietary survey were discussed in detail in Monograph No. 1 of this series. Two dietary surveys have been carried out in the Bukoba district. In each survey 30 families were observed for a period of seven days during which time all food consumed was recorded.

Table 4 gives the averages of findings, and Tables 5, 6 and 7 show the detailed research of three families, one consuming a high-level diet, one consuming a low-level diet, and one showing intermediate values. An extra one, showing starvation diet, is included.

Nutrition Surveys, Bukoba District, 1953 and 1954

One dietary survey was carried out at Maruku, five miles to the south of Bukoba Town, during the early part of 1953, and another one at Nyakato, the same distance from Bukoba on the north side. The first was undertaken during the rainy season, and the second was in the dry months, so as to compare diets in the wet and dry seasons. As, however, Bukoba has a heavy average rainfall in the region of 80 in. per year, and few months without showers, not much difference was found in the diets.

The Bahaya are wealthy by African standards as they grow coffee as a cash crop. At the time of the survey coffee was fetching £350 a ton. Few Haya smallholders have a ton, but nearly all grow some coffee, and incomes of from £35 to £50 per annum from this crop are common.

This condition of comparative affluence separates the Bahaya sharply from more unfortunate tribes with no cash crop, but, as is frequently seen with monied Africans, they do not know how to spend it wisely, and a great deal is wasted on drink and venereal excesses.

TABLE 4—ILLUSTRATING AVERAGE BUKOBA DIETS

	Calories	Proteins	Fats	Cho.	Calcium	Iron	Vit. A.	Thiamine	Riboflavin	Niacin	Ascorbic Acid
		<i>gm.</i>	<i>gm.</i>	<i>gm.</i>	<i>mg.</i>	<i>mg.</i>	<i>i.u.</i>	<i>mg.</i>	<i>mg.</i>	<i>mg.</i>	<i>mg.</i>
Average of 10 Families	2,755	69.5	19.2	568.9	554.1	25.8	5,028	1.69	1.64	14.7	276
Average of 17 Families	1,956	62.1	17.8	373.0	507.0	18.3	2,877	1.28	1.06	12.0	146
Individual Family ..	2,862	106.4	24.9	527.3	773	36	12,514	2.43	2.91	30.8	263
Individual Family ..	1,480	53.6	24.8	253.0	223.0	14.6	2,354	0.89	0.87	10.8	91
Individual Family ..	1,694	40.9	9.8	349.8	524.0	15.2	2,645	1.0	0.80	5.4	193
AVERAGE TOTAL ..	2,145	66.5	19.3	414	516	21.9	5,083	1.46	1.45	14.7	191
RECOMMENDED TOTAL (PLATT)	2,500	60	50	472	800	20	5,000	1.5	1.8	12.0	30-70

TABLE 5—COMPARISON OF BAHAYA DIETS WITH THOSE OF OTHER AFRICAN TRIBES

	Calories	Proteins	Fat	Cho.	Calcium	Fe.	V.T.A. as Carotene	Thiamine	Riboflavin	Nico- tinic Acid	Ascorbic Acid
		<i>gm.</i>	<i>gm.</i>	<i>gm.</i>	<i>mg.</i>	<i>mg.</i>		<i>mg.</i>	<i>mg.</i>	<i>mg.</i>	<i>mg.</i>
Bahaya Diet (Bukoba, Tanganyika Ter.) ..	2,141	66.5	19.3	414	516	21.9	5,083	1.46	1.45	14.7	191
Kisii Diet (Nyanza, Kenya)	2,531	88	37	453	770	39	13,855	2.42	1.39	18.3	118
Kwimba Diet (Sukama- land Tanganyika Territory)	1,735	60.0	22.0	329	392	19.0	7,765	1.32	0.70	11.9	73
Msambweni Diet (Mombasa, Kenya)	1,744	36.4	18.3	376	809	18.8	1,041	0.43	0.68	8.2	93
Lala Diet (Northern Rhodesia)	1,437	43.2	11.1	281	1,238	24.7	4,163	1.30	0.53	9.0	16
Buha Diet (Kibondo, Tanganyika Ter.) ..	2,606	93	23	498	532	45	17,386	2.98	1.74	16.3	246
Suggested Require- ments	2,500	60.0	50.0	472	800	20	5,000	1.50	1.80	12.0	30-70

(Platt) Reference diets of Kisii, Kwimba, Msambweni and Buha, all these figures are for Dietary Surveys carried out by the 'East African Medical Survey. The Lala diet is from Thomson's figures, Northern Rhodesia Government Survey of Serenje Plateau, 1949.

TERRITORY, TANGANYIKA.

DISTRICT, BUKOBA.

TABLE 6.—FOOD SURVEY

VILLAGE, NYAKATO.

DATE 3RD JULY TO 9TH JULY, 1954

				PARTICULARS OF FAMILY			HOUSEHOLDER'S:—	
				AGE	HEIGHT	WEIGHT	Occupation: Tailor.	
							Income: Sh. 110 per month.	
Head	Antonio s/o Mitago .. ..	..	..	47			FOODS At Home: Plantains, Beans, Ground-nuts, Sweet Potatoes. Bought: Meat, Fish, Liver, Tea, Beer.	
Wife	Amina d/o Musa .. ..	..	..	35				
Child	Anatoria d/o Antonio .. ..	..	..	11				

DIET ANALYSIS PER HEAD PER DAY

FOOD	Amount per Head	Calories	Proteins	Fat	CHO.	Ca.	Iron	Vit. A.	Thiamine	Ribo-flavin	Nico. Acid	Vit. C.
	<i>gm.</i>		<i>gm.</i>	<i>gm.</i>		<i>mg.</i>	<i>mg.</i>	<i>i.u.</i>	<i>mg.</i>	<i>mg.</i>	<i>mg.</i>	<i>mg.</i>
CEREALS— Bread	124	429	13·6	1·9	89·3	24·8	3·1	—	0·49	0·21	6·2	—
ROOTS AND TUBERS— Sweet Potatoes	760	706	12·1	—	159·6	182·0	7·6	380	0·60	0·38	4·5	182
LEGUMES— Beans	160	489	38·4	3·2	76·8	176·0	12·8	—	0·72	0·54	3·7	—
VEGETABLES— Plantains	670	690	6·7	2·0	160·8	46·9	3·3	2,340	0·33	0·40	3·3	67
ANIMAL PRODUCTS— Meat	100	189	18·0	13·0	*	12·0	4·0	40	0·09	0·25	5·0	*
Liver	36	51	6·1	2·1	1·8	3·9	3·6	9,720	0·10	0·90	5·4	11
Fish	33	32	6·8	1·0	*	270·0	1·0	—	0·02	0·04	1·0	*
BEVERAGES— Tea	1·7 cups	136	1·7	0·7	32·0	47·6	—	34	0·02	0·14	0·5	—
African Beer	260 gm.	130	2·6	*	7·0	10·4	0·5	*	0·06	0·06	1·2	3
MISCELLANEOUS— Bambara Nuts	2	10	0·4	1·0	—	0·2	trace	trace	trace	trace	trace	trace
TOTAL		2,862	106·4	24·9	527·3	773	35·9	12,514	2·43	2·91	30·8	263
DESIRABLE		2,500	60	50	472	800	20	5,000	1·50	1·80	12	30

GENERAL REMARKS

Table 6 illustrating good food intake.

TABLE 7.—FOOD SURVEY

TERRITORY, TANGANYIKA.

DISTRICT, BUKOBA.

VILLAGE, NYAKATO.

DATE 3RD JULY, 1954.

PARTICULARS OF FAMILY

	NAME OR NUMBER	AGE	HEIGHT	WEIGHT	HOUSEHOLDER'S— Occupation: Headman. Income: Sh. 60 per month.
Head	Kayage s/o Ritegya	85			FOODS— At Home: Plantains, Sweet Potatoes, Beans, Groundnuts. Bought: Meat, Fish, Tea.
Wife	Kayuka	65			
Child	Dalia	12			

DIET ANALYSIS PER HEAD PER DAY

FOOD	Amount per Head	Calories	Proteins	Fat	CHO.	Ca.	Iron	Vit. A.	Thiamine	Ribo- flavin	Nico. Acid	Vit. C.
	<i>gm.</i>		<i>gm.</i>	<i>gm.</i>		<i>mg.</i>	<i>mg.</i>	<i>i.u.</i>	<i>mg.</i>	<i>mg.</i>	<i>mg.</i>	<i>mg.</i>
ROOTS AND TUBERS—												
Sweet Potatoes	450	418	7.2	—	94.5	108.0	4.5	225	0.36	0.22	0.27	108
Yam	170	170	3.4	—	39.1	17.0	2.0	—	0.08	0.09	0.90	—
Cassava	—	35	0.1	—	8.6	6.7	0.2	—	trace	trace	—	8
LEGUMES—												
Beans	15	46	3.6	0.3	7.2	16.5	1.2	—	0.06	0.05	0.3	—
VEGETABLES—												
Bananas	670	690	6.7	2.0	160.8	46.9	3.3	2,340	0.33	0.40	3.3	67
ANIMAL PRODUCTS—												
Fish	13	35	6.5	1.0	—	260.0	1.0	—	trace	trace	trace	trace
Meat	18	34	3.2	2.3	—	2.1	0.7	7	0.01	trace	0.3	—
BEVERAGES—												
Beer	72 gm.	36	0.7	—	2.1	2.8	trace	—	trace	trace	0.4	—
Tea	½ cup	40	0.5	0.2	9.5	14.0	—	10	trace	0.04	0.2	trace
MISCELLANEOUS—												
Bambara Nuts	55	190	9.0	4.0	28.0	50.0	2.3	—	0.16	—	—	—
TOTAL	—	1,694	40.9	9.8	349.8	524	15.2	2,645	1.0	0.8	5.4	183

GENERAL REMARKS

Table 7 shows family with average of all findings.

GENERAL REMARKS

Table 7 shows family with average of all findings.

TABLE 8.—FOOD SURVEY
 TERRITORY, TANGANYIKA. DISTRICT, BUKOBA. VILLAGE, NYAKATO. DATE 3RD JULY, 1954
 PARTICULARS OF FAMILY

	NAME OR NUMBER	AGE	HEIGHT	WEIGHT	HOUSEHOLDER'S— Occupation: Mason. Income: Sh. 250 per month.
Head	Andreas	56			FOODS— At Home: Plantains, Sweet Potatoes, Groundnuts, Beans, Beer. Bought: Meat, Tea
Man	Apolinal	32			
Wife	Ndimu				
.. .. .	Maria				
Child	Fraxia				
.. .. .	Clementina				
.. .. .	Roxa	9			
.. .. .	Sicora	7			
.. .. .	Salvatori	4			
.. .. .	Sipexita				
.. .. .	Geraldina				
.. .. .	Damiani	12			

DIET ANALYSIS PER HEAD PER DAY

FOOD	Amount per Head	Calories	Proteins	Fat	CHO.	Ca.	Iron	Vit. A.	Thiamine	Ribo- flavin	Nico. Acid	Vit. C.
	<i>gm.</i>		<i>gm.</i>	<i>gm.</i>		<i>mg.</i>	<i>mg.</i>	<i>i.u.</i>	<i>mg.</i>	<i>mg.</i>	<i>mg.</i>	<i>mg.</i>
ROOTS AND TUBERS— Sweet Potatoes	100	93	1.6	—	21.0	24.0	1.0	50	0.08	0.05	0.6	24
LEGUMES— Beans	15	46	3.6	0.3	7.2	16.5	1.20	—	0.06	0.05	0.34	—
VEGETABLES— Plantains	640	659	6.7	1.9	153.6	44.8	3.20	2,240	0.32	0.38	3.2	67
ANIMAL PRODUCTS— Meat	125	236	22.5	16.2	—	15.0	5.0	50	0.11	0.31	6.2	—
BEVERAGES— Beer	58 gm.	30	0.6	*	1.8	2.0	0.2	*	0.02	0.02	0.3	trace
Tea	70	70	0.6	0.4	15.0	20.0	—	14	trace	0.06	0.2	trace
MISCELLANEOUS— Ground Nuts	100	346	18.0	6.0	55.0	90.0	4.0	*	0.30	—	—	—
TOTAL		1,480	53.6	24.8	253	223	14.6	2,354	0.89	0.87	10.8	91
DESIRABLE		2,500	60	50	472	800	20	5,000	1.50	1.80	12	30

GENERAL REMARKS

Table 8 householder with good salary but large family. Low food intake.

TABLE 9.—FOOD SURVEY

TERRITORY, TANGANYIKA.

DISTRICT, BUKOBA.

VILLAGE, NYAKATO.

DATE 3RD JULY TO 9TH JULY, 1954

PARTICULARS OF FAMILY

	NAME OR NUMBER	AGE	HEIGHT	WEIGHT	HOUSEHOLDER'S— Occupation: Farmer. Income:
Head	John	30			FOODS— At Home: Plantains, Sweet Potatoes, Groundnuts, Beans. Bought: Meat, Beer.
Women	Francisca	40			
”	Kabone	65			
”	Frazia				
Child	Christopher	5			
”	Novati	2			

DIET ANALYSIS PER HEAD PER DAY

FOOD	Amount per Head	Calories	Proteins	Fat	CHO.	Ca.	Iron	Vit. A.	Thiamine	Ribo- flavin	Nico. Acid	Vit. C.
	<i>gm.</i>		<i>gm.</i>	<i>gm.</i>		<i>mgm.</i>	<i>mgm.</i>	<i>i.u.</i>	<i>mgm.</i>	<i>mg.</i>	<i>mg.</i>	<i>mg.</i>
ROOTS AND TUBERS— Sweet Potatoes	260	241	4.1	—	56	62.4	2.6	130	0.20	0.13	0.16	62
LEGUMES— Beans	40	120	8.0	0.4	21	28.0	2.4	—	0.21	0.06	0.6	—
VEGETABLES— Plantains	280	288	2.8	0.8	67	19.6	2.8	980	0.14	0.17	1.4	28
ANIMAL PRODUCTS— Meat	8	15	1.4	1.0	*	0.9	0.3	3	trace	0.02	0.4	—
MISCELLANEOUS— Ground Nuts	44	152	7.9	2.6	24	39.6	1.8	—	0.13	—	—	—
TOTAL		816	24.2	4.8	168	148	9.9	1,113	0.68	0.38	2.4	90
DESIRABLE		2,500	60	50	472	800	20	5,000	1.50	1.80	12	30

GENERAL REMARKS

Table 9.—Starvation diet. Suspected of drinking too much beer (seen almost daily at beer shops in Bukoba).

The women, who do most of the work of cultivation, benefit little from the profit and this is a cause of great dissatisfaction amongst them.

A Haya house is nearly always surrounded by a banana plantation which may contain anything from 600 to 1,000 plants. Most of them are different varieties of plantains, which fruit so as to keep the family supplied throughout the year, but sweet bananas are included also with which to make banana wine. The coffee trees grow in the same plantation in between the bananas, and it is the women's business to keep both mulched. Beans and groundnuts are also sown amongst the bananas and coffee, but sweet potatoes have a plot by themselves.

Due to the dependable rainfall, there are two planting seasons and two harvests annually. Maize, beans, and groundnuts are sown in November and also in March. Sweet potatoes may be planted at any time, as also cassava and yams, although a time is usually chosen when the rains are near. Millet is usually sown in March. The Bahaya diet is varied, and although they do not consume sufficient calories as judged by modern nutrition standards, they never experience "hunger months" and have a great sense of security as far as their food is concerned.

DISCUSSION ON FOOD SOURCES

Food Crops Grown Locally

These observations on foodstuffs grown or obtained locally, together with the prices in English currency, were made in the town itself and at the Bukoba market.

Plantains: *Musa paradisiaca* Linn.—Price, 2½d. for five or six. These are grown to fruit at different periods of the year. They are the staple food of the Bahaya, and are grown everywhere in the district.

Small Sweet Bananas *Musa sapientum* Linn.—Price, four for 1d. Generally two crops per year, but a few seem to be obtainable most of the time.

Cassava: *Manihot utilissima* Pohl.—Price, 4d. for one large tuber. This may be eaten raw, or dried and ground into flour. The leaves are cooked and are eaten as a vegetable.

Sweet Potatoes: *Ipomoea batata* Linn.—Price, two small potatoes for 1d. Plentiful. Generally eaten roasted or boiled.

Groundnuts, Bambara: *Voandzeia subterranea* Thou.—Price, 1s. per lb. These are frequently used cooked with plantains.

Groundnuts: *Arachis hypogæa*.—Price, 1s. per lb. These are popular eaten raw, or cooked with oil and salt.

Beans: *Phaseolus lunatus* Linn.—Price, 8s. to 10s. for 36 lb. Small beans, known locally as *Nkoba*. Price as for larger variety. These are only on sale once a year at planting time (March) before the heavy rains.

Yams: *Disolorea sativa*.—Price, from 1d. each upwards according to size. The yam is a deep-rooted tuber rather resembling cassava. The leaves are not usually eaten. Some natives disagree on this, but yam leaves were not observed as a dish during the dietary survey.

Tomatoes: *Lycopersicum esculentum* Mill.—Price, 6d. for five or six very small ones. Tomatoes are scarce and expensive round Bukoba, owing to frequent rain and clouds. They are used to flavour meat dishes stewed by themselves or with onions.

Maize: *Zea mays* Linn.—Price, ground into flour, 6d. per lb. Maize cobs, one or two for 1d., according to size.

Sugar-cane: *Saccharum officinarum* Linn.—Price, 5d. for a stick of 3 ft. to 4 ft. in length.

Chillies: *Capsicum annum* Linn.—Price, four or five for a 1d.

Egg Plant: *Solanum meloncena* Linn.—Not usually on sale, but can be found occasionally growing in a garden plot.

Mushrooms: *Agaricus* spp.—These grow wild and can be picked in places where there is short grass.

Bulrush Millet: *Pennisetum typhoides*.—This is used ground into flour. It is not sold on the market.

Sorghum (red): *Sorghum* spp.—This variety is grown for brewing beer. It is not sold in the market.

Spinach, Sweet Peppers, Pumpkins, Cabbage.—All these are grown by the Bahaya as required. They are seldom for sale on the market. There is also a small plant, called "Curry Plant", which is used as a curry powder.

Green Leafy Vegetables.—This heading includes leaves of cassava, leaves of sweet potatoes, leaves of pumpkins, leaves of wild spinach of the *Amarantus* variety. These are not much eaten, as they are not popular with the Bahaya. It may be that this neglect of green food is due to the fact that their staple food, plantains, contain much of the qualities of a good vegetable, and that they do not feel the need of cooked "greens", but the Bahaya are somewhat snobbish, and may think that to have to eat leaves as a relish, instead of meat or fish is to have come down in the world.

Irish Potatoes and other vegetables.—Chiefly for Europeans and Asians, such as beetroot, carrots, onions and peas, are grown at Karagwe, 70 miles distant from Bukoba Town, but part of Bukoba district. Prices vary, but are generally expensive as the roads are bad and transport cost high.

Coffee.—This is chiefly of the Robusta type. It is the principal cash crop of Bukoba, and is grown by nearly everyone according to the amount of land they possess which is suitable. The coffee trees are interspersed between the bananas, so that the one mulch covers both. Coffee may not be sold except through the Bukoba Coffee Board, which has a monopoly of the crop. There is, however, a good deal of smuggling of coffee to outside buyers who offer a higher price.

Fruits Grown Locally

Oranges: *Citrus aurantium*.—Price, 1d. each. The Bukoba oranges are a pleasant juicy type, but they are not much eaten by the Bahaya, and are chiefly grown as a minor cash crop, and are exported by lake steamer to towns round Lake Victoria with a drier climate than Bukoba where orange trees do not thrive.

Tangerines: *Citrus aurantium sinensis*.—Price, 2d. each. Grown outside Bukoba. Rather scarce.

Lemons: *Citrus limonia*.—Price, ½d. each. These are fairly plentiful and there are many lemon trees growing round the houses in the town.

Limes: *Citrus aurantifolia* (Christm.).—Price, six for 1d. Limes are plentiful but of small size. Lime juice is used as a drink, and was met with several times during the survey.

Pineapples: *Ananas comosus* Linn.—Price, 6d. or 9d. each, depending on size. These are grown in all the garden plots.

Pawpaw: *Carica papaya* Linn.—This fruit comes into the market from persons growing them within a radius of five or six miles.

Passion Fruit: *Passiflora quadrangularis*.—Seldom on sale in the market. They are used to make sweet drinks.

Mangoes: *Mangifera indica* Linn.—Price, 2d. to 2½d. each, depending on size.

Tree Tomatoes: *Cyphomandra betacea*.—Price, two or three for 1d. The Bahaya appear to use this fruit a good deal cooked with sugar.

Bananas, Small, Sweet, Yellow: *Musa sapientum* Linn.—Price, ½d. each. Plentiful.

Plantains: *Musa paradisiaca* Linn.—Price, five or six for 2½d. These are always sold unripe and green, as they are used for cooking in that state.

Bitterberries.—These grow wild and are eaten by children.

Other Foods Obtained Locally

Beef.—Price, 1s. 6d. per lb. Sold in the market, and at outside country butchers' stalls. It is fairly generally eaten.

Mutton.—Price, 2s. per lb. This is seldom for sale. Women do not eat mutton.

Goatflesh.—Price, 2s. per lb. Can be bought in the market from time to time. This is usually also a man's dish, although women are commencing to eat it.

Fowls.—Price, 4s. to 7s. for a medium-sized bird. Rarely on sale at the market. Chickens and fowls generally are eaten only rarely, and hardly at all by the women. When the time for planting beans comes round in October and March, all the hens are shut up in little pens for six weeks to two months till the beans are ready to harvest. During that time they get little or no attention, and many die for lack of food or water.

Eggs.—Price 2½d. to 3d. each. They are, however, very scarce, chiefly as the fowls in Bukoba are so neglected. The Bahaya eat eggs rarely. They are considered to be the food of the foreigner or white man.

Milk.—Price 6d. per bottle. Very difficult to obtain, since cattle are few owing to rinderpest.

[This important article of food is very scarce. The Ankole cattle are poor in milk yield, and, as elsewhere in Africa, the calves suck at the same time as milking is in progress. Otherwise, the natives believe the cow will not yield her milk. The procedure is somewhat as follows: The calf is put to the cow to suck, then after a minute or two it is elbowed aside and the milker takes its place. Two minutes of this and the calf is allowed another innings, and so it goes on till about a whisky bottleful of milk has been produced. This is considered a normal yield. With judicious watering, which is a very common practice in Bukoba, two bottles of cow's milk will yield three bottles of watered milk, which can be sold for 6d. per bottle. If there is milk, and there is a market for it within five or even seven miles, it will be sold. Europeans and Indians are the chief buyers. One may say that African children in the Bukoba district seldom have milk. Goats are not milked, and in neglecting this valuable source of food Africans make a big mistake. It is true that a native goat with a kid will only give about half a teacupful of milk daily, but even this amount would help a small child.]