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A "Meat-Hungry" People: Nutrition Science and the Colonial Discovery of Animal-Protein Malnutrition in Nigeria

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ABSTRACT

Following the discovery of vitamins in the 1910s, nutritional deficiencies began to be increasingly identified as crucial factors in disease causation. This development partly inspired many colonial doctors and scientists who moved into the Nigerian area and other colonial territories during the interwar years to undertake ethnographic and biochemical dietetic studies in relation to locally prevalent health problems. Fundamentally, these "colonial experts" pathologised tropical diets as lacking in essential nutrients, especially protein. Impelled by their works, the colonial government launched various initiatives to "improve" and "modernise" local diets to achieve the "promotion of public health" and "native welfare". On the strength of a close reading of germane archival data, this article explores the development of nutrition science and the colonial discovery of animal-protein malnutrition in twentieth-century Nigeria.

KEYWORDS

Nutrition; malnutrition; colonial science; meatification; food; meat

Introduction

In a report, *Nutrition in the Colonial Empire*, published in 1939 (CNCE 1939, 102), a special committee of the British government's Economic Advisory Council submitted that the "improvement of nutrition in the colonies" is "a case where the interests of finance and humanity coincide". Comprising renowned colonial administrators, academics and researchers in fields such as medicine, biology, agriculture, anthropology and economics, the Committee on Nutrition in the Colonial Empire (CNCE) was convinced that improving the nutrition of colonised peoples held out great economic benefits to the British Empire as it would lead to a general improvement in the native's wellbeing, which was essential for optimal labour productivity.

In essence, it was not lost on the Committee that imperial Britain's economic fortunes were closely linked to the wellbeing of the colonial labour force, for which good food played a pivotal role. These – to wit, imperial economic gains and public health – were the "interests of finance and humanity" that the report pointed out could be achieved

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simultaneously through dietary interventions. In effect, nutritional improvement in the colonies was a single stone to be deployed for killing two birds.

Why, though, was there a need to improve the diet of colonised peoples? While the rest of this article answers that question extensively with a focus on British Nigeria, it should be highlighted here that the reason derives from the common colonial notion that the African diet – and, indeed, much else about the continent – was generally of a poor and inadequate nutritive value, and it was "the white man's burden" to help improve it (Little 1991, 12). To be clear, this ethnocentric presupposition was trans-imperial in nature, cutting across the different colonial powers and their agents, and regarding their respective colonial possessions.

Impelled by colonialism's "civilising mission" ideology and its paternalistic hubris, British officials and scientists presumed that local diets across the Nigerian area were nutritively poor and deficient to varying degrees. This critical point has been well captured in the limited existing scholarship on food and nutrition in Nigerian history, notably in the works of scholars such as Eno Ikpe (1994), Jane Guyer (1997), Lacey Sparks (2023), Chima Korieh (2007), Michael Watts (2013), John Nott (2021) and Obi Iwuagwu (2012), among others. In an article exploring how, through food, British medical experts, administrators and colonial wives in Nigeria built and reinforced structures of power in quotidian contexts, American food historian Jonathan Robins (2010, 463) has underscored the sheer superficiality of the criteria by which colonisers deemed local foods as nutritively inferior and deficient.

The interwar "discovery of colonial malnutrition", while fundamentally trans-imperial, is most productively explored on a fine-grained level, where commonalities and peculiarities can be made clear (Worboys 1988). David Arnold's (1994) study focusing on colonial India brilliantly illustrates this point, and that is what this article similarly examines in the case of colonial Nigeria. On the strength of a critical reading of extensive archival data, I argue that the colonial concern over malnutrition in British Nigeria is inseparable from the push for cattle capitalism by the colonial state. While local diets were pathologised on different grounds, the focus here is on those relating to animal-protein deficiency in humans as the centrepiece of colonial nutritional interventions. We begin by examining the broader epistemological contexts of this "malnutrition fetish" in colonial science.

The New Science of Nutrition in the Age of Empire

The 1920s and 1930s was an era when, in the medical sciences, nutritional deficiencies were increasingly being identified in the causation of diseases, not just in humans but also in animals (Carpenter 2003b). Aside from the different kinds of pathogens already discovered in epidemiology, scientists began to discern that some illnesses were due to the dearth of certain chemicals or nutrients obtainable from foods (NANK V997 1932, 8). Underscoring the attention that nutrition commanded in medical practice at the time, Bruce Nicol, a leading physician-cum-nutritionist in colonial Nigeria, noted that "a study of the state of nutrition of his patients is a most important part of the doctor's work" (NANE MinHealth 12/1/4/H.7/Vol. II n.d. 340). A memorandum issued in 1932 to herald dietetic research in Nigeria further emphasises Nicol's point. Couched in the white civiliser rhetoric, the memo noted that it is "absolutely an imperative duty of the Medical

Profession in primitive countries to investigate the dietaries of the primitive people amongst whom they are working" (NANK V997 1932, 11).

Whereas intellectual interests in the relationship between food and health have existed for centuries, the advent of modern nutrition science is commonly traced to the 1840s (Todhunter 1973, 7–8). German chemist Justus von Liebig is generally regarded as having set the discipline on a fine footing with the publication of two books on animal and plant chemistry in 1842 and 1846 respectively (Kamminga and Cunningham 1995, 3–4). He shattered the humoral theory of health by demonstrating that living tissues (including foodstuffs) were made up of carbohydrates, fats and "albuminoids" or proteins. Minerals were added to the list later in the century through the works of other researchers, while German biochemist Wilhelm Stepp established the existence of what became known as vitamins as a vital food class in 1909. This discovery validated a series of research works by Dutch scientists in their East Indies colonies identifying beriberi as a deficiency disease (Tannahill 1988, 375–376). Stepp's work and those of biochemists Casimir Funk and Elmer McCollum in 1912 ushered in "the vitamin era" during which several types of vitamins were discovered in quick succession.

Thus, while the disciplinary foundations of nutrition science had been laid in the mid-nineteenth century, it was not until half a century later that the field began to gain currency. The discovery of several types of vitamins and minerals and their biochemical effects in the first quarter of the twentieth century marked a watershed in knowledge production on food and public health (Nkhoma 2020; Carpenter 2003a). The newfound body of knowledge and its practical application rapidly gained ascendancy in shaping government policies on food production, public health, land use, agriculture and the economy across Europe, particularly in Britain (Smith 1997).

In no time, the widespread scholarly preoccupation with nutrition was extended beyond the European metropolises into the colonial territories. Indeed, true to Helen Tilley's framing, Africa and other colonial societies quickly became the "living laboratory" and field site where many nutrition researchers tested out their hypotheses, collected useful data and built their careers (Tilley 2019). The era saw numerous European scientists moving into different colonial societies to conduct ethnographic and biochemical dietetic studies in relation to various local health problems.

The interwar boom in dietetic studies can be seen as the upshot of several realities. First, it could be understood as a product of necessity following the large-scale public health and nutritional exigencies of World War One (Worboys 1988, 26). Coupled with that, dietary and public health issues in colonial societies formed a part of the increasing inter-imperial commitment – however tokenistic – to development and welfarism that characterised the era of decolonisation (Wicker 1958, 189). These developments catalysed many investigations into the critical nexus between food and health at the time (Carpenter 2003a, 3331).

Equally, food historians often highlight the role of the League of Nations and other international organisations in championing what was then "the new science of nutrition" (Weindling 1995; Little 1991, 12). Indeed, Britain's establishment of the CNCE was in compliance with a 1935 resolution of the League mandating all member states to investigate the practical means for achieving better nutrition across their territories (NANE MH(Fed) 1/2/67/Vol. II n.d., 31; NANI CSO 26/23544/Vol. III n.d. 410–414). Other colonial powers also established similar outfits charged with collecting baseline data regarding local dietary

culture and food production in their colonial territories for guiding policy formulation (Little 1991). It was within this context that Nigeria, as a British colonial territory, appeared on the radar of the globalising science.

The Nigerian Food Scenario on the Eve of Colonisation

It is important to point out that the twentieth-century colonial nutrition scientists were not the first crop of researchers interested in understanding the food pathways and dietetic cultures of Nigerian peoples. The interwar wave of colonial nutrition studies was preceded by several publications which touched on food and dietary customs in different precolonial Nigerian societies. The works ranged from travelogues of Arabian and North African traders to accounts of European explorers and missionaries, memoirs and cookbooks by colonial officers and colonial wives, as well as texts by European anthropologists and sociologists, among others (Meek 1925, 135–141; Larymore 1908). These sources, combined with other relevant secondary literature, offer a vivid picture of the diets of Nigerian peoples as seen by outsiders on the eve of British colonisation.

Fundamentally, two broad types of food culture have been identified within the Nigerian area – namely, one built around grains, and the other on starchy roots and tubers. The grain food complex is synonymous with the cereal belt, while the roots and tubers comprise the yam and cassava belts. Some scholars have identified yet another food complex: the cattle belt. The cereal and cattle complexes existed mainly in the north, while the yam and cassava complexes predominated in the south (Isichei 1983, 21–28; May 1965, 40; Ikpe 1994, 77). Nonetheless, several pockets of overlap existed between two or more complexes across the different regions.

In northern Nigeria, which is characterised by its grain-based food system, cereals such as several kinds of millet (*gero*) and sorghum (i.e. guinea corn or *dawa*) were the main staples on which the people commonly fed (Watts 2013, 27, 61; Meek 1925, 135). Rice and wheat also featured in their diets, but they were much less prominent. Meanwhile, among the pastoral Fulani, Kanuri, Kanembu and others belonging within the cattle complex, diets consisted mainly of grains and milk, and the people ate comparatively more meat and other animal products (Blench 1996, 112–113; de St Croix 1945, 47–53).

Conversely, within the roots and tuber complexes of southern Nigeria, people's nutrition relied heavily on different types of yam and, to a lesser degree, cassava (manioc). Over time the people had developed several ways of processing and preparing these two crops into various foods. They could be eaten boiled, fried, roasted or in other edible forms (May 1965, 60). There are folk poems and oral literature capturing the elevated status of the yam in the Yoruba diet. Indeed, the yam has customarily been at the centre of several traditional festivities and socio-cultural events in many parts of southern Nigeria, particularly among the Yoruba and the Igbo (Korieh 2007).

The prominence of the yam among the Igbo people of south-eastern Nigeria is evident even in popular culture. For instance, pioneering Nigerian novelist Chinua Achebe ([1958] 1994, 33–34) aptly captures the yam's pride of place in Igbo culture as the "king of crops" in his popular classic *Things Fall Apart*. Over the last century, however, cassava steadily grew in popularity across southern Nigeria. Particularly among the Igbo, cassava has been elevated from being a poorly reputed famine relief cultigen to becoming a

popular mainstay (Korieh 2007; Iwuagwu 2012). Aside these two staples, maize (corn), cocoyam and plantain were supplementary crops in the precolonial diets of southern Nigerian societies (Güsten 1968, 42; Guyer 1997, 49).

Soups, stews or sauces made of ground peppers and various vegetables commonly accompanied most local dishes, with oil made from palm fruits, palm kernels or coconut in the south, or groundnut in the north (May 1965, 58). Legumes such as beans of different variants were also cultivated and consumed across the different food belts of precolonial Nigeria, but more commonly in the north.

The central Nigerian area, commonly called the Middle Belt, was an area where the different food cultures of northern and southern Nigeria overlapped. There, the grain- and cattle-based food culture of the north intersected with the root- and tuber-based cultures of the south. Thus, crops belonging to both food cultures were common in the Middle Belt. While the main crop of the Benue people and other ethnic groups of central Nigeria was yam, cassava, millet, maize and rice were also grown and eaten (Odey 2011, 67–69, 74; Bohanan and Bohanan 1968, 60).

Notably, meat was a luxury across southern and central Nigeria. It was a preserve of "big people" or reserved for "big days" (Bohanan and Bohanan 1968, 75). Commenting on the precolonial foodways of south-western Nigeria, a colonial report published in 1910 noted: "The Yoruba people live more on vegetables than on flesh [meat]" (Hopkins 1969, 100). William Bascom (1951, 42) has also highlighted the fact that "meat was a food for ceremonies and special occasions. Only the chiefs and the wealthy could afford to buy meat regularly or to kill a domestic animal simply for food." The Yoruba, like many precolonial African peoples, "ate meat only when an animal died or was sacrificed, and might go for long periods without tasting meat" (Bascom 1951, 42). Even when meat was available, eating it liberally was often considered ostentatious or prodigal. Fish and other aquatic lives were the common protein sources in the menus of the coastal and mangrove communities of the south and the Middle Belt, as well as those of pockets of northern riverine communities.

It is important to highlight the role of nature and ecology in determining the dynamics of Nigerian food cultures. Each region's vegetation, cultigens and food resources were largely determined by natural factors such as the nature of the soil, climatic condition, volume of rainfall and availability – or lack – of waterbodies (Ikpe 1994, 14; May 1965, 40). Much the same is true regarding livestock production across Nigeria. The fact that the southern and central Nigerian areas, unlike the north, lie within the African tsetse belt where the primary vector of trypanosomiasis is endemic has been the main obstacle hindering substantial animal husbandry throughout the region (May 1965, 51). Thus, while southern Nigeria had no significant livestock complex, as was the case in the north, the rearing of small stock (goats, pigs, fowls and geese, for example) as well as game hunting for subsistence were not uncommon.

The dietary scenario sketched out above is in many ways similar to what obtained in many parts of Africa on the eve of European colonisation of the continent (Bascom 1949, 334; Nkhoma 2020, 3–4). Indeed, as eminent historian Philip Curtin (1983, 371) has pointed out, African people have had to adapt to "nutritional deficits in significant and creative ways" as they confronted "fragile climates". It is in the light of the foregoing that colonial nutritional scientists began stressing that Nigerian diets, especially in the south, were low in protein.

Colonial Nutrition Research in Twentieth-Century Nigeria

It is in this diversity of food cultures and negligible meat consumption that the *Nutrition in the Colonial Empire* report diagnosed serious nutritional deficiencies and several associated health problems as major barriers to development across colonial Africa and other colonial societies. Arising from the concerns and dual interests communicated in the report mentioned earlier, the CNCE and the British colonial government found it necessary to commit to further research into nutrition in the Tropics and its improvements. For this, interdepartmental cooperation was deemed crucial in order to cut out duplication of efforts. It bears highlighting that the experts were commonly fired up by the presumption that African peoples were just as malnourished and needing remedies as the British peasantry at the time (Nkhoma 2020, 4–5). Nutrition historian Cynthia Brantley (2002, 10) underscores the fact that the CNCE's report carried the conclusion that "virtually all colonial peoples had health problems that could probably be associated with diet". Hence, collecting and disseminating information about local dietary problems and their remedies were deemed crucial for tackling and preventing malnutrition in any community.

As a result, the Committee set up a body headed by Benjamin Stanley Platt, a doctor and nutritionist with the British Medical Research Council's Human Nutrition Research Unit, to organise and conduct nutritional surveys in British colonial territories. In testament to the growing popularity of the scientific study of nutrition at the time, Platt soon became the research unit's director; he was also appointed as a professor of human nutrition in the Applied Nutrition Unit of the London School of Hygiene and Tropical Medicine (*Nature* 1947). His empire-wide surveys commenced in East Africa, starting out at Nyasaland (present-day Malawi) in 1938, and soon shifted to the British West Indies (Culwick 1944). By the end of World War Two, Platt and his party sojourned in West Africa to investigate the region's dietetic realities (NANE CalProf n.d., 16).

Prior to Platt's West African stint in 1945, however, several scientists were already in the Nigerian field conducting studies into the local food systems. Notable among such researchers were William McCulloch, J. G. S. Turner, D. G. Fitzgerald Moore, Alfred Clark, William Hughes, Manfeld Oberdorffer, James Leslie McLetchie and William Bascom, among others. Several other nutrition scientists also came into Nigeria after 1945. These included Bruce Nicol, I. G. Thomson, Alan Waller Woodruff, W. D. Silvera and D. B. Jelliffe, among numerous others. While British medical doctors dominated the pack, there were also a few non-British scholars such as Bascom, an American anthropologist with an abiding interest in nutritional ethnography.

It is noteworthy that prison rations and their impact on inmates' health were among the first concerns that whetted the appetite of the earliest nutrition scientists in colonial Nigeria (NAUK CO 859/115/1 1944, 33). In 1920, rising prison mortality figures across southern Nigeria (with some gaols reporting rates as high as 300–400 per thousand inmates) compelled the secretary of state to order an investigation into the roots of the problem. The panel blamed the high rates of health problems and mortality among the prisoners on nutritional deficiencies primarily. Consequently, a new diet scale that raised the proportion of "protective elements" such as meat, fish, vegetables and salt was adopted for colonial prisons in southern Nigeria. The result of the improved ration quality and supervision was a quick, steep reduction in sickness and mortality figures, as well as in the annual feeding expenditure. It was so much so that the death

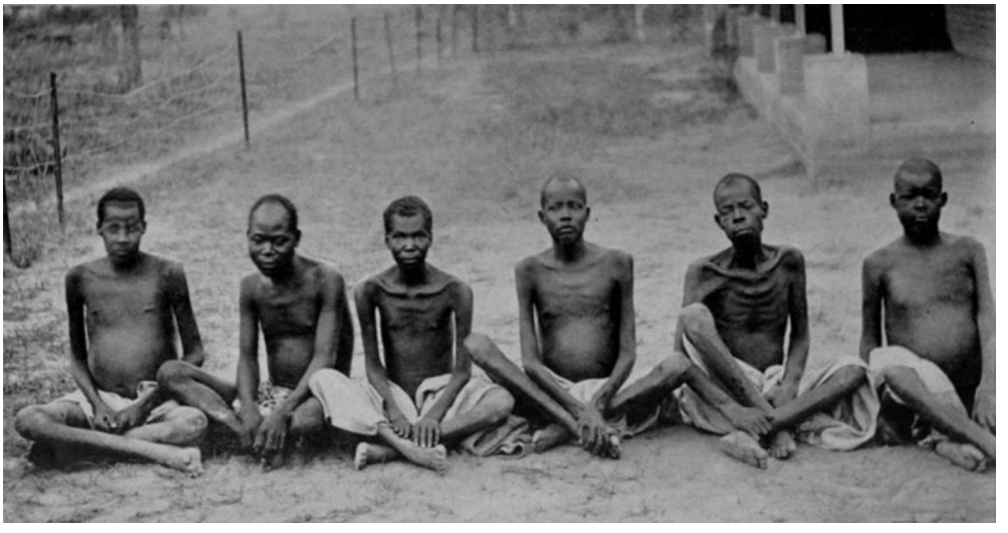

Figure 1. Cases of beriberi among colonial prisoners at Kano in 1927. Source: AMSR 1927, 120.

statistics reported in 1930 and 1937 were 24 and 12 per 1,000 respectively. More than anything else, this episode indelibly impressed the importance of improved nutrition, and the utility of dietetic studies to that end, in the minds of the Nigerian colonial authorities (NAUK CO 859/115/1 1944, 2).

A similar incident happened at the Kano Native Administration prison, where there was an outbreak of beriberi from August to November 1927. The problem was sparked by food shortages and undernourishment resulting from serious overcrowding in the cells and general food scarcity in the preceding months. Twenty-eight cases were reported, out of which nine deaths resulted (AMSR 1927, 33, 120). Confined to an even deeper level of imperial subjugation and oppression than the general colonised population, colonial prisoners were the ready "captive subjects" on whom the nutrition scientists conducted their initial feeding experiments (Nicol 1991, 87). Incarceration placed the colonial human subject in much the same social class – on the bottom rungs of the social hierarchy – as the colonial non-human that could freely be exploited and objectified like a model organism in the laboratory (Morin 2018, Figure 1).

Gauging What Nigerian People Ate

Arising from the foregoing, the Nigerian colonial government felt compelled to take an active interest in dietetic research across the colony. The administration promptly considered commissioning a colonial officer primarily to the assignment. In 1931, Dr William Edward McCulloch, who had just published the findings of his survey of northern Nigerian foods and their defects, was relieved of his general medical duties and seconded to nutritional research practice (McCulloch 1929). In the same year, a dietetics research laboratory was established in Katsina, and McCulloch was appointed as the dietetics research officer and pathologist in charge of it. The laboratory, its staff and research projects were financed through the Colonial Development Fund (NAUK CO 583/179/9 n.d. 4–9). The laboratory's establishment marked a watershed in the evolution of nutrition

science and dietetics research in Nigeria. The research facility was the first of its kind in the British overseas colonial empire and it demonstrates colonial nutrition science's rootedness in the colonial development and welfare schemes of the 1930s and 1940s (McCulloch 1958, 200).

The laboratory, which was moved to Zaria in 1932, was purposed for experimental investigations into the nutritional value of Nigerian foodstuffs, by means of chemical analysis and laboratory animal feeding. In December of the following year, McCulloch pushed for the establishment of a Dietetics Research Committee for Northern Nigeria. Constituted from the already existing Animal Health Committee, it had an interdepartmental makeup with membership drawn from the Administrative, Agricultural, Forestry, Geological, Water Supply, Medical and Veterinary Departments (NAUK CO 859/115/1 1944, 56A).

McCulloch's pioneering role in colonial nutrition research in Nigeria was, however, brief. Just two years after assuming office as the dietetic pathologist, he retired in 1933. McCulloch was succeeded by J. G. S. Turner, who led the establishment of a similarly constituted Dietetics Research Committee for Southern Nigeria (McCulloch 1958, 202–203). He also devoted himself to publishing papers and government pamphlets surveying the colony's "nutrition problem" and outlining principles for improving Nigerian diets.

Much like McCulloch's dietetic career in Nigeria, the dietetics research laboratory was also short-lived; it folded in 1936, after just five years of operation. With no other such facility within the colony, this meant that nutrition researchers in Nigeria often had to send samples to various institutions overseas for chemical analyses and other laboratory investigations (NANI MH(Fed) n.d., 779).

In their bid to ascertain the nutritional quality of Nigerian staples, the colonial nutritionists began by getting to know the local foodstuffs. Released as colonial reports and/or published in various journals, the findings of these nutritional studies were consistent with the dietary realities that have been described in earlier publications by colonial writers who were neither medical doctors nor nutrition scientists. The surveys corroborated the fact that cereals and grains formed a large part of customary diets in northern Nigeria, while root and tuber crops predominated in the south (NANE MinHealth 12/1/11/H.72 n.d.; CNCE 1939, 123). In line with earlier writings, nearly all the relevant sources agree on the concise description offered in the 1933 *Annual Report on the Social and Economic Progress of the People of Nigeria*. The report (ARSEP 1933, 55; NANE MinHealth 12/14/H.7/Vol. II n.d. 345; Nicol 1953b) states:

> The staple articles of food … are, in the south, yams, cassava, maize, palm oil and greens with pepper, dried fish and occasional small quantities of meat. In the north the chief articles are millets, guinea-corn, cassava, beans, groundnut oil, and pepper; the quantity of meat consumed is greater while that of fish is less.

The fact that the Middle Belt of Nigeria was a nutritional melting pot where the various staples and cultigens of the north and south intersected is equally confirmed in these studies (Nicol 1949, 27).

The studies establish a regional disparity in meat consumption in Nigeria. And that disparity is traceable to the regional differences in livestock production between the north and south of Nigeria. The prevalence OF the menacing tsetse fly in much of the southern parts of the country meant that there was a constant and serious threat to animal

husbandry in the region. Hence, a large majority of the livestock population of the Nigerian area has historically been found in the north. Few cattle were reared in the southern provinces, and the majority of the cattle slaughtered there were brought either by road or rail from the north (ARVD 1935, 33). As such, it was not unexpected that diets in the north of Nigeria typically contained more meat than in the south.

The late-colonial wave of nutritional studies was set apart from earlier dietetic enquiries. For one, nutritional researchers of the 1930s and 1940s began to go beyond just descriptive ethnographic accounts of Nigerian diets and their preparation. They started to introduce quantitative approaches to determine the nutritional quality of the various foods their study populations consumed. The nutritionists began to weigh and measure foodstuffs and ingredients, as well as prepared meals, thereby setting off the nutritional metrics and caloric valuation of foods that are commonplace today. While it was not uncommon for the researchers to ascertain the energy and nutrient composition of foods through chemical analyses, it was easier to do the computation by consulting existing lookup tables (Emmett 2019). The food composition tables, as they are called, are reference materials compiled from direct chemical analyses and they contained detailed information on the level of concentration of chemical nutrients in a range of foods, sometimes numbering several hundred (Church 2006; McMasters 1963). Armed with the nutrient tables, nutritional researchers did not have to reinvent the wheel in the field.

One such handbook was the *Tables of Representative Values of Foods Commonly Used in Tropical Countries* released in 1945 by no other figure than Platt, the doctor-nutritionist who headed the Committee on Nutrition in the Colonial Empire (Platt 1945). The well-known *The Chemical Composition of Foods* and *Tropical Nutrition and Dietetics*, published in 1946 and 1951 respectively, are two other examples (McCance and Widdowson 1946; Nicholls 1951). Similar compilations were done by French colonial scientists for deployment in French colonies (Randoin 1937).

In addition to measuring and weighing foodstuffs to determine their nutrient value, some nutrition scientists of the early twentieth century began to undertake comparative analyses of the diets of various Nigerian groups (such as rural and urban dwellers, farmers and wealthy traders, or between different colonial societies). They also began to correlate the nutrient data they collected with observable biological features and with the results of clinical examinations among the population in order to draw links between the people's nutrition and their health. Collecting biochemical, somatometric, pathological or clinical data quickly became part and parcel of new nutritional studies; after all, nearly all the nutrition scientists at the time were trained as medical doctors. It was also during the late-colonial era that standard operating procedures and methods for conducting nutritional surveys and analyses began to be developed and codified into schedules, manuals and handbooks (NANE MinHealth 12/1/4/H.7/Vol. II n.d., 413–418). This was to ensure uniformity across the vast number of studies being conducted at the time.

Apart from the food composition tables, there were also "recommended dietary allowances"; these were nutritional benchmarks against which the scientists would measure the computed nutrient values of the sampled local diets in order to ascertain their adequacy or otherwise. Also known as recommended nutrient intake, these were sets of ideal baselines established by different institutions and leading nutrition scholars for evaluating people's diets. The first detailed recommended intakes data was published in 1938

by the League of Nations' Technical Commission on Nutrition. Five years after that, the US Food and Nutrition Board also released its recommendations, just as the British Medical Association did likewise in 1950 (Truswell 1976, 1–2). In the same vein, Platt presented a simple table on the "Amounts of Nutrients per Head Daily Recommended as an Immediate Objective in Colonial Territories", and another on the "Categories of Foods and Replacement Equivalents as a Guide to the Construction of Dietaries" in a paper he delivered at a scientific meeting of the Nutrition Society in 1946 (Platt 1946, 7–8). From the result of the juxtaposition (computed actual nutrient intake against recommended allowances), nutritional researchers began to pass normative pronouncements regarding the quality of the nutrition of diverse Nigerian cultures and regions.

It is instructive to underscore the fact that the nutrition scientists deployed the same standards of dietary requirements developed for European peoples for evaluating diets in Africa and throughout the Tropics. Their justification for this was simply that there was no basis to think that a different standard was necessary. McCulloch, Gilkes Breinl and none other than Boyd Orr, the pioneer director-general of the United Nations' Food and Agriculture Organization (FAO) were some of the world's leading scientists of the time who subscribed to this assumed biological universalism even as it contrasted sharply with the predominant focus on racial difference among scholars at the time (NANK V997 1932, 31). Indeed, colonial-era scientists spoke of difference primarily in racialised terms, marking a major shift away from nineteenth-century acclimatisation theories (Osborne 2000).

It was this difference that Bruce Nicol brought to the fore right at the outset of his very first published nutritional research, cautioning against the universalisation of the standards established by Euro-American experts and institutions for assessing the adequacy of diets across societies. He counselled: "there is no valid reason to expect that the requirements of optimum health and performance of one individual or one race will be the same as those of other individuals or races living under different environmental conditions" (Nicol 1949, 25). To drive home his point, Nicol cited the case of a study which established that Gurkha soldiers, on a diet substantially "inferior", by British and American standards, to that eaten by Canadian and American soldiers, were significantly able to outperform the white troops (Kark 1947). On the other hand, in a later study, Nicol (1956, 196) found evidence to conclude that "the calorie requirements of [some Nigerian] children in their own environment are greater than those suggested by the Food and Agriculture Organization".

Nicol's devotion to gaining a well-rounded understanding of local nutritional realities rather than merely gauging them against generalised European benchmarks derived from his professional experience prior to joining the colonial medical service (Nicol 1991, xvi). In the course of numerous clinical studies into the causation, prognosis and treatment of peptic ulcers at the universities of Aberdeen and Edinburgh successively from 1937 to 1939, Nicol (ibid., 41–44) observed geographical variations in the distribution of peptic ulceration in different parts of the world, likely linked to local dietary regimes, among other factors. This experience probably shaped his vigilance to cultural subtleties and their impact on health and wellbeing in different societies.

It is little wonder why, of all the colonial nutritionists of his era, Nicol seemed more positive in his overall assessment of Nigerian diets. He repeatedly maintained that the state of nutrition in Nigeria was, on the whole, quite commendable and satisfactory

when compared with many other tropical countries in Africa and elsewhere (NANE MinHealth 12/1/11/H.72 n.d., 159–160). He submitted that serious undernutrition and malnutrition occurred only in the densely populated colonial cities due to economic misfortune, but rarely in the rural areas. However, he sounded a note of caution: "Hospital records may be mistaken to indicate that many people in Nigeria suffer from mal-nutrition, but when complete populations are examined in towns or in bush, this concept is found to be untrue" (NANE MinHealth 12/1/11/H.72 n.d.). Fundamentally, Nicol was pointing out the fact that there was some selection bias in many of the studies that reported a high rate of malnutrition in Nigeria when the sample essentially comprised the hospitalised subsets of a community's larger population: that is, patients who were receiving medical care for diet-related health problems (ibid.).

The hasty generalisations and colonial misreading of African food culture and nutritional health common to many of the studies should not come as a surprise given the fact that the majority of the nutrition scientists were, as earlier pointed out, medical doctors who simply turned the colonial hospitals into their dietetics laboratories. Nicol (1991, 41–44), however, had learned the pitfalls of such a course from his precolonial professional experience. Platt, too, stressed the value of data obtained from surveys of representative samples of general populations over estimates of the prevalence of nutritional disease or of the state of nutritional health in colonial territories determined from hospital data. Platt noted:

> A satisfactory measure of [the] nature and dimensions [of the nutrition problem] can only be obtained from [general] surveys for evidences of nutritional ill-health, preferably combined with a study of food consumption, of food supplies and of various factors likely to affect the food economy. (Platt 1947, 385)

As earlier mentioned, after calculating, by means of food composition tables or through chemical analysis, the nutritive value of a specific diet, the scientists would then evaluate the result obtained against the recommended daily intake. It is from such juxtapositions that they would adjudge the adequacies and deficiencies of people's diets. Some nutritionists then went further to correlate dietary defects with common clinical features among the populations. This was how the colonial scientists arrived at the public health implications of the different food cultures of Nigerian people.

Meat as Antidote and Development: The Colonial Meatification of Nigerian Diets

Arising from the dietetic studies, the colonial scientists discovered several kinds of nutritional deficiencies in different parts of Nigeria. For instance, McCulloch found several nutrient deficiencies in his 1930 nutritional survey of northern Nigeria. For one, he identified shortages of calcium, iodine, iron and chlorine in northern diets. He also found an endemicity of specific diseases such as eye diseases, beriberi and scurvy, which he identified as results of deficiencies of vitamins A, B, and C respectively (NANK V997 1932, 13, 17). He suggested that low fertility and declining reproduction rates among women in northern Nigeria had much to do with a deficiency of vitamin E, which he referred to as the fertility vitamin (McCulloch 1930, 2). Much later, Nicol (1959) equally inferred that poor diets, such as southern Nigeria's yam staple, had an

adverse effect on reproduction. It is worth noting, though, that the apparently monomaniacal perspective of the colonial nutritionists – who found cause and effect very narrowly in dietary practices rather than integrating these practices into other fields and contexts – has been found to systematically overlook the role that colonial conquest and rule played in driving down birth rates (Hunt 1999).

Of all the various kinds of nutrient deficiency discovered by colonial nutritionists in Nigeria, none was as prominent as protein malnutrition, particularly animal-protein deficiency. Indeed, the *Annual Report of the Western Provinces* for 1948 noted: "One of the main problems of the country from the health point of view has been the marked protein deficiency of animal origin of the human diet of the peoples of Southern Nigeria" (ARWP 1948, 32). Similar observations were made regarding the eastern provinces. At a meeting of the Eastern Regional Medical Advisory Board in 1952, the officials concluded that malnutrition existed, even at a serious level in some areas and among certain social classes. In specific terms, the board concluded that "protein deficiency was the most serious form of malnutrition generally present" (NANI MH(Fed) 1952, 701).

The problem was far more pronounced in southern Nigeria than in the north, given the predominance of starchy roots and tubers in southern foods as against the high protein content of the northern cereal staples. Indeed, a colonial report in 1945 referred to central and southern Nigeria as "the meat-hungry" parts of the colony, an interesting phrasing that attributes "demand" to the population themselves through biological metaphor, rather than just prescribing meat as a "cure" for a deficiency that can be seen only by the scientists, and which might theoretically be addressed by other supplements (ARVD 1945, 3).

While northern diets were appraised for their good supply of plant-based protein, Nicol and McCulloch stressed the fact that very little meat was consumed in the northern parts of Nigeria. Despite being home to a lion's – or, more literally, a cow's – share of the colony's cattle and other livestock population, only very small quantities of meat were eaten occasionally across the north, except in areas along the main northern rivers and in certain parts of Sokoto, Katsina and Bornu (Gervis 1963, 31; AMSR 1929, 14). In effect, the nutrition scientists largely held the view that the entire Nigerian area, including the north, suffered from animal-sourced protein deficiency. Relative to crop-sourced options, animal protein was rated as "first class quality" protein, and regarded to offer much better "biological value" (NANK V997 1932, 33; NANI CSO 41700/S.1 n.d. 22). The consensus within the scientific community was, as McCulloch stated: "No vegetable protein has yet been found which is as efficient as animal protein in nutrition" (NANK V997 1932, 33; AMHSR 1932, 115). With regard to southern Nigeria, however, the official verdict remained uniform that the diets were predominantly vegetarian.

One official report (Shaw and Colville 1950, 72) estimated that per capita meat consumption in Nigeria ranged between a meagre average of 5–10 pounds (approximately 2,270–4,535 grams) per year. Whereas, going by the universalised recommended daily intake, it was generally accepted at the time that each adult person required 100 grams of protein each day (36,500 grams per annum). By that standard, while protein was expected to make up 35 per cent of the 3,400 total required calories for each person, carbohydrates, fats and other nutrients would constitute the remaining chunk. McCulloch, however, noted that the Hausa consumed only about 85 grams of protein

per day – largely from "poor value" plant-based proteins – when they ought to be eating as much as 110 grams. McCulloch (1930, 4) maintained that this protein deficiency in quantity and quality resulted in poor muscle formation, which was reflected in the people's poor weight as well as impaired resistance to diseases.

In 1951 and 1955, A. W. Woodruff, a professor of clinical tropical medicine, published two articles in the *British Medical Journal*, among several others shortly afterwards. The works established that protein malnutrition plays an important part in the causation of anaemia in pregnancy, which was reportedly common in Nigeria and throughout the Tropics. Woodruff (1951, 1955) established a link between anaemia in pregnancy and kwashiorkor or protein deficiency in childhood, with the latter often being a continuum in the natural order of the former, and the ultimate results being liver damage and death. The publications were based on a study conducted on pregnant women, children and adults in hospitals associated with the University College Ibadan (later University of Ibadan) in the 1940s and 1950s.

In another research study, Nicol (1953a) observed a higher incidence of liver disorders among Isoko farmers compared to Ijaw fishermen and Warri traders of the Niger Delta, and concluded, after studying their diets, that the common incidence of cirrhosis among the Isoko was principally due to a relatively low protein intake. A separate biopsic study attributed cases of kwashiorkor, fatty liver and cirrhosis in Nigerian children to maternal protein malnutrition (Silvera and Jelliffe 1952).

Similarly, D. B. Jelliffe (1951) established that maternal protein undernutrition among Yoruba women, combined with vitamin D deficiency in childhood, was responsible for the frequent cases of rickets in Ibadan clinics. Several such studies establishing quantitative and qualitative protein deficiency in children's diets, and drawing links between such malnutrition and morbidities presented, were produced by other contemporary nutrition scientists (Nicol 1956).

In all of these, the basic recommendation of these scientists for fixing widespread protein deficiency and its related health problems was the same. They advocated that the people increase their meat consumption considerably. As the logic went, cutting down on the predominantly vegetarian food cultures in favour of more omnivorous diets was a public health and development imperative for Nigeria. Without exactly stating it as such, the nutritionists essentially proffered meat as the medicine with which the various protein deficiency syndromes would be treated. Meat was "the centerpiece of colonial meals", and British officials spared no effort in their bid to meatify Nigeria (Robins 2010, 461).

To that end, school feeding programmes were initiated across the colony where schoolchildren were served regular "specimen" or "supplementary" diets containing ample meat servings (BECC OH/633 1998). Special attention was paid to the colonial boarding schools, since students in those institutions lived directly under colonial confines and could thus be closely monitored for the scheme (NAUK WAF 450/27/04 1957; ARVD 1945, 24; ARVD 1950–51, 42; ARVD 1952–53, 17). In a 1932 article promoting the school feeding programme in Nigerian colonial schools, McCulloch (1932, 26–28) drew up a couple of model diets in which meat was a recurring item. Highlighting the superiority of animal protein, particularly meat, over other sources of protein, McCulloch (ibid., 26–27) declared: "Meat, groundnuts and benniseed (sesame) contain much "biologically good" protein, meat being the best source for the growing child."

Furthermore, many colonial institutions and establishments, such as the colonial army, the Nigerian Railway and the Nigerian Coal Corporation, also began offering messes and catering houses that served meat-rich model meals (NANI MH(Fed) 1/2/MH67/Vol. III 1951, 602). Banquets, luncheons and dinners held in connection with different colonial celebrations, which often had African colonial elites as guests, equally became avenues for the popularisation of classic European dishes rich with sizeable meat servings. Cookbooks and recipes replete with significant meat content were also frequently published in various media, including in the colonial newspapers. Practical West African Cookery (Leith-Ross and Ruxton 1910), The Kudeti Book of Yoruba Cookery (Mars and Tooleyò 1934) and Miss Williams' Cookery Book (Williams 1957) are classic examples of such works.

In addition, the colonial authorities established domestic science centres and curricula to train schoolgirls and women in "food education", and that largely entailed getting people to increase the animal-protein content of their diets (Denzer 1992; Sparks 2017, 2023, 26, 114–115). Women and girls were seen as critical stakeholders in the nutritional interventions since food production was culturally their responsibility in most parts of Nigeria (Callaway 1987). Indeed, the colonial experts and administrators conducted their nutrition propaganda and meatification campaign through every means possible, including posters, pamphlets, radio programmes and filmstrips (NAUK WAF 450/27/04 1957, 4; NANI MinTraInd, 1/2 (2nd coll.), BF97, n.d).

All these initiatives achieved the desired result: colonial Nigerians became hooked on meat. In no time, Nigerian people had acquired an instinctive appetite for beef. The growing popularity of meat in the social life of the colonial urbanite is evident in the way the municipal administrations established slaughter slabs and meat markets across Nigerian cities.

Conclusion

This article has traced the development of nutrition science and dietetic research in colonial Nigeria. It details how the meatification of the Nigerian human diet was curated through colonial science. By seeking to improve the nutritional health of colonised Nigerians, primarily through increased meat eating, nutrition science was operationalised to achieve market expansion for the intensive livestock production that the colonial veterinary department was championing. Thus, the British colonial state, in furtherance of its imperialist-capitalist considerations, transformed cattle, among other Nigerian livestock, into livestock or cash cows. The cow therefore became the "chief meat of the colonial state, needed to feed the expanding population and generate wealth" (Aderinto 2022, 8).

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